

Chapter 4

Impact of fin-fish aquaculture on waterway health

4.1 Fin-fish farming has the potential to effect waterway health through the deterioration of water quality and benthic habitats, introduction of pest species and damage to threatened species. Impacts can occur in the near field or broadscale.

4.2 Water quality may be affected by soluble wastes associated with fin-fish farming. Soluble wastes include ammonia, phosphates and dissolved organic carbon emissions. The level of nutrient loads in the water column is influenced by flushing rates at farming sites.¹

4.3 The Tasmanian regulatory regime establishes a permitted zone of impact 35 metres a lease boundary. Benthic composition may change due to elevated organic loading of the sediments from excess feed and solid fish excreta. Pollution tolerant species may come to dominate other species with the TSGA noting that this will be visually obvious.²

4.4 This chapter canvasses the evidence received in relation to waterway health commencing with general comments and then addressing specific issues raised in evidence: impacts of in-water net cleaning; broadscale impacts; and the effects of hatcheries on rivers. Finally matters relating to threatened and endangered species are addressed.

Waterway health in Tasmania

4.5 The Kingborough Council pointed to the importance of waterway health in areas where fin-fish fishing operates. Mr Stephen Wass, Mayor, stated in relation to the D'Entrecasteaux Channel:

It is regarded as one of the safest waterways in the state. It not only provides a working area for the salmonid industry but is also a working bay for other industries. And certainly as far as the community and business go it is a recreational area. So from our perspective, the community's perspective, it is very important that this waterway is maintained in a healthy manner into the future so that all can continue to enjoy it. It is pleasing to note that over the last number of years Kingborough Council, Huon Aquaculture and Tassal have had a very good working relationship. Those companies have come on board in relation to what is called the D'Entrecasteaux collaboration. That collaboration aims at having people involved within the D'Entrecasteaux Channel to come together to work to

1 Tasmanian Salmonid Growers Association, *Submission 33*, p. 16.

2 Tasmanian Salmonid Growers Association, *Submission 33*, p. 14.

ensure that the waterway and all life that that waterway supports will continue into the future.³

4.6 Some submitters to the inquiry stated that there had been adverse impacts on waterway health from fin-fish farming. For example, the Tasmanian Conservation Trust commented:

The aquaculture industry in Tasmania is often represented as being clean and green and a positive development for the environment. In fact this industry has many negative effects on our environment, and these are going to become even worse if the industry's planned expansion become a reality.⁴

4.7 Mr Jon Bryan from the Trust added:

I think it should be obvious that the aquaculture industry has environmental impacts. Fin-fish aquaculture in the marine environment as it is done in Tasmania has significant impacts on the environment including loss of amenity. These impacts are of concern to many. In some cases we believe that environmental impacts may be serious enough to impact the aquaculture industry itself.⁵

4.8 Environment Tasmania stated that the marine environment may not be able to cope with the expansion of fin-fish farming in south east Tasmania. It also commented that there has been an increased number of community reports of toxic algal blooms, declines in native fin-fish and shellfish numbers, algal epiphyte growth smothering marine vegetation, and nutrients impacting on macroalgal communities hundreds of metres away.⁶

4.9 The Tasmanian Abalone Council stated that, in relation to the D'Etrecasteaux Channel:

...it is also commonly accepted now that the salmon industry is a major contributor of anthropogenic effects in the lower channel in particular, and so we have some concerns about their current practices and those practices going forward. We have concerns primarily about the waste products.⁷

4.10 The Tasmanian Abalone Council added that 'there is an underlying premise that the surrounding ecosystems can assimilate and break down the waste'.⁸

3 Mr Stephen Wass, Mayor, Kingborough Council, *Committee Hansard*, 15 July 2015, p. 13.

4 Tasmanian Conservation Trust, *Submission 92*, p. 10.

5 Mr Jon Bryan, Marine Campaigner, Tasmanian Conservation Trust, *Committee Hansard*, 16 July 2015, p. 1.

6 Environment Tasmania, *Submission 93*, p. 11.

7 Mr Dean Lisson, Chief Executive, Tasmanian Abalone Council, *Committee Hansard*, 16 July 2015, p. 11.

8 Tasmanian Abalone Council, *Submission 74*, p. 4.

4.11 Other submitters commented that the waterway health of inland rivers had also been adversely affected by salmon hatcheries.⁹

4.12 Both the Tasmanian Government and the industry commented on the success of the regulatory regime and farming practices to ensure waterway health in marine lease areas. The Tasmanian Government pointed to the robust and adaptive regulation of the industry which is designed to ensure the impacts on waterway health and threatened and endangered species are identified and mitigated to the extent of an acceptable risk. In addition, it was noted that environmental impact statements, required for draft marine farming development plans (MFDPs), must identify impacts on the environment and threatened and endangered species as well as measures to mitigate the impacts.¹⁰

4.13 The Tasmanian Government also stated that management controls contained in MFDPs, and licence conditions contained in marine farming and freshwater fish farm licences, provide mechanisms to manage the impacts of salmonid farming on the environment. The Tasmanian Government concluded:

When considered in the context of other jurisdictions, it is clear that the adopted approach for waterway management in Tasmania is world's best practice, particularly in relation to management of stressors to water quality.¹¹

4.14 The TSGA submitted that the impact of salmonid aquaculture on waterway health is dependent on a number of factors, the nature and intensity of farming and the capacity of the receiving environment to assimilate the impacts. Other factors, such as natural catchment and oceanic inputs, also influence waterway health.¹²

4.15 In relation to water quality impacts, the TSGA commented on both the near field and broadscale. In the near field, 'the effect of feed input and fish excreta at any salmonid farm is expected to result in localised environmental impacts to water quality within and around a lease area'. In relation to broadscale impacts on water quality, the TSGA stated that 'salmonid farm derived nutrient inputs were not anticipated to result in significant or broadscale effects to the water quality characteristics or ecosystem'. However, further research is currently being undertaken.¹³ In relation to benthic impacts, the TSGA commented that impacts on the near field benthos are 'largely predictable and reversible' and added that the deposition

9 See Tasmanian Aquaculture Reform Alliance, *Submission 95*, p. 18; Mr Geoffrey Swan, *Submission 99*; Mr Robert Dax, *Submission 100*.

10 Tasmanian Government, *Submission 35*, p. 19.

11 Tasmanian Government, *Submission 35*, p. 19.

12 Tasmanian Salmonid Growers Association, *Submission 33*, pp 14, 16; see also Dr Catriona Macleod, Institute for Marine and Antarctic Studies, *Committee Hansard*, 16 July 2015, p. 42.

13 Tasmanian Salmonid Growers Association, *Submission 33*, p. 16.

to the seafloor of excess feed and solid fish excreta is very well understood'.¹⁴ It was stated that 'evidence from the BEMP in the Huon Estuary and D'Entrecasteaux Channel show no evidence of effects on the condition of the seafloor and faunal communities as a result of salmon farming'.¹⁵ Nevertheless, the committee received evidence from submitters that expressed concern about broadscale impacts. The issues they raised are discussed later in this chapter.

4.16 Dr Adam Main, Chief Executive Officer, TSGA, commented further on concerns about the impact of fin-fish aquaculture on waterway health. He stated that the industry's position is that:

...the health of Tasmanian waterways reflects historical and current marine and terrestrial influences from both natural and man-made sources—not the least of which is a changing climate. We accept that we should be part of the discussion regarding the health of Tasmanian waterways. We do not, however, for one moment accept the oft-cited mantra—namely, that there is a problem and we should be a part of it. We reject categorically that there is a problem.¹⁶

4.17 The TSGA commented on the need for the industry to ensure waterway health and stated:

Minimising the environmental impacts of marine aquaculture is a common goal for regulatory authorities and producers because environmental quality, growth and health of fish and farm profits are inextricably linked. Internationally, many countries and independent global organisations have developed aquaculture best management practices to improve the environmental and financial performance of aquaculture operations.¹⁷

4.18 Dr Main went on to note that the industry is highly visible, works within a regulatory framework:

You can see our industry and, through the regulatory framework, you can see everything that is happening within our industry. We are out there to be looked at and to be judged, but, more importantly, we need really good water to grow really good fish. If we do not have good water, we will not be able to grow good fish. So we have those as push factors within the companies. They know that, to manage a whole range of issues that affect other places around the globe, we need to maintain our waterways, because that means that we can grow good fish. We have been able to achieve that and demonstrate that.¹⁸

14 Tasmanian Salmonid Growers Association, *Submission 33*, p. 14.

15 Tasmanian Salmonid Growers Association, *Submission 33*, p. 15.

16 Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, pp 26–27.

