28 July 2015

Ms Christine McDonald

Committee Secretary
Senate Standing Committees on Environment and Communications
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Dear Ms McDonald,

Please find attached the final version of the addendum to the TSGA submission, including references. This is our consolidated response to a number of the major issues raised by some of the submissions lodged by other interested parties.

We hope that our response document is of assistance to the committee.

Yours sincerely,

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1 Executive Summary

The Tasmanian salmonid farming industry is committed to investing in and supporting the best available science and globally proven best management practices to guide the operation and growth of our industry.

From an initial 56 tonne harvest in 1986-87, in 2013-14, the Tasmanian salmonid farming industry produced in excess of 43,000 tonnes of Atlantic salmon and Ocean trout, with a Gross Value of Production (GVP) of approximately $625.9M. The Tasmanian salmonid industry is now:

- the largest single “fishery” sector in Australia by GVP;
- the second largest primary production sector in Tasmania;
- larger than all other aquaculture and fishery sectors in Tasmania combined; and
- a significant contributor to the Tasmanian “food bowl” concept.

The TSGA is committed to:

- minimising the environmental impact of Tasmanian operations;
- sourcing sustainable feed from responsible feed producers and suppliers;
- continuing to improve the positive social impact of our operations;
- ensuring that the industry supports economic growth and prosperity in Tasmania; and
- the sustainable production of healthy and nutritious salmon.

2 Response to Submissions

2.1 Submission 1 – Kingborough Council

TSGA's Summary of Major Issues

i. Monitoring, regulations and transparency (see also submissions 9, 13, 37, 38, 41, 42, 46, 56, 57, 60, 70, 73, 74, 89, 91, 92, 93)
ii. Information available to the community (also 9,37,38,46,60)

TSGA's Response to Major Issues

2.1.1 Monitoring, regulation and transparency

- Marine farming licences contain specific provisions in relation to environmental monitoring and management of marine farming operations. In many cases licence conditions contain specific conditions that expand on the provisions of management controls, defining environmental standards and outlining reporting and monitoring requirements.
- Environmental standards prescribe relevant indicators and trigger levels for ongoing environmental management. Should there be a need to modify licence conditions following consideration of monitoring, research or compliance outcomes, prescribed controls can be varied at any time in accordance with provisions of the *Living Marine Resources Management Act 1995*.
- The Tasmanian salmonid farming industry collects a range of data relating to waterway health. The data collected goes well beyond meeting basic compliance needs and provides a transparent environment from which regulators, scientists, environmental groups and the general public can assess the industry's actions. These data sets are robust, often publicly available, independently sourced, longitudinal, peer reviewed and audited. Our work in this area has been internationally recognised.
- The industry maintains that there is currently adequate and available data on waterway health in terms of quality and quantity to provide sufficient confidence for:
    - Industry participants to make appropriate management decisions;
    - Regulators to be able to monitor industry and apply regulation;
    - The scientific community to research, analyse and report on data;
    - Other parties such as certification bodies; and
    - Interested parties in the community, including consumers.
- The industry also recognises that due to evolving technology and knowledge, there will be opportunities to review and improve data collection, management, security and sharing. Further, the industry considers that information sharing with stakeholders and the public provides a welcome opportunity to demonstrate our environmental credentials at both a company and industry level in both local and broadscale effects.
- Please refer to *TOR (a) The adequacy and availability of data on waterway* health in the TSGA submission (no.33) on pages 7-13.
- Involving another party in the collection of evidence allows the Tasmanian Government (first party) and the industry (second party) to gather authentic and valid evidence under specific circumstances in a cost-effective way.
- The third party is considered independent from the other two, even if hired by them, because not all control is vested in that connection. A third party contractor acts autonomously but is given a very strict set of procedures to follow (often set out in regulation or license conditions).

The third party has no power to adapt, change or delete any part of the methodology. The second party equally has no ability to adapt, change or delete any part of the methodology.

- In every case where a third party has been contracted to collect evidence to complement other evidence gathered by the Tasmanian Government, it is still the role of the government to make the judgement about whether procedures have been followed and compliance has been achieved. Audit QA/QC processes are in place to ensure robustness and accuracy of information.
- The government maintains a list of approved third party contractors who can conduct a third party activity or assessment for Industry and Industry adheres to this list.
- The industry's procurement strategy mandates that priority should be given to Tasmanian based companies who have the appropriate skill set, qualifications and local knowledge to undertake a third party activity or assessment. The questions of lack of independence and bias do not dissipate by simply hiring further afield.
- At present the industry operates on a 100% user pays or full cost recovery model in relation to environmental monitoring to meet regulatory compliance. We do not advocate that this cost should be shifted to the Tasmanian Government or local government at the expense of the Tasmanian public.

2.1.2 Information available to the community

- The industry recognises that there is public interest in fish farming generally and specifically as it relates to environmental performance and waterway health. The regulator, the industry, the scientific community and certification bodies provide information publicly as it relates to waterway health and other aspects of environmental performance.
- The industry continually engages with key stakeholders to ensure the calibre and relevance of regulations and the ongoing development environmentally and socially responsible practices. The industry has developed and initiated a modern and adaptive stakeholder engagement approach to ensure that there are ample opportunities for communities, interest groups and other stakeholders to engage in a range of consultative processes and discussions in relation to marine farming management and ongoing industry development.
- Each company employs community engagement officers who are able to facilitate access to data and information where readily available and appropriate (please refer to *TOR (f)* in the TSGA submission (no. 33) on page 39).

2.2 Submission 7 – Biofouling Solutions

TSGA's Summary of Major Issues

i. In-situ net cleaning. (Also 41,71,73,74)

TSGA's Response to Major Issues

2.2.1 In-situ net cleaning

- Modern husbandry aquaculture practices, whether it be shellfish or finfish structures, require cleaning and maintenance to avoid a variety of production issues including competition for space and nutrients from other species, maintenance of water flow and oxygen levels and the reduction of weight to structures by fouling species. The surface area provided by aquaculture infrastructure provide substrate for attachment organisms and if this is not maintained can lead

to water quality issues and dramatically reduce overall production and success of any aquaculture operation.

- Industry now uses in-situ MIC technology for washing of nets, which has considerably reduced the need for land based net cleaning and maintenance. This technology is also utilised for net and rigging inspections on a regular basis.
- Copper antifoulant is no longer applied to nets and this is a significant, positive environmental achievement that cost the Industry tens of millions of dollars to date.
- The progressive introduction of new technology nets has resulted in a two thirds decrease of in-situ net washing output. This has also reduced the need for land based net maintenance as these nets remain in the water for the entirety of their serviceable life.
- Supporting research into in-situ MIC technology examined all potential impacts on and off lease including modelling to understand plume and broadscale effects. This was done after characterising fouling community on nets in different biophysical profile sites. The research resulted in best practice guidelines for in situ net washing which resulted in small localised impacts and those impacts were assimilated within the lease area; where the impact is greatest.
- With the current practices and the current machinery, in situ net washing results in small localised impacts and those impacts are assimilated within the lease area; where the impact is greatest.
- Modern day net cleaning is undertaken on a high frequency, low output basis and due to this frequency, 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
- The industry is 100% compliant with the Department of Agriculture's *Anti-fouling and in-water cleaning guidelines, June 2013*, and the industry's *Environmental Best Management Practice Guideline for In situ Net Cleaning of Salmon Cages Using Marine Inspector Cleaner (MIC),2013*.
- As an industry we will examine all technology that may mitigate against any detrimental impacts – with the caveat that those impacts have not been verified. We are in the process of investigating any potential broadscale impacts after we were alerted to concerns. There is research and development work being done internationally on filter technology which we are following.

2.3 Submission 9 – Australian Marine Conservation Council

TSGA's Summary of Major Issues

i. Baseline data (also 59,70,73,74,91, 93)
ii. Monitoring - BEMP, MHEMP and on farm (also 42, 70, 74, 89, 93)
iii. Macroalgal and Reef Communities
iv. Monitoring Threatened and Endangered Species
v. Maugean Skate and other threatened or endangered species (Also 88, 93)
vi. Dorvillid worm (also 93)
vii. World Heritage Area (also 93)
viii. Dissolved Oxygen (DO) (also 93)
ix. Ecosystem level management (also 74, 93)

TSGA's Response to Major Issues

2.3.1 Baseline data

- It is true that there is no broad scale baseline dataset available for existing salmon farming regions, pre farming or pre human influence. However, no salmon farming region internationally or global water management authority can make this claim. New regions such as Storm Bay will have pre-farm baseline data.

