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FISHERIES RESEARCH & DEVELOPMENT CORPORATION

Small Pelagics Research Co-ordination Program

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In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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Executive Summary

The Small Pelagics Research Co-ordination Program (SPRCP) was established to ensure that small pelagic fisheries R&D conducted by the FRDC was coordinated, made the most efficient use of available resources, and integrated key stakeholders including industry, government and research providers.

Small pelagic fish form an important link between primary and secondary producers and higher predators including tunas, seabirds and marine mammals. They also form some of the world's largest pelagic fisheries in the upwelling regions around the world. In Australia, despite our waters being relatively less productive, small pelagics support valuable localised fisheries for species such as sardines, anchovy and mackerels.

The introduction of large factory trawlers into the Small Pelagic Fishery revealed a significant lack of confidence and level of public distrust in the science and management of small pelagics in Commonwealth waters. This included debate over the stock status and assessment method and highlighted a need to increase our understanding of small pelagic fisheries and to better communicate this knowledge to the community and other stakeholders.

The aim of the Co-ordination Program was to build confidence in the science underpinning the sustainability of small pelagic fisheries in Australia.

This was achieved through a series of high profile workshops that included broad stakeholder engagement across industry, community, government and research, media reports and articles, and the completion of several major research projects. Research contributed significantly to the understanding of the stock status of target species in the Small Pelagic Fishery (SPF), while an international expert forum suggested that the assessment and management frameworks for Australia's fisheries for small pelagic species, especially the South Australian Sardine Fishery (SASF), were consistent with world best practice.

Despite this there remains a considerable lack of community support for SPF and more needs to be done to build social acceptance in this fishery and to counter misinformation about the sustainability of small pelagic fisheries in Australia.

Keywords
Small pelagic fish, forage fish, Jack Mackerel *Trachurus declivis*, Redbait *Emmelichthys nitidus*, Blue Mackerel *Scomber australasicus*, Australian Sardine *Sardinops sagax*, marine mammal interactions, factory trawling

Introduction

Small pelagic fish such as sardines, anchovy and mackerels form an important link between the primary and secondary producers and higher predators including tunas, seabirds and marine mammals (Bulman *et al*. 2011). They also form some of the world's largest pelagic fisheries in the upwelling regions around the world.

In Australia, despite our waters being relatively less productive, small pelagics support valuable localised fisheries.

The Commonwealth Small Pelagic Fishery (SPF) extends from southern Queensland to southern Western Australia. The SPF targets Jack Mackerel (*Trachurus declivis*, *T. symmetricus*, *T. murphyi*), Blue Mackerel (*Scomber australasicus*), Redbait (*Emmelichthys nitidus*) and Australian Sardine (*Sardinops sagax*) predominantly through purse seine and midwater trawl. The most recent assessment of the SPF showed no evidence to suggest that catch levels of any SPF quota species were not sustainable (Ward *et al*. 2013).

The South Australian Sardine Fishery (SASF), which began 1991, is the largest fishery in Australia by weight and is conducted mainly in the Spencer Gulf. Current Total Allowable Commercial Catch (TACC) is less than 25% of spawner biomass, estimated at between 150,000t and 300,000t in 2011, and is considered sustainable (Ward *et al*. 2012).

Small pelagic species are also taken in other State and Commonwealth managed fisheries and there are current plans to develop fisheries in both Northern Australia and Tasmania.

Several scientific studies have recently examined the effects of fisheries on small pelagic species (also sometimes called forage fish) and how they should be managed so as to avoid undesirable flow-on effects of these fisheries on the food web and ecosystem. There is now clear and widely agreed understanding about how these fisheries should be managed, and this understanding has a strong scientific basis (e.g. Smith *et al*. 2011). The latest and most comprehensive study and guidance comes from the Lenfest Forage Fish Task Force (Pikitch *et al*. 2012).

Although methods used to set the Total Allowable Catch (TAC) in the SPF were consistent with this scientific advice, recent attempts to introduce a factory trawler into the fishery were met with intense public resistance. Much of the concern related to perceived risks of localised depletion and the impact that this would have on fisheries for predator species (eg SBT). Thus the interaction between commercial fisheries for small pelagics and commercial and/or recreational fisheries that target predators is pertinent.