17 Tasmanian Salmonid Growers Association, *Submission 33*, p. 31.

18 Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 37.

4.19 The Tasmanian Seafood Industry Council concluded that:

In any consideration of the impacts of marine farming it must be recognised as with any farming activity there will be an impact at least [at] the local near field level. What must be taken into consideration is that it is not in the best interests of marine farmers to alter the environment to an extent that marine farming activities are compromised.¹⁹

Issues concerning waterway health in Tasmania

4.20 As noted above, some submitters commented that the fin-fish aquaculture industry was impacting adversely on waterway health in Tasmania. The following discussion canvasses there major issues raised in evidence:

- possible adverse impacts from in-water cleaning of nets;
- broadscale impacts on rocky reefs in south east Tasmania; and
- the effect of hatcheries on inland rivers.

4.21 Evidence relating to aquaculture activities in Macquarie Harbour is discussed in chapter 6.

In-water cleaning of nets

4.22 Biofouling occurs on submerged surfaces when unwanted marine organisms grow. In the fin-fish aquaculture industry, as the areas are used for intensive production, large volumes of organic material such as leftover fish food and faeces are a source of food for biofouling organisms. Biofouling occurs on the infrastructure used in production including nets, cages, ropes, floats, boats and barges.

4.23 High levels of biofouling can lead to increased hydrodynamic drag, reduced buoyancy, poor flow and low dissolved oxygen, resulting in increased cleaning and maintenance costs. Depending on their composition, biofouling communities can also harbour disease, toxins, Invasive Marine Species (IMS), cause irritation and lesions in salmon, and adversely affect the caging and associated infrastructure.²⁰

4.24 Until recently, the fin-fish aquaculture industry used copper-based anti-fouling agents to curtail biofouling. However, following concerns about the environmental impact of copper, the industry has moved away from copper-based agents. In-water cleaning operations have been introduced to manage biofouling on fish cage nets. The industry uses in-situ Marine Inspection Cleaner (MIC) technology for washing nets. This involves using high pressure blasting or vacuuming to remove biofouling from the net surface of the pen before it reaches mature stages or heavy

19 Tasmanian Seafood Industry Council, *Submission 19*, p. 4.

20 Biofouling Solutions Pty Ltd, *Submission 7*, p. 1.

growth. The TSGA noted that 'particulate organic matter is released to the environment through this process'.²¹

4.25 The TSGA has produced a Best Management Practice guideline for in-water cleaning which details net washing practices to reduce impacts on the marine environment. The TSGA noted that ongoing research and monitoring is being undertaken to further refine best practice in relation to:

- general mass balance calculations around net cleaning emission volumes and overall assimilation capacity;
- updating the marine biosecurity and biofouling management plan for the industry;
- continual improvement of onsite surveillance and monitoring programs and strengthening this in relation to natural seasonality; and
- linkages to international work being undertaken around emission capture and beneficial reuse.²²

4.26 The Tasmanian Government noted that net cleaning information is reported to the regulator, in addition to a range of other information, and is used by DPIPWE to determine monitoring survey specifications and focus monitoring effort in appropriate locations within and outside operational lease sites.²³ Mr Graeme Woods, DPIPWE, added that monitoring activities:

...not only looks at the benthos or the sediment chemistry and the organisms within the sediments but also involves very targeted underwater video surveys. Those surveys are basically targeted at cage sites that have the highest frequency of in-water cleaning. The idea there is to be able to detect any potential effects from that activity underneath the cages and outside the lease areas. To date we have not detected any substantial sedimentation effects as a result of that cleaning activity.²⁴

4.27 The move away from copper-based antifouling paint on farming infrastructure was acknowledged as a major change for the aquaculture industry and had resulted in a significant benefit for the marine environment. Dr John Whittington, DPIPWE, stated:

...it is really important to recognise what an innovation this has been, because previous to in situ net cleaning the mechanisms for cleaning nets and managing nets involved the use of copper based antifoulants, which potentially have an impact on the environment. Moving to this technology

21 Tasmanian Salmonid Growers Association, *Submission 33*, p. 17; see also Tasmanian Salmonid Growers Association, *Response to submissions*, p. 7.

22 Tasmanian Salmonid Growers Association, *Submission 33*, p. 17.

23 Tasmanian Government, *Submission 35*, p. 11.

24 Mr Graeme Woods, Acting Manager, Department of Primary Industries, Parks, Water and Environment, *Committee Hansard*, 15 July 2015, p. 7.

has significantly reduced the risk of environmental contamination by salmon farming by essentially taking copper out of the system. So I think that is something that really needs to be celebrated. It has also improved fish handling, because there is a lot less movement in having to move fish around as nets are changed, so I think there are some really good benefits there from both a production and an animal welfare perspective.²⁵

4.28 The TSGA also commented that in-water cleaning has 'considerably reduced the need for land based net cleaning and maintenance'. In addition to the introduction of in-water cleaning, the TSGA stated that the progressive introduction of new technology nets has resulted in a two-thirds decrease of in-water net washing output.²⁶

4.29 However, a number of submitters commented negatively on the move to in situ net cleaning.²⁷ For example, Biofouling Solutions Pty Ltd commented that there is the risk that in-water net cleaning can facilitate the spread and proliferation of dislodged viable biofouling organisms to the wider environment, and even the spread of IMS.²⁸ Biofouling Solutions recommended the development of an overarching Biosecurity Management Plan, an appraisal of current in-water net cleaning operations and surveillance and monitoring of IMS. Biofouling Solutions concluded:

The uncertainties and associated risks with current biofouling and IMS management practices highlights the need for a critical assessment of risks associated with net cleaning and a robust, independent review of the biosecurity system requirements across the state of Tasmania.²⁹

4.30 Two seafood industry submitters, Dover Bay Mussels and the Tasmanian Abalone Council, also commented negatively about the change to in-water cleaning and its possible impact on waterway health. Dover Bay Mussels stated that in-water net cleaning resulted in 'industrial quantities of fragmented marine biofouling being introduced in to marine environment'. It was stated that a major component of this fouling are hydroids, a member of the jellyfish family, which have a hard chitinous exoskeleton that, when fragmented, release large volumes of nematocysts (stinging cells) into the water. Dover Bay Mussels stated that nematocysts are known to cause gill damage in the caged salmon. It went on to comment that no studies have been undertaken into the potential impact of nematocysts on the health of other marine organism gills. It was also stated that studies show that, due to small particle size of net wash material, it will spread far beyond the current 35 metre monitoring point.³⁰

25 Dr John Whittington, Secretary, Department of Primary Industries, Parks, Water and Environment, *Committee Hansard*, 15 July 2015, p. 7.

26 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 7.