- In fact, Tasmania has one of the best broad scale survey histories in the world. The efforts of our local scientists to capture information on reef systems and marine sensitive areas have been recognised globally (i.e. Reef Life surveys, Marine Protected Area assessment).

- In 1997/98 all control sites were sampled in the south east, in conjunction with various other baseline survey research.

- 2009 benthic sampling was undertaken at all sites on leases and at control sites.

- A baseline environmental survey must be undertaken prior to the commencement of marine farming operations (see Tasmanian Government submission (No.35) pages 8-10 for more detail).

- The licensing of a lease area for finfish is contingent on assessment and approval of the baseline environmental survey report by DPIPWE.

2.3.2 Monitoring- BEMP, MHEMP and on farm

- We are the only salmon farming region in the world that does broad scale monitoring (see Tasmanian Government submission (No.35) pages 19-20 for more detail).

- Industry maintains that the current monitoring framework is appropriate and allows us to take action within the right timeframe and it is adequate to meet adaptive management principles.

- Broadscale monitoring is undertaken in the South East and in Macquarie Harbour. Please see the TSGA submission (No.33) for more detail.

- Tasmania is either comparable to or in front of other finfish farming regions in regard to monitoring and sampling regulatory framework (see Tasmanian Government submission (No.35) pages 18-19 for more detail).
- Monthly broadscale monitoring associated with fish farming is only completed in Tasmania, nowhere else internationally.
- Additional voluntary surveys are run within the compliance period as required
- Every parameter has its own frequency (see Tasmanian Government submission (No.35) pages 11 and 22 for more detail)
- The ROV surveys, that are a corner stone of our sampling and monitoring framework, are easily comparable to everywhere in the world
- The intent of the BEMP is to monitor water and sediment quality in the system, as these measures are deemed to be the most relevant monitoring indicators for assessment of the broader ecosystem.

- This is consistent with the outcomes of the Aquafin CRC research[1] which clearly identified that water and sediment quality were the most relevant and useful indicators for such an assessment.
- The adaptive management framework employed by both industry and regulator alike allows for both results of the process studies and the monitoring itself to be continually assessed and the need for new data/information identified, with its collection then incorporated into the programme itself. A specific example is provided by the current development of both process studies and re-surveys of intertidal algae and rocky reefs.

2.3.3 Macroalgal and Reef Communities

- Marine farming regulations prohibit the siting of a finfish zone over a rocky reef, however the potential broadscale impact of salmonid farming on nearby rocky reefs has been recently identified as a gap in our knowledge. To fill this gap, the industry has spearheaded the development of an IMAS led Fisheries Research and Development Corporation (FRDC) project (2015-024) 'Managing ecosystem interactions across differing environments: building flexibility and risk assurance into environmental management strategies'. The aim of this project is to understand potential broadscale interactions with reef systems and validation of local scale sediment condition indicators in new salmonid farming regions. Industry is also supporting an additional FRDC project (2014-042 A1 Atlantic Salmon Aquaculture IPA) 'Understanding broadscale impacts of salmonid farming on rocky reef communities' that is updating a coastal reef study undertaken ten years ago.
- Early work on macroalgal communities found that '*Changes in the abundances of algae species were recorded in the reserves and at external control sites. No consistent patterns over time were apparent. Each species varied over time in different ways, depending on location and site*'. There were no trends in macroalgae communities that could be attributed to fish farming in the area. However, as a means of addressing the concerns of the Tasmanian Abalone Council and Environment Tasmania about the broadscale impacts on rocky reef communities the industry has funded a two year study aimed at characterising the status and health of macroalgal communities in south east Tasmanian waters. In addition the industry is supporting two further FRDC funded projects over the next three years that will provide a comprehensive assessment of reef health and re-survey local marine protected area and reef life survey sites from previous studies.
- Giant kelp (*Macrocystis pyrifera*) was once a commonly visible aspect of Tasmanian coastal ecology, in quantities sufficient to support a commercial harvest. Reliant on cold nutrient rich waters, the giant kelp has been in a long term decline on the east and south coasts of Tasmania aligning with the increased influence of the East Australian Current over the past 30 years. This change has been increasingly evident on the east coast and has moved further south as the East Australian Current has influenced further south and persisted in southern regions. While the decline in giant kelp has therefore been observed in parallel with increased fish farming activity over the past 30 years, there has been no scientific evidence that salmonid farming is the cause of the decline in giant kelp and considerable evidence that it is the result of changes in the East Australian Current.

[1] Thompson, P., Wild-Allen, K., Macleod, C., Swadling, K., Blackburn, S. and Volkman, J. 2008. Monitoring the Huon Estuary and D'Entrecasteaux Channel of the Environmental Effects of Finfish Aquaculture. Aquafin CRC Technical Report (CRC Project 4.2(2)/ FRDC Project 2004/074), Tasmanian Aquaculture & Fisheries Institute, Hobart, Tasmania, Australia.

2.3.4 Maugean skate and other threatened and endangered species

- In the original environmental impact statement the Maugean skate was identified by industry as a species of interest requiring further research. This research is ongoing and early results indicate that salmon farming is having no significant impact on the skate.
- Please see the TSGA submission (No.33) pages 22-24 and 34 for more information.

2.3.5 Monitoring threatened and endangered species

- The industry continues to support research to understand our potential impact on identified endangered and threatened species not only within the Macquarie Harbour system, but all areas in which we farm.
- 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.
- Please see the TSGA submission (No.33) pages 22-24 and 34 for more information.

2.3.6 Dorvilleid worm

- Dorvilleid worm species naturally occur in Macquarie Harbour.
- The significance of the Dorvilleid worm species and the role they play in the unique ecology of Macquarie Harbour is currently under study.
- It is clear that Dorvilleids generally indicate elevated organic enrichment of the sediments. Dorvilleids are opportunistic colonisers of organically rich environments. They appear in sediments during enrichment and reappear during recovery phases in the natural environment and on fallowed farms. They are in fact an integral part of the natural process for breaking down organic material.
- The state government is currently researching the role of the Dorvilleid worms and their significance as an indicator species.
- The regulatory framework utilises a range of environmental indicators to determine environmental health.

2.3.7 World Heritage Area

- There are no salmon farms in the World Heritage Area (WHA) in Macquarie Harbour.
- The WHA is at the top of the Macquarie Harbour body of water, upstream of salmon farming.
- Farming activity within the "compliance zone" continues to operate in the environmental limits set by DPIPWE.
- These limits protect the WHA from adverse environmental impacts from salmon farming.
- The Gordon system flows, both regulated and unregulated, through the WHA and then onto the farming region.
- The percentage of the harbour taken up by the industry is less than 3.3%, which is 924ha. The actual fish pens take up 20ha. Macquarie Harbour is 27,600ha in size.

2.3.8 Dissolved Oxygen (DO)

- Currently the DO levels are good in Macquarie Harbour and we understand the dynamics of the harbour today better than we did last year and we continue to research DO fluctuations in the harbour.
- Operationally we are now wiser with respect to DO depletion and recharge.
- DO is recharged by a combination of rainfall, river flow, wind and low pressure systems
- DO events occur and levels fluctuate over time and we are doing the best to understand that and improve practices.
- As soon as the low bottom water DO trend was identified the industry put together a working group with a broad range of stakeholder organisations. This Group is the Macquarie Harbour Dissolved Oxygen Working Group.
- The working group comprises; the industry (Huon Aquaculture, Tassal and Petuna Aquaculture), Hydro Tasmania, CSIRO, IMAS, and DPIPWE.