27 See Mr David Abbott, *Submission 42*, p. 2; Mr Lance and Mrs Jen Hadaway, *Submission 73*, p. 2.

28 Biofouling Solutions Pty Ltd, *Submission 7*, p. 2.

29 Biofouling Solutions Pty Ltd, *Submission 7*, p. 4.

30 Dover Bay Mussels, *Submission 41*, p. 2.

4.31 Dover Bay Mussels concluded:

...this shift to In-Situ Net Cleaning although done with good intentions has not had the potential impacts on the surrounding environment fully investigated, it has evolved without any checks or balances and the risk for harm is real and warrants further investigation before further expansion is allowed.³¹

4.32 The Tasmanian Abalone Council commented that there is no requirement that the waste (biofouling or equipment coatings) generated by in-water cleaning is to be captured or removed from the marine environment. Previously, nets had been cleaned onshore in semi-closed systems with waste being captured. The use of in-water cleaning 'results in waste being deposited directly into the marine environment and thereby removing the farms responsibility to capture and process its biofoul by-products'.³²

4.33 Mr Dean Lisson, Tasmanian Abalone Council, commented that:

...the salmon industry here in Tasmania operates on this premise that whatever waste products that go into the water—the waste from the salmon itself, the uneaten feed pellets, the biofouling from the cleaning of the nets; all of those things—will be assimilated by the environment and there will not be any long-term detrimental effects on the environment.³³

4.34 In response to the industry's claim that in-water cleaning of enables nets to be cleaned while relatively free of biofouling, thereby minimising waste, the Council stated that this premise was 'flawed as previously the method of removing nets for washing deposited very little waste at the lease site, so any in-water cleaning methods increase the overall input into the environment'.³⁴ The Tasmanian Abalone Council recommended that the industry cease in-water cleaning of equipment until waste capture technology is available and becomes a regulatory requirement.³⁵

Response to issues raised in evidence

4.35 The TSGA responded to concerns about in-water net cleaning and stated that cleaning is undertaken frequently to optimise fish health, lessen the level of outputs that need to be assimilated by the sediment and surrounding environment, to prevent the establishment and colonisation of potentially harmful species and to maintain high

31 Dover Bay Mussels, *Submission 41*, p. 14.

32 Tasmanian Abalone Council, *Submission 74*, p. 5.

33 Mr Dean Lisson, Chief Executive, Tasmanian Abalone Council, *Committee Hansard*, 16 July 2015, p. 13; see also Tasmanian Abalone Council, *Submission 74*, p. 5.

34 Tasmanian Abalone Council, *Submission 74*, p. 6.

35 Tasmanian Abalone Council, *Submission 74*, p. 14.

levels of water flow and in cage environmental conditions.³⁶ The TSGA added that as a result of the high frequency of cleaning:

...tunicates, shellfish and colonising hydroids do not have sufficient time between net cleaning events to become well established on net surfaces. It is recognised in some literature that large volumes of fragments of some hydroid species may have a detrimental effect on fish gills; this is a different species of hydroid than is present in Tasmanian waters.³⁷

4.36 Dr Main concluded that:

We are confident that the impact of the net cleaning falls within our farm footprint. We have a very defined farm footprint.³⁸

4.37 The TSGA also noted that a two year study investigating deposition of net wash in and around leases and the hydrodynamics of various sites had been undertaken. It was shown that there was minimal impact and net wash organics were assimilated within lease space by natural benthic biological processes. The TSGA went on to state that these findings are supported by data from annual compliance assessments.³⁹

4.38 In relation to technology to capture debris from in-water cleaning, the TSGA stated that it was following international research and development work being undertaken on filter technology.⁴⁰ In addition, further research is being undertaken to determine the risk factors associated with net cleaning.⁴¹ Mr Graham Woods, DPIPW, explained that the research is aimed at investigating a range of concerns raised including those by Dover Bay Mussels. The research is being undertaken by the Institute for Marine and Antarctic Science (IMAS) and is a precursor to a wider research project investigating the effects of salmon nutrient emissions on nearby reef systems and macroalgae communities.⁴² This is discussed further in the following section.

36 Tasmanian Salmonid Growers Association, *Response to submissions*, pp 18–19.

37 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 7.

38 Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 34; see also Tasmanian Salmonid Growers Association, *Response to submissions*, p. 7.

39 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 18.

40 Tasmanian Salmonid Growers Association, *Response to submission*, p. 7; see also Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 35.

41 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 20.

42 Mr Graeme Woods, Acting Manager, Department of Primary Industries, Parks, Water and Environment, *Committee Hansard*, 15 July 2015, p. 7.

Broadscale impacts of fin-fish farming

4.39 Submitters expressed concern that the impacts of the fin-fish industry at the far-field or broadscale level were not adequately understood or regulated. Dr Catriona Macleod, The IMAS, commented that a great deal of research has been undertaken on what is generally called the broadscale effects but these relate to water column interactions rather than reef or intratidal interactions.⁴³ The impacts on reef systems in the south east of Tasmania were raised by the Tasmanian Abalone Council and Environment Tasmania.

4.40 The Tasmanian Abalone Council released a report in October 2014 in response to plans by the salmonid industry to expand in to waters adjacent to productive wild abalone beds. The report commented on a range of issues including the potential for nutrient input from salmonid farming to affect the structure and biodiversity of inshore oceanic reef communities; and the effect of sediment from salmonid farming on abalone larvae and adult abalone.⁴⁴

4.41 The committee notes that the Tasmanian Government, on the day of the committee's first hearing in Hobart, released a review by Professor Colin Buxton on a report by the Tasmanian Abalone Council on the risks to the Tasmanian abalone fishery from further expansion of the salmonid industry.⁴⁵ Professor Buxton's major findings were outlined by Dr Whittington who commented:

...essentially, there was no evidence for a direct cause-and-effect relationship between the loss of abalone productivity and salmon farming. His report basically finds that there is no link between salmon farming and abalone productivity. There is a whole lot of reporting around that, but that is, essentially, the crux of it.⁴⁶

4.42 Dr Main, TSGA, also commented on the findings in Professor Buxton's report and stated:

...it seems from my early understanding that it supports exactly what I have just said: our impact is in our farm footprint. The risk or the threat of in situ cleaning, or salmon farming output in general, does not have that far-field effect. It is quite gratifying to have that validated...⁴⁷

43 Dr Catriona Macleod, Institute for Marine and Antarctic Studies, *Committee Hansard*, 15 July 2015, pp 40–41.

44 Tasmanian Abalone Council, *Submission 74*, Attachment 3.

45 C Buxton, *Review of the Tasmanian Abalone Council Report on Risks to the Abalone Fishery from Further Expansion of the Salmonid Industry*, July 2015.

46 Dr John Whittington, Secretary, Department of Primary Industries, Parks, Water and Environment, *Committee Hansard*, 15 July 2015, p. 8.

47 Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 34.

4.43 The committee received other evidence which commented on the potential impact of farming activities on reef health. Environment Tasmania, for example, noted that 5,500 tonnes of feed can be used in one fish lease in south east Tasmania. This corresponds to an input of 275 tonnes per year of nitrogen, of which 41 tonnes is released into the environment. Environment Tasmania commented:

This represents a significant increase of nitrogen to sediments and nearby reef and kelp communities. It is possible that the effects of this increase in available nitrogen could lead to changes in reef ecosystem structure, biodiversity, biomass and productivity, and more importantly impact on the endangered and vulnerable species in the area. However there are no monitoring programs established to monitor the impact of this significant increase in nutrients on these ecosystems.⁴⁸

4.44 Environment Tasmania also provided the committee with a recently published paper on the broadscale impacts of farming on macroalgal assemblages on rock reefs in Tasmania.⁴⁹ Environment Tasmania noted that the findings included that:

- the extent of the impact of dissolved wastes is poorly known both in Tasmania and elsewhere;
- nutrient enrichment from fish farms affects subtidal reef communities to a variable distance, and at scales of hundreds of metres, but rarely kilometres;
- given consistent findings from multiple sites, the most plausible explanation for observed differences in algal communities is impact from the release of nutrients from fish farms;
- fish farms had a significant effect on benthic reef communities at greater distances than regulatory compliance sites; and
- ongoing nutrient enrichment from fish farms remains a potential threat to macroalgal community structure and reef diversity through the long-term.⁵⁰

4.45 The TSGA responded to concerns about the possible impacts on rocky reefs including the paper provided by Environment Tasmania. In relation to the paper, the TSGA stated the paper is based on work completed in 2009 and information from this work has been incorporated in a number of research initiatives in recent years.⁵¹

4.46 The TSGA also commented that marine farming regulations prohibit the siting of a fin-fish zone over a rocky reef. However, the TSGA stated that potential broadscale impact of fin-fish farming on nearby rocky reefs has been recently identified as a gap in knowledge. In response to this gap in knowledge, two projects

48 Environment Tasmania, *Submission 93*, p. 11.

49 E Oh *et al*, 'Broad-scale impacts of salmon farms on temperate macroalgal assemblages on rocky reefs', *Marine Pollution Bulletin*, 2015.

50 Environment Tasmania, *Supplementary Submission 93*, pp 2–3.

51 Tasmanian Salmonid Growers Association, *Supplementary Submission 33*, p. 1.

have been funded by the Fisheries Research and Development Corporation (FRDC). The TSGA noted that the research will be aimed at addressing the concerns raised by the Tasmanian Abalone Council, Environment Tasmania and other stakeholders:

....[it] has been framed with the specific intention of addressing key concerns of industry (both aquaculture and fisheries), regulators and other stakeholder groups on how finfish farming in new areas could change environmental interactions...the purpose of the research is to evaluate the potential for interactions between local reef systems and salmon farming, and recommend industry and Government appropriate monitoring and assessment approaches based on risk mitigation strategies.⁵²

4.47 The first will investigate the broadscale interactions of salmon farming with reef systems through sediment deposition and nutrient dispersion, including the development of risk appropriate approaches for assessment and monitoring of reef health. The IMAS, the Tasmanian Abalone Council, the rock lobster industry, the recreational fishing industry and the salmon industry are collaborating on the study.⁵³

4.48 Dr Macleod informed the committee that there will be steering committees that comprise the stakeholders as well as a community reference group and a science reference group. Dr Macleod commented that:

...we are actively trying to engage with the broader community to explain to them what the research is going to be doing and get feedback from them as to whether it is addressing the issues they would like to see addressed. I have to acknowledge to the community that we cannot potentially address every issue, but where we can we will try to transfer the information back to them that is relevant to the issues of concern.

But also, most significantly out of this, the scientific reference committee as part of this project is something I am really enthusiastic about, because it will allow us to engage with other scientists working in and around the area, which is something that is often not done with research projects going forward—scientists who may not be part of the active research project but have very valuable insights and information about the areas we are researching. We are really excited about that project kicking off.⁵⁴

4.49 The IMAS is also undertaking analysis as a precursor to this study with the aim to determine whether there have been any broadscale changes associated with the development of the salmon industry at Tinderbox and Ninepin Points.⁵⁵

52 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 19.

53 Dr Catriona Macleod, Institute for Marine and Antarctic Studies, *Committee Hansard*, 15 July 2015, p. 45; see also Institute for Marine and Antarctic Studies, *Submission 20*, p. 8; Mr Julian Harrington, Project Manager, Tasmanian Seafood Industry Council, *Committee Hansard*, 15 July 2015, p. 47.

54 Dr Catriona Macleod, Institute for Marine and Antarctic Studies, *Committee Hansard*, 15 July 2015, p. 45.

55 Institute for Marine and Antarctic Studies, *Submission 20*, p. 18.

4.50 Further information on the study was provided at the Budget Estimates in May 2015 by the FRDC. The FRDC stated that the project had been identified as a 'high priority'. In relation to outcomes, Mr Patrick Hone, Executive Director, FRDC, commented:

Like all science, that is an uncertainty. This is a process to look at a range of questions that we have in salmon farming, particularly because, as many people would be aware, it is a continually expanding development. We have to keep up in terms of that expansion to make sure that the increasing biomass of salmon is consistent with the ability of the environment to be resilient in terms of how it will respond. They are also now expanding into areas that they had not done previously. As you are probably aware, they are going into much more deeper, exposed environments. These are areas in which we previously had not done research. So we are testing a whole lot of new hypotheses about dispersion, impact, down-stream currents, et cetera.⁵⁶

4.51 Mr Hone went on to state that environmental research will continue for many years and concluded that:

Our feeling is that this will also result in some significant policy changes. But there will be more policy questions that will come forward and that will require an ongoing environmental research program.⁵⁷

4.52 The Tasmanian Conservation Trust welcomed the study but commented that it 'should have been carried out before aquaculture expansion was permitted to occur to the extent that it has'.⁵⁸ The Tasmanian Seafood Industry Council also commented on these research projects. Mr Julian Harrington stated that in the Council's view:

...where it is demonstrated that fin-fish farming activities are having an unacceptable negative impact on the activities of other stakeholders who have access to Tasmania's marine resources and/or an unacceptable impact on the broader marine environment, then fin-fish farming practices must be altered to alleviate any impacts.⁵⁹

4.53 In addition, the TSGA stated that while early work on macroalgal communities found that there were no trends in macroalgae communities that could be attributed to fish farming in the area, the industry has funded a two year study aimed

56 Mr Patrick Hone, Executive Director, Fisheries Research and Development Corporation, *Rural and Regional Affairs and Transport Legislation Committee, Budget Estimates Hansard*, 25 May 2015, pp 153–54.

57 Mr Patrick Hone, Executive Director, Fisheries Research and Development Corporation, *Rural and Regional Affairs and Transport Legislation Committee, Budget Estimates Hansard*, 25 May 2015, p. 154.

58 Tasmanian Conservation Trust, *Submission 92*, p. 3.

59 Mr Julian Harrington, Project Manager, Tasmanian Seafood Industry Council, *Committee Hansard*, 15 July 2015, p. 47.

at characterising the status and health of macroalgal communities in south east Tasmanian waters.⁶⁰

Inland hatcheries

4.54 The committee received evidence on the long-standing concerns about the impact on the health of inland river waterways from hatcheries.

4.55 Fresh water hatcheries produce smolt for deep water farms. They are either flow-through, that is they use river water, or recirculation hatcheries. The Environment Protection Authority (EPA) noted that recirculating aquaculture systems provide better control over fish growing conditions and use significantly less water (compared to flow-through systems). When their wastes are managed by beneficial reuse (for example, sustainable irrigation on agricultural land) emission of nutrients to waterways is avoided.⁶¹

4.56 The Tasmanian Government provided the committee with information on an environmental review of inland fish farms to be undertaken by the EPA:

In 2014, in light of the ongoing expansion of the salmon industry and the subsequent increase in production and development at the inland fish farms to meet demand for smolt, an environmental review of the large scale inland fish farms is being conducted by the Environment Protection Authority Division and Inland Fisheries Service, beginning with a review of the regulatory conditions and environmental performance of existing activities.

The purpose of the review is to assess current environmental performance and review existing environmental regulation of these activities. Following review of the existing activities the Environment Protection Authority Division will then review the regulatory framework for these activities in a consultative process with stakeholders.⁶²

4.57 The Tasmanian Government went on to state that the Inland Fisheries Service and EPA continue to actively deal with water quality management in new farm licences, renewals and to address issues raised about the hatcheries.⁶³

4.58 A number of submitters commented on the Huon Aquaculture hatchery on the Russell River.⁶⁴ The original hatchery on the Russell River was purchased by Huon

60 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 9.

61 Environment Protection Authority, *Annual Report 2013–14*, p. 35.

62 Tasmanian Government, *Submission 35*, p. 15.

63 Tasmanian Government, *Submission 35*, p. 15.

64 See Tasmanian Aquaculture Reform Alliance, *Submission 95*, pp 18–19; Ms Miranda Howie, *Submission 97*, p. 3; Mr Geoffrey Swan, *Submission 99*; Mr Richard Dax, *Submission 100*, p. 1; Ms Rebecca Hubbard, Marine Coordinator, Environment Tasmania, *Committee Hansard*, 16 July 2015, p. 3.