2.3.9 Ecosystem level management

- The health of all Tasmanian waterways reflects historic and current marine and terrestrial influences from both natural and anthropogenic sources, not the least of which is a changing climate. The industry acknowledges that salmonid aquaculture, in line with all types of farming and human activity, can have impacts in the waterways where we farm.
- The industry is gaining more awareness of ecosystem components and linkages, and is taking a holistic approach to lease management, even beyond the farming boundary, that is improving production, environmental and social outcomes.
- Contemporary research such as the INFORMD 2 project (CSIRO and UTAS) identifies drivers of change in the catchment & coastal ecosystem and highlights the connectedness of factors traditionally viewed in isolation.
- We need to know the effect of farming on the catchment and coastal ecosystem as much as we need to know the effect of the ecosystem on our farms.
- The Broadscale Environmental Monitoring Program, the INFORMD 2 research, the State of the D'Entrecasteaux Channel investigation, Your Marine Values research, are just a small number of the key drivers for industry transitioning from a near field focus to an ecosystem focus.
- The ongoing evolution of industry Environmental Management Programs and the attainment of third-party sustainability certification have also fostered a transformation of attitudes and abilities within the companies to consider management at the ecosystem level.

2.4 Submission 12 – Doctors for the Environment

TSGA's Summary of Major Issues

i. Potential impacts on human health (also 95)
ii. Use of PCBs (also 95)
iii. Data on human health impact (also 95)
iv. Solastalgia (also 36,37,73,88, 95)

TSGA's Response to Major Issues

2.4.1 Potential impacts on human health

- The industry continues and is committed to producing salmon which is safe and healthy for the consumer and believes that adequate monitoring is undertaken to comply with all food safety regulations.
- The industry notes that two studies quoted in this submission make important contributions to understandings of the use of antibiotics and antifoulants both globally and in Tasmania. However, the industry also feels it is important to note that Sapkota et al (2008)[2] does not include an assessment of Tasmanian aquaculture and that different growing regions face varying challenges, particularly in regards to antibiotic use.
- The use of antibiotics is strictly monitored, recorded and regulated with levels used reported to the relevant regulatory authority quarterly. Furthermore, Tassal, Huon Aquaculture and Petuna make data in relation to antibiotic usage publically available through sustainability reports and online dashboards.
- Furthermore, levels of antibiotics used have fallen dramatically since 2008/09 across the industry and significant resources have been invested to improve knowledge and increase research activities targeting specific fish health issues.
- Copper antifoulant is no longer applied to nets and this is a significant, positive environmental achievement that cost the Industry tens of millions of dollars to date.

2.4.2 Use of PCBs

- A study conducted by the Harvard School of Public Health[3] and published in The Journal of the American Medical Association found that levels of PCBs and dioxins in fish species are low, similar to other commonly consumed foods such as beef, chicken, pork, eggs, and butter. Although PCBs are present in many of our daily meal choices, all these foods remain safe to eat.
- The Tasmanian Industry does not use feed from Canada.

2.4.3 Data on human health impact

- The Department of Agriculture conducts an annual national residue survey (NRS) that regularly tests farmed salmon to ensure that they are safe to eat – industry has participated in this for almost a decade. Tests in 2014 confirmed that Tasmanian salmon were well within acceptable ranges for a wide range of potential contaminants based on European Union Values and Food Standards Australia New Zealand.

2.4.4 Solastalgia

- As represented in the submission the industry understands *solastalgia* to be a concept derived from philosophical academia. The companies within industry have not experienced complaints of *solastalgia* directly.

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[2] Sapkota A et al (2008). Aquaculture practices and potential human health risks: current knowledge and future priorities. *Environment International* 34(8):1215-122.

[3] Mozaffarian,D. and Rimm,E.B. (2006) Journal of the American Medical Association. Vol. 296(15):1885-1899.

- The industry does not believe it has caused significant modification to the natural environment to the extent suggested in the submission and all companies act within visual and noise guidelines and regulations.
- The industry is committed to working with the community through consultation to identify concerns and has a strong track record of being responsive to those concerns.
- All companies within the industry have a responsibility to respond to comments of mental and physical harm or illness regardless of the cause. The industry does not accept that assisting residents through these issues is an admission of responsibility or cause but an integral part of being a responsible community member and corporate citizen.

2.5 Submission 36 – Danielle Cairns

TSGA's Summary of Major Issues

i. Visual impacts.
ii. Ronja Huon (also 37,48)

TSGA's Response to Major Issues

2.5.1 Visual impacts

- The industry complies with all visual guidelines in the relevant regulations.

2.5.2 Ronja Huon

- Huon Aquaculture Company Pty Ltd (Huon), leased a vessel from Solvtrans known as the Ronja Huon. The vessel arrived in Tasmania in December 2014 and following local certification, commenced operations later the same month. The Ronja Huon specifically provides the company with the capacity to move offshore and farming at these locations would not be possible without its use and the vessel allows the safe bathing and transport of fish in higher-energy locations.
- The75 metre state of the art vessel is powered by a diesel electric motor that readily complies with the *Environmental Management and Pollution Control (Miscellaneous Noise Regulation) 2014*.
- The vessel operates in a designated commercial shipping lane (up the Huon River) and services marine farming sites in the Huon and D'Entrecasteaux Channels.
- The Company is of the view that it is using best available technology and employs best practice environmental management to reduce noise emissions to the greatest reasonable extent. In addition, the Company has continued to modify the operation of the vessel as far as possible to limit the impact on residences.

2.6 Submission 37 – Cr Rosalie Woodruff

TSGA's Summary of Major Issues

i. Community (also 73,88, 95)
ii. General environmental impacts (also 39,47,48,57,59,73,87,88)
iii. Impact of escaped salmon (also 39,46,56,57,58,59,73,87,89)

iv. Negative impact on tourism – visual impact (also 39,42,71)
v. Impact onf reefs (also 42,57,74)
vi. Availability of information about chemicals used, components of fish feed – growth regulators, antibiotics, vaccines, pigments. (also 60,89, 95)
vii. Impact on sailing and recreation. (also 73,89, 92, 93, 95)

TSGA's Response to Major Issues

2.6.1 Community

- The Industry is part of the Tasmanian community, and a key part of many small regional communities and works closely with individuals, organisations and stakeholders through all elements of planning and operations. The industry welcomes interest from the community and has always held an open door policy.
- It is common to involve peak community bodies in discussion and development of industry based policies and processes.
- The industry acknowledges that scientific and planning documents and reports can be difficult for members of the community to interpret and provide comment on. The industry undertakes extensive community consultation prior to the submission of these documents to ensure a high level of understanding prior to commencing a formal approvals process.
- The industry recognises that there is a high level of public interest in fish farming generally and specifically as it relates to environmental performance and waterway health. The regulator, the industry, the scientific community and certification bodies provide information publicly as it relates to waterway health and other aspects of environmental performance.
- The industry continually engages with key stakeholders to ensure the constant improvement of regulations and environmentally and socially responsible practices. The industry has developed and initiated an adaptive stakeholder engagement approach to ensure that there are ample opportunities for communities, interest groups and other stakeholders to engage in a range of consultative processes and discussions in relation to marine farming management and ongoing industry development.
- Each company employs community engagement officers who are able to facilitate access to data and information where readily available and appropriate (see the TSGA submission (No.33) TOR (f) for further detail).

2.6.2 General environmental impacts

- Please refer to section 2.3.3.

2.6.3 Impact of escaped salmon

- Escapes are reported in Tasmania under the Department of Primary Industries, Parks, Water and Environment (DPIPWE) Marine Farming Branch (MFB) as per Marine Farm licence conditions and relevant Marine Farm Development Plans (MFDP). The industry is required to report major fish escape events of > 500 fish. Industry operations in the south east of the state have not had a reportable escape event since 2011.
- In addition, third party environmental and sustainability certification has specific criteria around escapes, which are more stringent than Marine Farming requirements.
- The University of Tasmania in conjunction with the Tasmanian Salmonid Growers Association conducted preliminary research into salmonid escapees from marine farming operations in

Macquarie Harbour. The study primarily focused on aspects of post-escape feeding activity and involved examination of stomach contents and condition of escaped fish. Results indicated that escapees did not appear to successfully forage outside of the sea cages and lost condition, which supports the view that escaped fish do not appear to thrive in the wild[4]. Farm cage configurations and mooring systems have improved significantly in recent years and are based on world's best practice design, with adequate zones allowing for required scope and structural stability.

- Research overseas[5] has also looked at the impacts of escaped exotic finfish aquaculture species in the inner seas of southern Chile. The results of the study found that escapee Atlantic salmon were the least successful predators in that environment, with just under half of the Atlantic salmon sampled having empty stomachs.

2.6.4 Tourism

- The industry is committed to supporting the tourism industry in Tasmania and to playing a role in the state's growing reputation as a food destination. The industry consults widely with tourism operates in the areas in which it operates and is responsive to any concerns.
- Marine-based tourism is generally limited in close proximity to most farming leases. However, in adjacent waterways there are tourism businesses which have incorporated salmon farm tours as part of their on-water tour experience.
- In Macquarie Harbour there has been significant interest in establishing new business opportunities inclusive of fish farms. For example, one dive business owner envisaged potential for tourism projects associated with the salmon farming industry such as observation areas for cruise vessels, niche marketing tours, diving, shore-based interpretation and an "ocean to plate" experience.
- Industry regularly engages with tourism providers in our growing regions and the consulted tourism providers advise industry that they have no objections to fish farming. For example, Pennicott Wilderness Journeys conduct frequent marine debris clean-ups around the Labillardiere Peninsula with groups of school students. Tassal currently provide support for these shoreline clean-ups and will continue to work with the tourism provider.

2.6.5 Impact on reef systems

- Please refer to section 2.3.3.

2.6.6 Availability of information

- The industry proactively provides information as to the general composition of feeds used and raw materials sourced – individual company recipes are commercial in confidence.
- A quick internet search on any major feed or grower company web site will reveal a multitude of information on feed ingredients used today, and the changing nature of feed ingredients as the industry has evolved over the last 30 years.

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[4] Steer, M. and Lyle, J. (2003). *Monitoring escapees in Macquarie Harbour: a collaborative study between the salmon industry (TSGA) and the Tasmanian Aquaculture and Fisheries Institute*.

[5] Sepulveda M., Farias F., Soto E. 2009. Salmon escapes in Chile. In: Incidents, impacts, mitigation and prevention, World Wildlife Fund (Ed.), 1-52, Valdivia, Chile.

- For example, Skretting Australia undertakes residue testing on both raw materials and finished feeds to ensure their quality. Residue report contains the results of finished feeds tested for different PCBs and Dioxins, Pesticides and Heavy Metals. In 2014, all results for Skretting Australia feeds were within the Australian and European limits.
- The Department of Agriculture conducts an annual national residue survey (NRS) that regularly tests farmed salmon to ensure that they are safe to eat – industry has participated in this for almost a decade. Tests in 2014 confirmed that Tasmanian salmon were well within acceptable ranges for a wide range of potential contaminants based on European Union Values and Food Standards Australia New Zealand.
- A study conducted by the Harvard School of Public Health and published in The Journal of the American Medical Association[6] found that levels of PCBs and dioxins in fish species are low, similar to other commonly consumed foods such as beef, chicken, pork, eggs, and butter. Although PCBs are present in many of our daily meal choices, all these foods remain safe to eat.
- As with any animal production, antibiotics may be required in fish farming from time to time, but their role and uses are poorly understood by the general public and easy for critics and observers to interpret in a negative light. In recognition of this, one company provides details of antibiotic use on its Sustainability Dashboard and another provides information on use in its annual Sustainability Report for example.
- Antibiotic use is strictly monitored, recorded and regulated, and so is open to close scrutiny.
- The use of medication is always under veterinary prescription. Antibiotics are never used prophylactically or for growth promotion. Any salmon that are treated with antibiotics undertake a lengthy withdrawal period of 1000 degree-days minimum (average water temperature X number of days = degree days (or Accumulated Thermal Units – ATU's) therefore 10 days at 10°= 100 degree days) to ensure all residues are cleansed from their system. Any group intended for harvest which falls within a period of twice the stated withdrawal period will undergo flesh testing for antibiotic residue. This complies with the Australia New Zealand Food Standards Code for residue levels (FSANZ 2013).
- The reliance on medication for farmed fish has seen a marked decrease in the last five years. This has been achieved through a greater focus on improving knowledge and research activities targeting specific fish health issues.
- Industry's focus on disease monitoring and early detection places a high importance on incorporating stock inspections into routine farming activities such as mortality collection and classification, weight checks and harvests. All salmon growing companies are actively involved in the Tasmanian Salmonid Health Surveillance Program, which is a joint program between the Tasmanian Salmonid Industry and the Tasmanian Government. This program provides passive and active disease surveillance through regular submission of fish diagnostic samples and testing for specific disease agents of concern.
- Finally in regard to antibiotic use in fish farming, vaccines are the preferred option. The Tasmanian industry has invested millions of dollars into vaccine research in cooperation with the Fish Health Unit (DPIPWE) in Launceston with already some very effective vaccines being used commercially. However, until appropriate vaccines can be developed for Tasmanian conditions, antibiotics may be required from time to time to ensure the health of farmed fish.

[6] Op cit Mozafaarian and Rimm 2006

2.6.7 Impact on sailing and recreation

- The industry recognises that it operates in waters that are considered world class in professional and recreational sailing circles. It is the goal of industry to therefore minimise or eliminate any negative interaction with urban and regional sailors.
- For example, in the preparation of the draft amendment for Macquarie Harbour the industry consulted specifically with the cruise and sailing operators in the harbour which led to changes in some of the proposed zones. An open day was also extensively advertised and held in Strahan to display the proposed amendment. This approach has been replicated in the south east.
- Industry also recognises that a number of recreational activities are undertaken in the vicinity of the leases, including on-water activities (boating/sailing, fishing, and kayaking), in-water activities (diving, snorkelling, and swimming) and on-land activities (fishing, camping, walking, wild-life watching, and general sight-seeing). Again mitigation strategies are developed and identified in all Environmental Impact Statements for any new leases or amendments to an existing lease.
- Effective consultation with the recreational community is essential at the genesis of a project, and ongoing. For example, the industry is collaborating with the West Coast Recreation Association on a proposal to minimise any potential impact of salmon farming on traditional recreation areas on the West Coast.
- The significant on water presence of our industry has a positive value add with respect to increased marine safety for all users:
    - Industry successfully lobbied for infrastructure improvements which have resulted in the best VHF radio system coverage in Australia for all marine users; and
    - We have 24 hour monitoring of emergency channels.

2.7 Submission 39 – John Nichols (all issues addressed in above commentary)

2.8 Submission 41 – Warwick and Irene Hastwell

TSGA's Summary of Major Issues

i. Impact on other businesses – mussel farm, abalone fishery in Port Esperance. (also 37,56,71,74)

TSGA's Response to Major Issues

2.8.1 Impact on other businesses – mussel farm, abalone fishery in Port Esperance

- Port Esperance has a range of aquaculture activities being undertaken including; Fin-fish, oysters and mussel production. The area has historically been a difficult and variable area for shellfish production, however under correct management regimes and practices has been a successful production area for many years. The most prominent challenges to growing shellfish in Port Esperance is the freshwater outlet from the Esperance River and closures due to biotoxins and coliforms. High rainfall events (particularly near river outlets) can cause a layer of fresh water near the surface which can cause the loss of newly seeded mussel spat by weakening their byssal attachment[7] Additionally, after high rainfall events Port Esperance has a high risk of coliform

[7] Macneill, S et al 2001. Handbook of mussel farm site monitoring – enhancing seed production. Newfoundland Aquaculture Industry Association. 24pp.

presence in the water, triggering regular closures for shellfish production (DHHS 2014). The area is also considered a high risk area for biotoxins and experiences regular closures due to repeated algal blooms of Gymnodinium catenatum (DHHS 2014). There has been an average of 110 days of closure/year from 2009 to 2012 due to biotoxins and coliforms.