Aquaculture in 2006. It was argued that the hatchery releases nutrient rich water into the Russell River which results in a decline in water quality below the hatchery including algal growth.⁶⁵ In addition to concerns about water quality, Ms Vicki O'May commented that the numbers of native endemic marine species, including water rats and platypus as well as nymph, dragon fly and other insect life, have declined on the river.⁶⁶

4.59 Huon Aquaculture responded to concerns raised in submissions and noted that the Lonnvale Hatchery on the Russell River is operated under Tasmanian Government regulation. Huon Aquaculture provided the committee with a detailed response to comments in submissions and noted that a study of the health of the Russell River had recently been undertaken. The study found that:

There therefore appears to have been no major negative impact of the raised algal levels on the fauna of the Russell River. The overall ecological impact therefore appears slight. Any management decision with regard to controlling algal density through management prescriptions at the Huon Aquaculture site should be made in this light.⁶⁷

4.60 The TSGA also responded to concerns about hatcheries and stated that the industry is committed to the responsible management of all its freshwater operations. The TSGA refuted claims that there is no independent monitoring of hatchery facilities and stated that the industry undertakes extensive monitoring to ensure it meets rigorous environmental standards as required by the regulation.

4.61 In relation to comments in submissions about the presence of algae, the TSGA observed that algae has been detected both down and upstream of freshwater hatcheries in the Huon and Channel area. It added that it 'is important to note that there are a variety of inputs into these freshwater systems and the industry continues to carefully monitor its contribution and work within the relevant regulation'.⁶⁸

4.62 The TSGA concluded that flow-through hatcheries are still playing an important, but transitioning, role in the salmonid industry with the industry currently undertaking large investments in new constructing new, state of the art recirculation hatcheries.⁶⁹

65 Tasmanian Aquaculture Reform Alliance, *Submission 95*, p. 19.

66 Ms Vicki O'May, *Submission 57*, p. 1.

67 Huon Aquaculture, *Response to submission from Mr Geoffrey Swan*, p. 2.

68 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 23.

69 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 23; see also Mr Chris Dockray, Chairman, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 26.

Committee comment

4.63 The committee acknowledges the importance of ensuring the health of Tasmania's waterways in areas where fin-fish farming is undertaken. The committee notes that operating practices have changed over time to ensure that, as more information emerges on the effects of the fin-fish industry on the marine environment, waterway health is maintained. This is a result of the industry's commitment to ensuring its continued sustainability and limiting its impact on the marine environment and the Tasmanian Government's commitment to a robust adaptive management framework.

4.64 One area of change has been the industry's move away from copper-based paint to control biofouling. This is a welcome change to fin-fish operations and will decrease the amount of copper contamination of the marine environment. While there are concerns about in-water cleaning practices, the committee notes that there is ongoing research, and modification of farm activities, to ensure that any impacts from in-water cleaning on the marine environment are within acceptable limits.

4.65 The committee notes the concerns raised by some submitters about the lack of adequate knowledge about broadscale interactions, particularly on rocky reefs. The committee considers that demonstrated adverse effects on far-field marine environments arising from fin-fish farming operations would not be an acceptable outcome for the environment or other aquaculture industries, such as the abalone industry, which are reliant on the health of Tasmanian waterways. However, at this point in time, it remains unclear that adverse effects are occurring in rocky reef environments or that any observed changes are the result of fin-fish farming activities.

4.66 The committee welcomes the research which is now underway to address the concerns about the lack of knowledge of broadscale interactions. The research involves many stakeholders in the industry, including the Tasmanian Abalone Council. The committee notes the engagement with the broader community in the research process. The committee is confident that, should it be demonstrated that there are unacceptable negative effects from fin-fish activities, the adaptive management regulatory regime will ensure that rocky reef environments are protected and that appropriate monitoring and management controls for the fin-fish industry are developed and implemented.

4.67 In relation to freshwater hatcheries, an environmental review of large scale inland fish farms is currently being undertaken by the Tasmanian Environment Protection Authority. In addition, the committee notes the outcomes of the recently completed study of concerns arising from farming activities at the Russell River hatchery. The committee has confidence that work to be undertaken by the Environment Protection Authority will inform future policy making in relation to inland hatcheries.

Threatened and endangered species

4.68 Evidence was received on the impact of the fin-fish industry on threatened and endangered species. Threatened and endangered species are listed under Commonwealth and Tasmanian state legislation.

4.69 The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) gives the Commonwealth Government responsibility for listed nationally threatened species and ecological communities as a matter of national environmental significance. Threatened species also receive protection through the protection of other matters of national environmental significance, for example, where they occur in protected areas such as world heritage properties, national heritage places, Ramsar wetlands, Commonwealth marine areas and the Great Barrier Reef Marine Park.

4.70 The EPBC Act requires the responsible minister to establish a list of threatened species divided into the following categories:

- extinct;
- extinct in the wild;
- critically endangered;
- endangered;
- vulnerable; and
- conservation dependent.⁷⁰

4.71 Once listed, threatened species and ecological communities (except ecological communities listed in the category of 'vulnerable') are recognised as a matter of national environmental significance. Consequently, any action that is likely to have a significant impact on listed threatened species and ecological communities under the EPBC Act must be referred to the minister and undergo an environmental assessment and approval process.

4.72 Marine species listed under the EPBC Act, in the areas where aquaculture activities take place, include Australian and New Zealand fur seals, Maugean skate (listed as endangered) and spotted handfish (listed as critically endangered). In addition, a number of birds are listed.⁷¹

4.73 The primary Tasmanian legislation is the *Threatened Species Protection Act 1995*. This Act lists a number of marine species including numerous coastal or oceanic bird species, four whale species, three seastar species, the spotted handfish, the Gunn's screwshell and the Maugean skate. A range of measures to protect listed threatened

70 EPBC Act, s. 178(1).

71 Department of the Environment, *Listed threatened species and ecological communities*, <http://www.environment.gov.au/epbc/what-is-protected/threatened-species-ecological-communities> (accessed 24 July 2015)

species are set out in the Act and makes it an offence to take a listed species without a permit.

4.74 In addition, regulations made under the Tasmanian *Nature Conservation Act 2002* list 'Specially Protected' or 'Protected Wildlife'. A large number of marine mammals and coastal or oceanic bird species are listed as either Specially Protected or Protected Wildlife. The protection of a number of fish species, including five shark species and all handfish species that occur in Tasmania, is provided for under the Fisheries (General and Fees) Regulations 2006. Freshwater species are listed and protected under the Threatened Species Protection Act and the *Inland Fisheries Act 1995*.⁷²

4.75 The TSGA commented that the industry continues to support research to understand the potential impact on identified endangered and threatened species not only within the Macquarie Harbour system, but all areas where farming activities occur. The TSGA went on to state:

The regulation of salmonid farming in Tasmania is robust and adaptive to ensure that the impacts on waterway health and threatened and endangered species are identified and mitigated to the extent of an acceptable risk.⁷³

4.76 The IMAS also commented that interactions with threatened and endangered species have largely been addressed through zone assessments and appropriate site selection.⁷⁴

4.77 However, the committee received evidence which raised issues in relation to threatened and endangered species. The following discussion canvasses the evidence received in relation to:

- Maugean skate;
- spotted handfish;
- fur seals; and
- birds.

Maugean skate

4.78 The Australian Marine Conservation Society stated that the Maugean skate is a rare and endemic species which is only found in Macquarie Harbour and Bathurst Harbour. It is adapted to low nutrient and low salinity environments of the harbours.⁷⁵ Environment Tasmania added that the Maugean skate has 'the oldest lineage of skate

72 Tasmanian Government, *Submission 35*, p. 6.

73 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 10.