- Tunicate biofouling has also been historically present on mussel cultures in the area at a range of leases that have since been closed.
- The BEMP water quality monitoring Site 12 is located approximately 0.6 km from the Dover Bay Mussel farm. The summarised data suggests that water quality and nutrient data obtained at Site 12 is consistent both with similar sites within the Huon and Port Esperance Marine Farming Development Plan Area, and with the Control Site at Recherche Bay, albeit with minor differences (such as ammonia and dissolved oxygen concentrations for bottom water) – but these minor differences are not unexpected or significant.

2.8.2 In-situ net washing

- Modern husbandry aquaculture practices, whether it be shellfish or finfish structures, require cleaning and maintenance to avoid a variety of production issues including competition for space and nutrients from other species, maintenance of water flow and oxygen levels and the reduction of weight to structures by fouling species. The surface area provided by aquaculture infrastructure (sea cages, mussel longlines etc.) provide substrate for attachment organisms and if this is not maintained can lead to water quality issues and dramatically reduce overall production and success of any aquaculture operation.
- Insitu net cleaning has replaced a known, environmental impact of copper painted nets; Industry has made a commitment to discontinue the use of copper treated nets which is a global first. This was a very positive environmental initiative costing Industry millions of dollars in replaced infrastructure. In direct response to recent concerns being raised, further research is being conducted to better understand the suggested potential impacts of in-situ net washing
- The Industry's $300,000 study completed over a two year period investigating deposition of netwash in and around leases; and the hydrodynamics of various sites – high, intermediate and low flow scenarios. Extensive assessments have shown that there was minimal impact and netwash organics were assimilated within lease space by natural benthic biological processes. These findings are supported by data from our annual compliance assessments of lease locations 35 metres from all these boundaries (consistent with Regulations). We also ensure that net wash material must not be visually present at 35 metre compliance locations from lease boundaries;
- With regards to biofouling species composition, generally this is made up of a combination of macroalgae species (red, green and brown), and invertebrates. This constitutes fast growing opportunistic marine vegetation responding to localised soluble emissions.
- Modern day net cleaning is undertaken on a high frequency, low output basis and due to this frequency, 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. Tassal's Zero Harm to Fish policy enforces high rotational cleaning of nets, to prevent the colonisation by any fouling species and reduce the risk of species dispersal from these activities to neighbouring natural habitats. As outlined in the Net Cleaning Best Practise Guidelines, placement of the discharge point must be done in such a way to minimise effluent movement/re suspension in the water column.
- The reason for high frequency of cleaning relates to optimising fish health, less outputs for the sediment and surrounding environment to assimilate, preventing the establishment and

colonisation of potentially harmful species, maintaining high levels of water flow and in cage environmental conditions. In addition, excessive fouling of nets is a significant impost, adding prohibitive weight to farming structures, again, reinforcing high frequency, low volume net cleans.

2.8.3 Practices and monitoring

- The industry development of Netwashing Best Practice Guidelines has led to these guidelines being included in Standard Operating Procedures (SOPs) across all marine operation sites that utilise net washing technology
- Companies regularly conducting internal lease inspections and maintain dedicated environmental departments with ROV capabilities.
- Industry submits all net data, on an annual basis to the Marine Farming Branch at DPIPWE This is utilised by the Department for the purpose of annual compliance survey work and necessary reporting
- An IMAS evaluation of BEMP data[8] between the period 2009 – 2012 determined that Tassal's broad scale monitoring system was sufficiently sensitive to detect environmental changes and that no significant or adverse environmental affects had been detected at any of the sites at Port Esperance for water quality and sediment condition parameters.
- Industry is participating in research (to be undertaken by IMAS) to provide important information on the variability in broad scale rocky reef conditions in south east Tasmanian waters. This FRDC funded research program titled "Managing ecosystem interactions across different environments: building flexibility and risk assurance into environmental management strategies" 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. This is relevant to our discussions as 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.
- Industry Marine Farming practices meet with State regulatory framework and third party, environmental standards, Best Aquaculture Practices - BAP and Aquaculture Stewardship Council – ASC and Global Gap (which are independent certification schemes confirming Industry meets international best practice at all of our sites).
- Several references on page 10 of the document in relation to the impacts of suspended solids and the potential impacts that these can have on mussel growth and gill health. There is no reference to daily onsite mussel farm data that is collected but this area of Port Esperance is known to be naturally high in relation to suspended solids from the Esperance River system. Any data collected from the mussel farm both upstream and downstream would show the natural levels of this river system and the potential impacts that this may be having on mussel stock. To accurately draw any conclusions to the suspended solids from net cleaning operations the initial analysis should look at the natural variability of the river system to the west of the DBM leases. Understanding the background levels that the mussel stock are subject to would be the first step in making accurate conclusions in relation to potential increased suspended solids from downstream in situ net washing operations.

[8] Ross, D. J. and Macleod, C. K. (2013). Evaluation of Broadscale Environmental Monitoring Program (BEMP) data from 2009-2012. IMAS Technical Report 140pp

- The Biosecurity risk of the spread of marine pests is a known issue and biosecurity is becoming increasingly important with the growth and intensification of aquaculture and fishing practices. The most notable vectors for the introduction and spread of marine pests in aquaculture are the movement of boats and equipment and the translocation of animal stock. The government has procedures in place to aid in early detection including reporting requirements which are specified under the National biofouling management guidelines for the aquaculture industry (NBMG)[9]. While early detection and reporting systems are important in the management of marine pests, prevention methods are impetrative for inhibiting the spread of marine pests. For example, the translocation of wild caught shellfish spat from different geographic locations can pose significant risks to biosecurity. For this reason the NBMG outlines that all livestock and equipment should be pressure cleaned before relocation into a different geographic location (Australian Government 2014). Additionally, it is acknowledged there is the risk of marine pests occurring in the soft tissue, mantel cavity or digestive tract of aquatic species, however this falls outside the scope of the NBMG. This highlights the importance of either using hatchery spat or wild spat caught within the same geographical area.
- Industry surveys identified that natural stock had lesions similar to that described in the submission. Results from the surveys identified that there are other parasites within the region that caused similar gross pathology.
- It has been inferred that net cleaning plumes have caused disease without performing a disease investigation, which takes into account:
  - Temporal mortality data;
  - Spatial mortality data;
  - Sampling and testing results from “healthy” and “moribund” animals on the lease; and
  - Water quality results on lease.
- This information is important to understand the involvement of different risk factors to the development of mortality. Further investigation is necessary to find the true cause of poor performance and mortality at this site. It is the Industry’s experience that stock loss can be caused by many factors.
- The submission references several papers on *Ectopleura larynx*, which is a species that is exotic to Tasmania. It is risky to infer that the issues that are seen in Norway and Ireland described in the papers referenced, are indicative of the Tasmanian environment as there are differences in net type, anti-foulant use, environmental temperatures, hydrology; and hence, vast differences in species and biofouling population dynamics.
- In conclusion, there is not enough evidence in our opinion to determine the most likely cause of mortality and poor performance in the mussels located on the lease. Claims made in the submission are anecdotal and hypothetical. Further investigation is being undertaken to determine the risk factors associated net cleaning. In regards to the referenced material in the submission, the papers referenced on finfish consider plume exposure of finfish immediately located within the cage (or tank), and do not take into account the dilution of nematocysts and medusa. This makes the papers difficult to apply in drawing a conclusion to the effects of net cleaning plumes on mussel leases located in Dover Bay.

[9] NSPMMPI 2013, National Biofouling Management Guidelines for the Aquaculture Industry, Commonwealth of Australia, Canberra.

2.9 Submission 42 – David Abbott

TSGA's Summary of Major Issues

ii. No industry code of practice.

iii. Science

TSGA's Response to Major Issues

2.9.1 Industry code of practice

- The Industry believes that international third party certification provides great outcomes for monitoring, transparency and best practice environmental management than the development of an industry code of practice. All companies within the industry have achieved third party certification across their marine farming operations.

2.9.2 Science

- Please refer to TOR (a) The adequacy and availability of data on waterway health in the TSGA submission (no.33) on pages 7-13

2.10 Submission 46 – Fraser Petrie

TSGA's Summary of Major Issues

i. Marine debris (also 68,88, 92, 93, 95)
ii. Seabed health
iii. Rate of expansion in Macquarie Harbour (also 91)

TSGA's Response to Major Issues

2.10.1 Marine debris

- The industry actively contributes at a variety of levels to the management of marine debris in the waterways in which it operates. Company policies include strategies to minimise marine debris at point source, conduct clean ups, provide and regularly service marine debris bins and to establish community partnerships.
- The industry contributes significant resources to marine debris management both through a variety of community partnerships and via policies within the companies. The industry believes it is important to note that there are numerous organisations and contractors who partner with individual companies across all marine farming regions.
- Huon Aquaculture dedicates time 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. 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.
- In regards to marine debris which is attributable to aquaculture operations and the respective increase in labour hours please see the table below which was included in the industry submission.

Consolidated salmonid industry marine debris cleanup figures.

	Volume of Rubbish	**% attributable to**	**Labour Hours**

	Collected (m3)	Salmonid Farms	
FY2013	50.4	67	479
FY2014	60.5	72	626

2.10.2 Seabed Health

- Each of the industries sites are operated within a licence agreement specific to that area. Whilst controls on different sites may vary the general indicators for environmental compliance within, and on the borders of lease areas are as follows:
- There must be no significant visual, chemical or biological impacts extending 35 metres from the boundary of the lease area, as specified in our marine farming licence; and
- Environmental monitoring must be done in the lease area, 35 metres outside the boundary of the marine farming lease area and at any comparison sites in accordance with the requirements specified in our marine farming licence.
- The practice of fallowing involves resting the seabed by moving pens to different locations within the lease area and has shown to be an effective method of ensuring the seabed is effectively managed. The companies within the industry actively promote and discuss environmental compliance as it relates to seabed health.

2.10.3 Rate of expansion in Macquarie Harbour

- Industry development in Macquarie Harbour was supported by a detailed EIS 2012 which is publically available.

2.11 Submission 47 – Lois Stubley (all issues addressed in above commentary)

2.12 Submission 48 – Nicholas Ash

TSGA's Summary of Major Issues

i. Birds (also 59,87)

TSGA's Response to Major Issues

2.12.1 Birds

- The industry participates actively through monitoring and relevant organisations in the monitoring of bird species in the areas in which it operates. This includes providing a detailed assessment of all bird species which have been recorded in a 5km radius of all proposed new leases and lease amendments in Environment Impact Statements and outlining management approaches to minimising impacts on local bird populations.

2.13 Submission 56 – Trish Kyne

TSGA's Summary of Major Issues

i. Economic return

TSGA's Response to Major Issues

2.13.1 Economic return

- Please refer to 'TOR (e) The economic impacts and employment profile of the industry' on page 33 of the TSGA submission to the inquiry (no. 33).

2.14 Submission 57 – Vicki O'May

TSGA's Summary of Major Issues

i. Hatchery management (also 37,58, 92, 93, 95)
ii. Freshwater dams

TSGA's Response to Major Issues

2.14.1 Hatchery management

- The industry is committed to the responsible management of all its freshwater operations. The claim that there is no independent monitoring of hatchery facilities is not accurate and the industry monitors extensively to ensure it meets rigorous environmental standards as required by the regulation.
- The presence of algae referred to in various submissions has been detected both down and upstream of freshwater hatcheries in the Huon and Channel area. 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.
- Flow through hatcheries are still playing an important but transitioning role in the Tasmanian Salmon Farming Industry; Industry is currently investing millions of dollars constructing new, state of art recirculation hatcheries.

2.14.2 Freshwater dams

- All freshwater damns owned or leased by the industry operated under a 'freshwater licence' issues by the Department of Primary Industries, Water and Environment under the Tasmanian Water Management Act 1999. Where there is any concern in relation to environmental flows from the streams, companies implement both physical diversions and management plans.
- Industry employees report regular siting of platypus at hatcheries in the Huon and Channel area, including dams being home to a population of platypus.

2.15 Submission 58 – Angela Butler (all issues addressed in above commentary)

2.16 Submission 59 – David Mills (all issues addressed in above commentary)

2.17 Submission 60 – Donn Umber (all issues addressed in above commentary)

2.18 Submission 68 – Sarah Lowe, Sustainable Systems (all issues addressed in above commentary)

2.19 Submission 70 – Environmental Defenders Office

TSGA's Summary of Major Issues

i. Community representation

TSGA's Response to Major Issues

2.19.1 Community representation

- The Industry is committed to undertaking thorough and wide reaching consultation in relation to marine lease proposals and amendments. Community forums, letter drops, brochures, stakeholder engagement, meetings and open days are only some of the ways in which the industry consults with local communities ahead of these proposals.
- Detailed accounts of this engagement are provided to the Marine Farming Review Panel through Environmental Impact Statements and there are examples of stakeholder feedback informing changes in lease planning.
- The EDO seeks a recommendation from the committee that Marine Farm planning fall within the jurisdiction of the Land Use Planning and Approvals act 1993 which would provide a recourse to appeal grants of lease space to the Resource Management and Planning Appeal tribunal.
- This is unnecessary. The way the system is administered presently provides the opportunity for "persons aggrieved" to appeal a decision of the Marine Farming Branch or the Minister to the Supreme Court pursuant to the judicial review act 2000: see in particular sections 4, 6, 7, 8 (b) and 17.
- The effect of these provisions is that a "person aggrieved" can appeal decisions of an administrative character made under an enactment, as specifically, the making of a report or recommendation by the Marine Farming Branch is a decision to which the act applies, as obviously is a decision made by a minister.
- Judicial review appeals are generally expeditiously or fast tracked by the Court given their public interest or importance. Planning decisions in the Resource Management and Appeal tribunal in Tasmania have a long and oft criticised history of stifling development.
- It follows that for people who have legitimate grievances an expeditious right of review already exists.

- For an overview of how judicial review works see Pervan v Frawley [2011] TASSC 27.

2.20 Submission 71 – H. Manning (all issues addressed in above commentary)

2.21 Submission 73 – Lance and Jennifer Hadaway

TSGA's Summary of Major Issues

i. Port Esperance.
ii. Youth employment

TSGA's Response to Major Issues

2.21.1Impact on Port Esperance

Refer section 2.8.1

2.21.2 Youth employment

- The industry is committed to providing training and employment to people in regional and rural areas. The aquaculture industry in Tasmania provides opportunities in a variety of fields requiring a wide range of qualifications and collaborates with Tasmanian schools and training providers to develop pathways for young people.
- Employment in the aquaculture industry also opens the door to opportunities beyond the immediate farming regions. A strong emphasis is placed on professional development by all companies, as well as culture of sharing information with other growing regions and pioneering innovation within the state.

2.22 Submission 74 – Tasmania Abalone Council

TSGA's Summary of Major Issues

i. Waste products
ii. Best practice
iii. Monitoring and research
iv. Use of chemicals
v. Certification

TSGA's Response to Major Issues

2.22.1 Waste products

- Aquaculture has the potential to impact negatively on water quality, the severity of which depends on the type and intensity of the farming activity and the capacity of the receiving environment to assimilate any impact[10]. There have been a range of significant improvements

[10] Black, K. D. (2001). *Environmental effects of aquaculture*. Sheffield Academic Press, UK.

over the last 20 years in the management of marine finfish aquaculture operations, resulting in improved water quality. This has been observed through improvements in feeding practices, feed formulation, understanding fish behaviour[11] and better siting of farming leases.

- Farm site characteristics, such as bathymetry, current and tidal flows are significant drivers in nutrient dispersion in and around farms. Establishing farm sites in waters of suitable depth, with sufficient flushing rates are known to lessen impacts on water quality. In addition, the combination of physical (hydrodynamic) and ecological (trophic relationships) processes are also known to influence the assimilative capacity of the receiving environment through:
    - nutrient uptake by phytoplankton, and the associated trophic transfers through higher trophic levels, and
    - dilution of nutrients and planktonic organisms, primarily driven by the prevailing hydrodynamic forces and movement of water masses – these occurrences may reflect patterns of large scale oceanic circulation or individual wind mixing events, or a combination of both[12]
- Nutrient emissions associated with finfish farming are known to affect water quality at both near-field and broadscale levels. The release of nutrients into the environment from finfish farming is largely associated with the exogenous feed input[13],[14],[15]. The extent to which water quality is affected by farming emissions can be attributed to the assimilative capacity of the environment, fish stocking densities and levels of feed input[16][17].
- Soluble wastes associated with finfish culture include ammonia, phosphates and dissolved organic carbon emissions. The CSIRO Huon Estuary Study (HES) (2000) assessed the sources, distribution and cycling of nutrients (including those derived from finfish farming) in the Huon Estuary[18] .These studies and further analysis of the broadscale impacts to the ecosystem were

[11] Price, C. S. and Morris, J. A., Jr. (2013). *Marine Cage Culture and the Environment: Twenty-first Century Science Informing a Sustainable Industry*. NOAA Technical Memorandum NOS NCCOS 164. 158.