74 Institute for Marine and Antarctic Studies, *Submission 20*, p. 2.

75 Australian Marine Conservation Society, *Submission 9*, p. 4.

in the world and the only one of its kind worldwide to occur mainly in brackish water, and with such a highly restricted distribution'.⁷⁶

4.79 Submitters expressed concern about the impacts of the current level of aquaculture activities and proposed expansion fish farming activities in Macquarie Harbour. These concerns included the impact of increased nutrient levels, changes in the dissolved oxygen levels, and increased sedimentation; and the low population levels of the Maugean skate (estimated at only 2,500).⁷⁷

4.80 EDO Tasmania commented that environmental organisations raised concern that not enough was known about the ecology or biology of the Maugean skate, or the likely movement of nutrients within Macquarie Harbour, to ensure the species would not be significantly impacted by the expansion of aquaculture activities in the Harbour.⁷⁸ The TSGA responded that the industry had identified, in the original Macquarie Harbour environmental impact statement, that Maugean skate was a species of interest requiring further research.⁷⁹

4.81 Concerns regarding the potential impacts on the skate from aquaculture activities have led to the commissioning of a FRDC-funded project that to examine the movement, habitat utilisation and population status of the skate in Macquarie Harbour. The IMAS provided the committee with an overview of the project and commented that acoustic tagging has been used to track the movements (location and depth) of both skates and escaped salmonids. The project is providing data on the biology, ecology, habitat preferences, and environmental sensitivities of the Maugean skate that can be used to not only understand the potential risks to the species associated with salmon farming but also to provide a better understanding of other environmental risk factors.

4.82 The IMAS went on to note that one concern was that fishing (gillnetting) in the harbour may have an adverse effect on the Maugean skates, and because one of the main species targeted in gillnet fishing is salmonid escapees, the study will evaluate strategies to reduce the probability of encountering skates whilst fishing.⁸⁰

4.83 The preliminary findings of the project indicate that some Maugean skate move widely throughout Macquarie Harbour, while others appear to be more site attached and the vast majority of their time is spent in the six to 15 metre depth range, although some individuals moved into deep or very shallow water. Environmental

76 Environment Tasmania, *Submission 93*, p. 7.

77 Australian Marine Conservation Society, *Submission 9*, p. 4; Mr Peter Schulze, *Submission 89*, p. 8; EDO Tasmania, *Submission 70*, p. 9; Dr Elizabeth Smith, *Submission 91*, p. 11.

78 EDO Tasmania, *Submission 70*, p. 9; see also Environment Tasmania, *Submission 93*, Attachment 2, p. 1.

79 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 10.

80 Institute for Marine and Antarctic Studies, *Submission 20*, p. 13.

data collected as part of the project are being analysed to examine how factors such as salinity and dissolved oxygen influence patterns of behaviour. IMAS noted that, although population size estimates are not yet available, it is clear from the catch rates that the population is substantially larger than the approximately 1000 individuals suggested in the past.⁸¹

4.84 The TSGA commented that the project findings indicted that detections of Maugean skate in depths greater than about 25 metres, which is the depth of the harbour in which the majority of the farms are located, were rare.⁸² Further, that 'early results indicate that salmon farming is having no significant impact on the skate'.⁸³

4.85 Dr Donald Ross, IMAS, indicated that it could not categorically be stated that the skate were not at risk. He went on to point to the developments in technology which will assist in greater understanding of skate and its habitat:

One of the exciting things with that technology is that those acoustic tags can track where they are but they can also measure some environmental parameters. A company has just come out with a tag that measures oxygen so it can transpond the oxygen concentration back. They are looking at putting these tags on skates so we will actually be able to tell what environment skates are sitting in. It is pretty much cutting edge technology that is being brought to Tasmania to look at skate behaviour for that very reason.⁸⁴

Spotted handfish

4.86 The Australian Marine Conservation Society commented that the spotted handfish is listed as critically endangered under the EPBC Act. The Society commented that the spotted handfish is potentially affected by farming activity, but 'there is limited understanding of the extent of impact due to a lack of monitoring' and stated the impact of salmon farming on this species warrants further and immediate investigation.⁸⁵

4.87 The TSGA responded to concerns about the impact of farming activities on the spotted handfish. The TSGA stated:

They are known to prefer inshore demersal habitats within a depth range of approximately 5 to 15 metres, and they have a limited and often fragmented range linked to habitat preference. Recently the handfish, was found within

81 Institute for Marine and Antarctic Studies, *Submission 20*, p. 21; see also Dr Donald Ross, Senior Research Fellow, Institute for Marine and Antarctic Studies, *Committee Hansard*, 15 July 2015, p. 43.

82 Tasmanian Salmonid Growers Association, *Submission 33*, p. 22.

83 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 10.

84 Dr Donald Ross, Senior Research Fellow, Institute for Marine and Antarctic Studies, *Committee Hansard*, 15 July 2015, p. 43.

85 Australian Marine Conservation Society, *Submission 9*, p. 4.

one fish farm lease in the lower D'Entrecasteaux Channel, a region in which the handfish was no longer thought to exist. There is no current evidence that the industry either positively or negatively impacts on the handfish. Through annual monitoring programs the industry is well placed to provide further data on this important group of fish.⁸⁶

Fur seals

4.88 Fur seals are listed as a protected marine species under the EPBC Act. The Tasmanian fin-fish industry has had to manage its interactions with Australian and New Zealand fur seals in south east Tasmania since its inception in the mid-1980s. Mr Jon Bryan, Tasmanian Conservation Trust, explained to the committee that:

There is a fundamental problem with seals and the aquaculture industry. To put this in context: a seal looks at a salmon like a cross between heroin and a 'big mac'. They just love salmon.⁸⁷

4.89 A number of submitters raised concerns regarding the relocation of seals and killings of seals by the Tasmania salmonid industry. The Australian Marine Conservation Society commented that 'there have been persistent fur seal deaths due to interaction with aquaculture operations in the southeast region either through accidental drowning in farming nets, or deliberate killing by operators'.⁸⁸

4.90 Problem seals are also relocated. However, the Tasmanian Scalefish Fisherman's Association (TSFA) also stated its main concern as:

...the practice of relocating rogue seals from the precincts of fish farms to other waters. These rogue seals have commonly been relocated to the North coast and usually in places of easy access with special attention given to the ease of unloading the seals. Invariably these places have been adjacent to commercial scale fishermen's areas of operation.⁸⁹

4.91 The TSFA commented that relocation of seals 'partially solves a problem for the aquaculture industry but creates a problem for the wild catch fisheries' and it suggested 'rather than move the problem, perhaps a more permanent solution may be found by euthanizing the problem seals – much the same as farmers being able to conduct vermin control'.⁹⁰

4.92 In response to the TSFA's suggestion to euthanize seals Tassal stated:

86 Tasmanian Salmonid Growers Association, *Submission 33*, p. 22.

87 Mr Jon Bryan, Marine Campaigner, Tasmanian Conservation Trust, *Committee Hansard*, 16 July 2015, p. 8.

88 Australian Marine Conservation Society, *Submission 9*, p. 4.

89 Tasmanian Scalefish Fisherman's Association, *Submission 94*, p. 1.

90 Tasmanian Scalefish Fisherman's Association, *Submission 94*, p. 2.

Tassal is dismayed by the suggestion that euthanizing seals is a solution to the issue. In August 2011, as part of our partnership with WWF Australia, Tassal agreed to cease euthanasia of seals (unless in extreme circumstances and safety of staff is at risk).⁹¹

4.93 According to Tassal, seal relocation sites are chosen and regulated by DPIPWE.⁹²

4.94 The committee heard evidence from Mr Bryan, Tasmanian Conservation Trust, in which he rejected 'the idea of killing seals or relocating them' as it avoids 'the fundamental problem, which is breaking that link between cages and food and seals'.⁹³

4.95 The Tasmanian Conservation Trust also observed that a number of fish farming companies have effectively implemented cage technology to keep seals out of the salmon pens. The Trust stated that:

Tassal, Huon Aquaculture and Van Diemen Aquaculture all have effective cage technologies and fish handling procedures that can be used to keep seals away from fish...there should also be a requirement for all farms to use appropriate cage technologies and fish handling procedures to prevent unwanted seal interaction. This will reduce the chance of seals continuing to associate fin-fish farms with food and make it easier for all farms to deal with this problem.⁹⁴

4.96 Mr Bryan, Tasmanian Conservation Trust, went on to comment that:

...I am absolutely enthusiastic about the industry's approach to this. My understanding is that Tassal—certainly; and I think Huon—have said they are no longer going to approve routine killing of seals. Van Diemen aquaculture has a system cage technology which seems to be pretty good at keeping seals away. I am very impressed with the work that is being done and I would encourage them to keep our seals safe and keep their workers safe by breaking that link between the seals and the food.⁹⁵

4.97 The TSGA commented that 'significant time and expense has been devoted to better understanding' the behaviour of seals as well as 'designing and installing netting systems that minimise interactions and impacts on both seals and fish'.⁹⁶

91 Tassal, *Response to the Tasmanian Scalefish Fisherman's Association submission*, p. 1.

92 Tassal, *Response to the Tasmanian Scalefish Fisherman's Association submission*, p. 1.

93 Mr Jon Bryan, Marine Campaigner, Tasmanian Conservation Trust, *Committee Hansard*, 16 July 2015, p. 8.

94 Tasmanian Conservation Trust, *Submission 92*, p. 6.

95 Mr Jon Bryan, Marine Campaigner, Tasmanian Conservation Trust, *Committee Hansard*, 16 July 2015, p. 8.

96 Tasmanian Salmonid Growers Association, *Submission 33*, p. 22.

4.98 Huon Aquaculture stated that its seal and bird-proof pens are being rolled out across farms in southern Tasmania. Huon Aquaculture stated that 'the new pens are world first in seal protection that will deliver unparalleled safety improvements'.⁹⁷ Tassal outlined in its *Sustainability Report 2014* that its exclusion measures include the use of KikkoNet, K-Grid nets, seal proof bird nets and seal jump fences. In addition to these measures, Tassal's Senior Wildlife Management Officer 'conducts regular rigging audits of pens at each farming lease to ensure maximum exclusion capability'.⁹⁸ Petuna noted that its pen and net management has resulted in zero cage breaches by seals for the past three years. Petuna has a policy of no lethal interaction and does not routinely practice seal relocation. Petuna stated that there had been no seal fatalities in the past 16 years.⁹⁹

4.99 The Tasmanian Seafood Industry Council were also supportive of the efforts of the salmonid aquaculture industry to manage seal interactions, as it stated:

Industry has spent considerable time and effort in understanding seal behaviour so that net systems can be modified to minimise interactions with the seals and to avoid additional stress on the fish that is caused when a seal gains access to a pen, not to mention fish mortalities. The industry reports out to the regulator and wider community on interactions with seals.¹⁰⁰

4.100 The committee notes the FRDC is currently funding research for the development of innovative seal exclusion technology.¹⁰¹

Birdlife

4.101 The risks to birds from aquaculture operations vary but include entanglement, loss of foraging habitat, behavioural change (for example, increased scavenging by raptors), disturbance reducing breeding success, and potential disturbance from noise, lighting, waste and vessel movements associated with daily and nightly operations.

4.102 Birdlife Tasmania commented that, with the exception of the Great Cormorant and Little Black Cormorant, all species of seabirds in Tasmania are protected under the Tasmanian Threatened Species Protection Act and associated regulations and many are also listed as marine and/or migratory species under the EPBC Act. Birdlife Tasmania went on to comment that some birds involved in entanglements and/or that died as a consequence could be reasonably be expected or inferred to be EPBC-listed species.

97 Huon Aquaculture, *Sustainability Dashboard*, <http://dashboard.huonaqua.com.au/>

98 Tassal Group Limited, *Sustainability Report 2014*, p. 33.

99 Petuna, *Creating a Sustainable Future in Aquaculture*, p. 17 <http://www.petuna.com.au/wp/wp-content/themes/petuna/img/Petuna-Sustainable-Living-Book-SML.pdf>

100 Tasmanian Seafood Industry Council, *Submission 19*, p. 4.

101 Fisheries Research and Development Corporation, *Submission 8*, p. 6.

4.103 In addition, Birdlife Tasmania noted that the Tassal *Sustainability Report 2013* stated that 498 Great Cormorants had been shot by Tassal at Russell Falls and Macquarie Harbour during that year. Birdlife Tasmania commented:

BirdLife Tasmania opposes any form of wildlife control such as shooting, and has raised our concerns regarding this report and the broader issue of seabird entanglement with Tassal over a number of years.¹⁰²

4.104 Birdlife Tasmania also commented that the behaviour of gulls in the south east had changed and many were present at aquaculture facilities. As a consequence, there are bird entanglements with nets. While noting that Tassal and Huon Aquaculture have made efforts to reduce interactions between seabirds and their infrastructure, Birdlife Tasmania stated that it was aware that the numbers of entanglements have been in the hundreds for a species in a calendar year, 'representing a significant proportion of the regional population'. Birdlife Tasmania also commented that it had obtained data from DPIPWE on gull management and control measures under a Right to Information request but had yet to analyse the data.¹⁰³

4.105 BirdLife Tasmania has been involved with both companies, either directly or through consultants, in the provision of data and advice on minimising the risks to threatened and endangered species listed under the Tasmanian and Commonwealth legislation that have been recorded within five kilometres of a lease or proposed lease site. The species assessed were the raptors such as the Wedgetailed and the White-bellied Sea-eagles, seabirds such as the Shy Albatross and woodland birds such as the Forty-spotted Pardalote and the Swift Parrot.

4.106 Birdlife Tasmania explained that :

For each identified species/threat combination, the threat to the species was identified and mitigation or minimisation measures were identified. In most cases, the risks were assessed as low, but for some species novel threats were identified arising from the use of strong lights used to illuminate facilities at night. Strong lights present a potential risk by disorienting birds, resulting in an increased risk of collision with facilities. Altering the lighting regime and reducing light spill outside of the facilities is likely to reduce the potential to disorient flying birds.¹⁰⁴

4.107 Tassal reported on bird entanglements, including deaths, in its *Sustainability Report 2014*. It was stated that:

There has been an overall steady improvement in regard to bird interactions and welfare outcomes since reporting began in April 2013. The

102 Birdlife Tasmania, *Submission 15*, p. 6.

103 Birdlife Tasmania, *Submission 15*, p. 3.

104 Birdlife Tasmania, *Submission 15*, p. 7.

implementation of our Seabird Rescue Strategy has enhanced welfare outcomes for the rare cases where birds require care.¹⁰⁵

Committee comment

4.108 The committee acknowledges the efforts of the Tasmanian fin-fish industry to proactively manage its interactions with threatened and endangered species. The industry is currently undertaking research into Maugean skate and has introduced management programs and changes to fish farm infrastructure to limit bird entanglements.

4.109 In relation to seals, the evidence presented to the committee indicates that the development and implementation of new pen and net infrastructure is the most effective solution for the fin-fish industry to deal with seals, as it reduces the industry's reliance on relocating problem seals. The industry's investment in the development of new pen and net infrastructure to reduce the number of seal interactions is welcomed. In addition, the industry now does not euthanize seals unless in exceptional circumstances.

4.110 In relation to bird interactions, the committee notes that some information is available from individual companies. However, more complete datasets are held by the regulator. The committee considers that there should be greater access to information on bird interactions. This information would fall within environmental information which the committee believes should be more freely available (see Recommendation 1).

Marine debris

4.111 The committee received submissions which commented that aquaculture activities contributed to large amounts of marine debris. Marine debris from aquaculture operations includes:

- rope waste;
- black hard plastic shavings from pipe modifications;
- black plastic feedpipe;
- treated pine and other timber;
- polystyrene filled buoys;¹⁰⁶ and
- general debris discarded by workers.