[12] Buschmann, A., Costa-Pierce, B. A., Cross, S., Iriarte, J. L., Olsen, Y. and Reid, G. (2007). *Nutrient impacts of farmed Atlantic salmon (Salmo salar) on pelagic ecosystems and implications for carrying capacity*. Report of the Technical Working Group (TWG) on Nutrients and Carrying Capacity of the Salmon Aquaculture Dialogue.

[13] De Pauw, N. and Joyce, J. (1991). Aquaculture and the Environment. *Spec. Publ. Eur. Aquacult. Soc* 14: 332.

[14] Handy, R. D. and Poxton, M. G. (1993). Nitrogen pollution in mariculture: toxicity and excretion of nitrogenous compounds by marine fish. *Reviews in Fish Biology and Fisheries* 3: 205-241.

[15] Pillay, T. V. R. (1995). *Aquaculture principles and practices*. Fishing News Books.

[16] Ackefors, H. and Enell, M. (1990). Discharge of nutrients from Swedish fish farming to adjacent sea areas. *Ambio*: 28-35.

[17] Black 2001 op cit

[18] Butler, E., Parslow, J., Volkman, J., Blackburn, S., Morgan, P., Hunter, J., Clementson, L., Parker, N., Bailey, R., Berry, K., Bonham, P., Featherstone, A., Griffin, D., Higgins, H., Holdsworth, D., Latham, V., Leeming, R., McGhie, T., McKenzie, D., Plaschke, R., Revill, A., Sherlock, M., Trenerry, L., Turnbull, A., Watson, R. and Wilkes, L. (2000). *CSIRO, Huon Estuary Study, Environmental Research for Integrated Catchment Management and Aquaculture*. Project Number 96/284.

subsequently updated through the Aquafin CRC biogeochemical modelling of the D'Entrecasteaux Channel and Huon Estuary[19] .

- The results of the HES demonstrated the importance of flow and flushing rates of a system in relation to nutrient cycling and confirmed that problems associated with nutrient emissions are minimised where flushing rates are sufficient enough to dilute nutrient loads.
- One of the environmental concerns relating to fish farming in Tasmania is eutrophication of the water column, since the combination of high stocking densities and feed inputs could potentially lead to imbalanced levels of nitrogen and phosphorous in the water column. In marine systems, nitrogen is typically the limiting nutrient, so its availability will dictate the amount of primary production.
- Approximately 5% of the total feed input from salmon farming is released into the receiving environment as a form of nitrogen[20] , of which 85% is released as dissolved nitrogen (predominantly ammonium) and 15% in particulate form. The phosphorus component released into the environment is considered to be divided between particulate labile detritus (at a fixed Redfield ratio of 16N:1P) and dissolved inorganic phosphorus. However, because nitrogen is the limiting nutrient in this marine system, the environmental impacts of salmon farming in the D'Entrecasteaux Channel and Huon Estuary are managed by regulating the total permissible dissolved nitrogen output (TPDNO) that enters the receiving environment as emissions from feed input.
- A report by GESAMP (1996)[21] stated that the acceptable level of change in any water quality parameter is generally unknown and the definition of impact level threshold is usually only achieved after data have been collected over a considerable period of time. This report suggested measuring chlorophyll concentrations to assess nutrient enrichment because:
    - nutrient enrichment is not a problem in itself; and
    - nutrient enrichment will only stimulate phytoplankton growth when that particular nutrient is the limiting factor.
- In most studies there is usually insufficient data to link nutrient availability to algal growth. The succession of algal species may be of significance, since species have different responses to different nutrient levels. The particular species present may be the most important factor in determining the nutritional value of the food, or impact of the algal bloom. Microscopic analysis of the species composition of the communities may be needed, or specific phytoplankton pigments may be measured as an indirect assessment of the community present. Phytoplankton assessment forms a key component of the BEMP and on-site daily water quality monitoring, as stated in EIS section 3.4.3.

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[19] Volkman, J., Thompson, P., Herzfeld, M., Wild-Allen, K., Blackburn, S., Macleod, C., Swadling, K., Foster, S., Bonham, P., Holdsworth, D., Clementson, L., Skerratt, J., Rosebrock, U., Andrewartha, J. and Revill, A. (2009). *A whole-of-ecosystem assessment of environmental issues for salmonid aquaculture*. CSIRO Marine and Atmospheric Research. FRDC Report No. 2004/074, Aquafin CRC Project 4.2(2). Hobart, 206 pp.

[20] Wild-Allen, K., J. Parslow, M. Herzfeld, P. Sakov, J. Andrewartha & U. Rosebrock 2005. Biogeochemical Modelling of the D'Entrecasteaux Channel and Huon Estuary. Technical Report, CSIRO Marine & Atmospheric Research, pp113.

[21] GESAMP (1996). *(IMO/FAO/UNESCO- IOC/WHO/OMS/IEAE/UN/UNEP Joint Group of experts on the Scientific Aspects of Marine Environmental Protection.) Monitoring the ecological effects of coastal aquaculture wastes*. 38.

2.22.2 Best practice

- In response to the Salmon industry not certified as world's best practice please see submission # 6 Aquaculture Stewardship Council, submission #34 Global Aquaculture Alliance and submission # 43 Mr. Bertrand Charron; all providing evidence of the industry being certified to world's best practice

2.22.3 Monitoring and research

- Please see section 2.3.2.

2.22.4 Use of chemicals

- Chloramine-T is not used as a treatment for AGD.
- Huon Aquaculture does not use chloramine-T through its well-boat or its operations more broadly.

2.22.5 Certification

- In response to limitations of International accreditation please see response above and accompanying representations. International certifications are robust, transparent and independent.

2.23 Submission 87 – Chrissie Rowland

TSGA's Summary of Major Issues

i. Independence of scientists (also 87)
ii. Royal Australian Chemical Institute lecture

TSGA's Response to Major Issues

2.23.1 Independence of Scientists

- The industry absolutely rejects the comment that it t intimidates scientists. The industry respects their right to interpret science based on their experience and recognises that on occasion there is vigorous debate amongst scientists as to interpretation.
- IMAS and CSIRO scientists represent organisations that have international reputations for the quality of their work, they participate in international collaborations in fields of expertise and a significant number of participants over the 30 years of applied research around the industry in a number of clearly different sectors.

2.23.2 Royal Australia Chemical Institute lecture

- The Industry rejects the claim that a Huon Aquaculture employee stated that 'clean green' is sacrificed for fish performance and financial gain during a presentation to the Royal Australian

Chemical Institute in May 2015. The comment made by the employee was recorded and is as follows:

> *"The big thing that our market research talks about it provenance so people want to know more about their food now than they ever have in the past and so the provenance we have is obviously that we're Australian, we're trusted, we're safe, we're first world. In Tasmania obviously we get clean green belted at us quite a lot but increasingly Tasmania has been known in Australia more for quality than for being clean green, I think that's something we can own 100%, that's quality. Clean and green can vary in the eye of the beholder."*

2.24 Submission 88 – Susan Westcott

TSGA's Summary of Major Issues

i. Truck traffic
ii. Fuel spills
iii. Waste disposal

TSGA's Response to Major Issues

2.24.1 Truck traffic

- The salmon industry contracts various Tasmanian transport companies to move live fish, feed and product around the state and to the mainland. These companies employ professional, trained and skilled drivers.