4.112 Submitters noted that debris from farming activities was not only unsightly but also posed a threat to wildlife through ingestion or entanglement.¹⁰⁷ Environment Tasmania commented:

105 Tassal Group Limited, *Sustainability Report 2014*, p. 34.

106 Ms Sarah Lowe, *Submission 68*, p. 2.

Marine debris from fish farm activities has been a significant concern for many local residents, waterway users and conservationists for years. Death caused by entanglement in fish farm nets and long ropes is difficult to assess on an individual lease by lease basis but which, when regarded in accumulation, is having a significant and unacceptable impact.¹⁰⁸

4.113 The TSGA provided the committee with information on the amount of marine debris collected in 2012–13 and 2013–14. This is at table 4.1.

Table 4.1: Marine debris clean-up

	Volume of rubbish collected (m ³)	% attributable to salmonid farms	Labour hours
2012–13	50.4	67	479
2013–14	60.5	72	626

Source: *Tasmanian Salmonid Growers Association, Submission 33, p. 18.*

4.114 The TSGA noted that the industry's clean-up activities also removed debris which could not be attributed to fish farming operations and this accounted for approximately 15m³ of the debris collected each year.¹⁰⁹ Tassal's *Sustainability Report 2014* also commented on the amount of debris collected and stated that, in relation to its outcomes for debris removed:

The increase in the percentage of rubbish attributable to salmon farms is the result of a focused effort by Tassal staff to clean up historic debris in the upper reaches of Macquarie Harbour, an area which has not previously been undertaken for clean up.¹¹⁰

Industry response and engagement

4.115 The TSGA commented that each company has implemented a waste mitigation strategy in order to reduce the amount of debris that enters the marine environment from farming operations. In particular, the companies have focused mitigation strategies on reducing rope and feed pipe debris.

4.116 The TSGA went on to state that the industry has a 'rapid response' philosophy when it is notified of debris irrespective of its origin. Broadly, strategic objectives are to:

107 Tasmanian Abalone Council, *Submission 74*, Attachment 3, p. 10; Tasmanian Aquaculture Reform Alliance, *Submission 95*, p. 2.

108 Environment Tasmania, *Submission 93*, p. 16.

109 Tasmanian Salmonid Growers Association, *Submission 33*, p. 18.

110 Tassal Group Limited, *Sustainability Report 2014*, p. 26 <http://www.tassal.com.au/wp-content/uploads/2015/04/Tassal-Sustainability-Report-2014.pdf> (accessed 24 July 2015)

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- develop clear, rapid response plans when marine debris is reported in the vicinity of fish farms;
 - achieve zero material waste entering the environment;
 - establish procedures and operating mechanisms that focus on managing the loss of farm materials into the marine environment;
 - establish chains of responsibility at the farm level;
 - establish monitoring procedures;
 - conduct regular marine debris clean-up efforts in the vicinity of fish farms; and
 - identify equipment to drive accountability.¹¹¹

4.117 In relation to the objective of zero material waste entering the environment, Dr Main commented it was part of the industry's continuous improvement program. The industry was using information gained during clean-up operations to enable it to more quickly respond to debris issues and to achieve the target of zero marine debris.¹¹² The companies also manage marine debris through a variety of community partnerships.

4.118 Tassal, in its *Sustainability Report 2014*, commented that 'marine debris has been highlighted by stakeholder materiality assessments as one of the most important issues for the salmon farming industry to solve'. The report went on to comment that the 'Adopt a Shoreline' approach was continuing and 'modest results from the implementation of farm level waste mitigation plans were being seen'. Tassal indicated that while clean-ups will continue to be undertaken, the company would focus on improving site ownership of the debris issue by holding farm staff workshops and increasing staff engagement in community-based marine debris clean-ups.¹¹³

4.119 Huon Aquaculture's marine debris policy has been developed to reduce the impact of activities on the marine environment. Huon Aquaculture undertakes collections of marine debris at the request of the community, regardless of source and is actively reducing marine debris from entering the waterway.¹¹⁴ Huon Aquaculture also provides information on its clean-up locations on the Huon River and D'Entrecasteaux Channel on its Sustainability Dashboard.¹¹⁵

111 Tasmanian Salmonid Growers Association, *Submission 33*, p. 17.

112 Dr Adam Main, Chief Executive Officer, Tasmanian Salmonid Growers Association, *Committee Hansard*, 15 July 2015, p. 34.

113 Tassal Group Limited, *Sustainability Report 2014*, p. 26 <http://www.tassal.com.au/wp-content/uploads/2015/04/Tassal-Sustainability-Report-2014.pdf> (accessed 24 July 2015).

114 Huon Aquaculture, 'Managing Marine Debris' <https://www.huonaqua.com.au/sustainability/marine-environment/managing-marine-debris/>

115 Huon Aquaculture, *Sustainability Dashboard*, <http://dashboard.huonaqua.com.au/>

4.120 BirdLife Tasmania also noted its involvement with Tassal in relation to marine debris. The industry undertakes to retrieve marine debris from aquaculture operations from nearby foreshores in the D'Entrecasteaux Channel. Birdlife noted that these collections can potentially impact on nesting birds if the collection is undertaken during the breeding season (October to March, inclusive). As a result of BirdLife Tasmania's presentation to Tassal staff, and ongoing interactions with Tassal management, clean-up and debris retrieval operations were shifted to winter months, which is the non-breeding season for resident shorebirds.¹¹⁶

4.121 Similarly, Huon Aquaculture addresses marine debris issues through toolbox meetings, training and internal communications to educate all staff on marine debris, including identifying all types of rope used across its marine operations. The TSGA noted that Huon Aquaculture identifies and records all marine debris attributable to its operations and other sources including household waste and other waterway user waste on clean-ups conducted both internally and through community partnerships.¹¹⁷

4.122 The Tasmanian Regional NRM Organisations also commented on its ongoing engagement with industry across a range of issues including on-ground marine debris clean-up and control projects.¹¹⁸

4.123 However, while acknowledging that individual companies conduct clean-ups, Environment Tasmania stated that these were only on an irregular basis and that marine debris 'is a persistent problem that appears to require stronger enforcement'.¹¹⁹ Ms Sarah Lowe also argued that further funds are need for community-based clean-ups and went on to state:

Policy regards marine debris at both Tassal and Huon Aquaculture is to be commended with dedicated staff at the coalface often endeavouring to appease angry community members lambasting marine debris from farms. While both companies' websites promote community consultation it is often difficult to contact community engagement officers who have a range of priorities to attend to.¹²⁰

4.124 The Tasmanian Conservation Trust pointed to the litter washed ashore in the vicinity of fish farms, particularly the southern shore of Macquarie Harbour. The Trust concluded that fin-fish farms should make a greater effort to prevent litter from leaving lease areas and cleaning up their litter on foreshores.¹²¹

116 BirdLife Tasmania, *Submission 15*, p. 3.

117 Tasmanian Salmonid Growers Association, *Response to submissions*, p. 21.

118 Tasmanian Regional NRM Organisations, *Submission 3*, p. 1.

119 Environment Tasmania, *Submission 93*, p. 16.

120 Ms Sarah Lowe, *Submission 68*, p. 3.

121 Tasmanian Conservation Trust, *Submission 92*, p. 4.

Committee comment

4.125 Marine debris is a significant problem in all Australian marine waterways. While the fin-fish aquaculture industry already undertakes activities to reduce the amount of debris entering Tasmanian waterways, the committee encourages the continued exploration of new ways to decrease marine debris attributable to aquaculture. In particular, the committee considers colour tagging of each company's ropes and nets would enable identification of the source of marine debris and provide information to aid debris reduction efforts.

4.126 The committee notes that much marine debris is not attributable to the fin-fish industry and that the industry assists communities through a number of programs to undertake clean-up activities. However, further expansion of the industry's support for community-based clean-up activities would greatly benefit the marine and coastal environment as well as contribute to the building of goodwill in local communities.