- In the event of a complaint being received from a member of the public, the industry works pro-actively with the transport companies and drivers to resolve any issues. This is evidenced by the salmon industry and various transport companies have working pro-actively with the Strahan Community to resolve issues regarding trucking. The end result being a trucking code of practice, soon to be released.

2.24.2 Fuel Spill

- Any chemicals that are classified under the Environmental Management and Pollution Control Act 1994 as controlled wastes require disposal by an appropriate licensed contractor - approved waste service providers dispose of chemicals in accordance with the appropriate regulations
- All chemicals used on marine farming sites are stored in bunded areas with the capacity to hold 110% of the volume of the largest container
- Spill kits and training – it is industry policy is to have a spill kit on every company vessel, barge, and at all fuel-fill stations
- Regular servicing of all boats and equipment; daily inspection and appropriate start up and shut down procedures ensuring early identification of issues and appropriate remedial action
- WH&S and Environmental policies and procedures in place for correct storage and handling

2.24.3 Waste Disposal

- Harvest Waster - Solid waste and bloodwater from the harvest process is contained in the harvest vessel during the harvest and delivered to the shore base for permitted disposal. Solid

wastes from processing fish and reject fish are sent to an approved composting or land-based rendering facility for further processing.

- Fish Mortalities - Mortalities from the lease will be collected in sealed fish bins and returned to the shore base where they are held in a refrigerated container until they are collected, at least once a week, for removal to an approved land-based facility for beneficial reuse (composting or rendering/oil extraction). Industry strives to improve fish health and reduce mortalities; this proposal in particular is expected to result in decreased mortalities as the proposed lease is located in a more optimal environment for rearing Atlantic salmon.
- Feed Waste - Uneaten feed is minimised through the use of video camera feedback systems and additional tools such as pellet catching panels. Any pellets that do fall through the cages are detected in routine video surveys, and the information is used to continuously improve feed management. Feed wastage (uneaten feed, fines and dust) at the proposed lease is forecasted to be approximately 1.5% of the total feed input. This has been determined from feed waste calculations obtained for similar operations in the D'Entrecasteaux Channel and through third party audit requirements from manufacturer to fish.
- Fish Water - Fish faeces fall through the bottom of the fish cages to the sea bed. Video survey work coupled with depositional modelling enables industry to demonstrate that there is very little spread beyond the immediate vicinity of the cage. The cage locations are routinely fallowed to allow the biological processes in the sediment to assimilate the organic matter, and for the sediments to recover. Herringbone mooring systems allow for flip-flop fallowing, i.e. essentially doubling the fallowing options and allowing for rotational stocking.

2.25 Submission 89 – Peter Schulze

TSGA's Summary of Major Issues

i. Escaped fish

TSGA's Response to Major Issues

2.25.1 Escaped fish

- Please refer to response 2.6.3

2.26 Submission 92 – Tasmanian Conservation Trust

TSGA's Summary of Major Issues

i. Noise
ii. Navigation
iii. Waste products
iv. Plankton blooms
v. Hatchery management
vi. Antifoulants
vii. Barrier technology

TSGA's Response to Major Issues

2.26.1 Noise

- All companies within the industry have thorough complaint procedures in relation to noise from operations. This includes conducting noise monitoring by independent agencies and the regulator in order to ensure all vessels are compliant.

2.26.2 Navigation

- The industry has worked extensively with Marine and Safety Tasmania to ensure there is increased understanding of navigation on the waterways in which we operate for all industries and recreational users. The industry is committed to continuously improving for its workers and all other users.

2.26.3 Nutrient output

- Please refer to section 2.21.1
- BEMP monitors for changes in phytoplankton and associated nutrients; see TSGA submission (33) page 7, plankton historically experienced by the industry have been attributed to oceanic conditions and in areas where there is no salmon farming.
- Previous studies in Scotland have found that at most farm sites, enrichment levels are low and that primary production attributable to fish farm nutrients is small relative to that generated by other marine and terrestrial nutrient inputs. Research also failed to conclusively establish a link between perceived increases in Harmful Algal Blooms (HABs) and expansion of the fish farming industry.[22]

2.26.4 Hatcheries

- Please refer to section 2.13.1.

2.26.5 Antifoulants

- Copper antifoulant is no longer applied to nets and this is a significant, positive environmental achievement that cost the industry millions of dollars to achieve.

2.26.6 Barrier technology

- The industry works proactively to develop barrier technologies which provide improved safety and wellbeing for employees, the fish within the pens and wildlife.
- The industry has a global reputation for innovation in pen technology and has seen an overall decrease in seal interactions in recent years.
- These innovations have been the result of significant investment in developing and implementing new pen and net infrastructure.

2.27 Submission 93 – Environment Tasmania

TSGA's Summary of Major Issues

i. Broadscale Environmental Monitoring Program

[22] The Scottish Association for Marine Science and Napier University (2002). *Review and synthesis of the environmental impacts of aquaculture*. Scottish Executive Central Research Unit. Edinburgh, Scotland.

ii. Macquarie Harbour
iii. Hatchery Management (also 95)
iv. Economic impacts
v. Tourism
vi. Independence of monitoring

TSGA's Response to Major Issues

2.27.1 Broadscale Environmental Monitoring Program

- Please refer to section 2.3.2.

2.27.2 Macquarie Harbour

- The industry has been responsive to emerging questions relating to farming in Macquarie Harbour through the establishment of the Macquarie Harbour Dissolved Oxygen Working Group (MHDOWG). The MHDOWG is working through those questions with research currently being updated before being finalised. The MHDOWG is comprised of the industry, Hydro Tasmania, CSIRO, IMAS and DPIPWE.

2.27.3 Hatchery management

- Please refer to sections 2.13.1 and 2.13.2.

2.27.4 Economic impacts

- Please refer to 'TOR (e) The economic impacts and employment profile of the industry' on page 33 of the TSGA submission to the inquiry (no. 33).

2.27.5 Tourism

- Please refer to section 2.6.4.

2.27.6 Independence of monitoring

- Please refer to section 2.1.3.

2.28 Submission 95 – Tasmanian Aquaculture Reform Alliance

TSGA's Summary of Major Issues

i. Community consultation
ii. Human environmental impact
iii. Solastalgia
iv. Stocking density
v. Fresh water dams impact

TSGA's Response to Major Issues

2.28.1 Community consultation

- Please refer to section 2.6.1.

2.28.2 Human Environmental Impact

- Please refer to sections 2.4.1, 2.4.2 and 2.4.3.

2.28.3 Solastalgia

- Please refer to section 2.4.4.

2.28.4 Stocking density

- The Tasmanian industry exceeds global standards in relation to stocking density with a maximum stocking rate of 15kg/m3 and global best practice at 25kg/m3. This translates to an industry average of 2 per cent fish, 98 per cent water within each pen.

2.28.5 Freshwater dams

- Please refer to section 2.13.2.

2.29 Submission 96 – Greg Phillips

The information contained within this submission does not reflect the modern salmonid industry in Tasmania.

TSGA's Summary of Major Issues

i. Environmental impacts
ii. Access to fish meal & fish oil
iii. Transparency

TSGA's Response to Major Issues

2.29.1 Environmental impacts

Please see the following sections 2.22.1 and 2.26.3

2.29.2 Access to fish meal and fish oil

The Tasmanian Salmon industry **DOES NOT** source fishmeal from local fisheries and does NOT source fish or fish products resulting from the activities of the Geelong Star operated by Seafish Tasmania.

Reducing the use of fish meal and fish oil in feed is primarily a response by industry to concerns raised by environmental organisations.

2.29.3 Transparency

Please refer to *TOR (a) The adequacy and availability of data on waterway* health in the TSGA submission (no.33) on pages 7-13.

Please see the following sections 2.1.1 and 2.1.3
Huon Aquaculture and Tassal Operations support and provided information to the publically available State of the D'Entrecasteaux Channel and Lower Huon Estuary 2012 report and complementary inventory of scientific research (http://www.kingborough.tas.gov.au/page.aspx?c=6745&admin=1). Both companies support the

activities of the “D’Entrecasteaux Channel and Huon Collaboration” (http://www.ourwaterway.com.au/) which seeks to engage and share information with communities about the condition of these waterways.