There was also considerable debate over the stock status and assessment method (Daily Egg Production Method – DEPM). This highlighted a significant level of distrust in the science and management of small pelagics, something that is likely to continue unless a concerted effort is made to increase our understanding of small pelagic fisheries and to better communicate this knowledge to the community and other stakeholders.

The aim of this project is to build confidence in the science underpinning the sustainability of small pelagic fisheries in Australia.

Objectives

1. To administer and co-ordinate the activities of FRDC funded small pelagics (SP) research
2. To review project proposals to ensure stakeholder relevance
3. To review milestone reports and final reports
4. To facilitate and chair meetings of the SP Technical Committee
5. To ensure appropriate liaison between beneficiaries and research providers
6. To provide advice to FRDC, DAFF, AFMA and other stakeholders on SP research
7. To communicate findings of SP research through:
    a. Research meetings (possibly held in conjunction with a major conference such as ASFB or Seafood Directions)
    b. Specialist workshops aimed at stakeholders on topics identified through the course of the program; and
    c. Relevant articles in the media and Fish magazine

Method

Program Structure

The aim of the Program was to ensure that small pelagic fisheries R&D is coordinated, makes the most efficient use of available resources, and integrates key stakeholders including industry, government and research providers. The administrative arrangements are designed to ensure that the Small Pelagic Research Coordination Program (SPRCP) addresses the proposed industry and government requirements for small pelagic fisheries, and that effective and efficient communication is maintained. Research needs and direction for the Program will be established through collaboration and close consultation with the DAFF, AFMA (SPF RAG) and relevant State bodies (FRABs, State departments).

Principal Investigator

The PI (Buxton) was the conduit for all communications between the FRDC and stakeholders, and was responsible for all activities of the SPRPC including:

- Milestone reporting of this project to FRDC.
- Schedule, call, chair and record all meetings of the SPRPC.
- Organise Workshops & Seminars – liaise with the Project Leaders and stakeholders to identify topics & speakers. Capture outcomes in the form of workshop proceedings.
- Review Project proposals, particularly from the perspective of Industry and Government stakeholder relevance.
- To review research progress against milestones so as to ensure that research directions are commercially focussed and are outcome driven thereby meeting the needs of FRDC.
- To approve and recommend draft final reports to the FRDC, assisting in the external review where appropriate.
- Effectively engage and facilitate liaison between the sector stakeholders (Industry, Government and Research Providers) on matters of R&D.
- Co-ordinate all Public Relations (PR) and media relating to the program and research projects, identifying inputs for the FRDC magazine Fish.

Technical Group

A Technical Group was formed to provide input and advice on the research program and other matters as needed. The membership of the Small Pelagic Technical Group (SPTG) included:

- Program Manager (Chair), Prof Colin Buxton
- FRDC Program Manager, Crispian Ashby
- Principal Investigators associated with Small Pelagic research

The Technical Group was to meet annually or as required and stakeholder representation was requested as required. The tasks of the SPTG were to:

- Devise an appropriate research response to specific research questions and needs.
- Assess new research applications and recommend budget allocations for selected projects.
- Recommend changes to projects and where necessary make recommendations on the termination of projects.
- Act as a discussion forum and to provide regular internal peer review of project progress.

Stakeholder Forum

The Program facilitated a Stakeholder Forum where research findings were communicated to

stakeholders. This included workshopping areas of special interest identified through the course of the research.

Key stakeholders included:

- FRDC
- Department of Agriculture and Water Resources
- AFMA and State Fisheries Departments
- Commercial fishing
- Recreational fishing
- Community ENGOs
-

Results, Discussion and Conclusions

The results against each of the objectives are summarised below.

Objective 1. To administer and co-ordinate the activities of FRDC funded small pelagics (SP) research

During the life of the project the Small Pelagic project portfolio included:

Project Number	Project Title	Principle Investigator	Organisation (Collaborators)
2013/028	Review and update harvest strategy settings for the Commonwealth Small Pelagic Fishery – Single species and ecosystem considerations	Tony Smith	CSIRO
2013/053	Summer spawning patterns and preliminary Daily Egg Production Method survey of Jack Mackerel and Sardine off the East Coast	Tim Ward	SARDI
2013/063	Benchmarking Australia's small pelagic fisheries against world's best practice	Tim Ward	SARDI
2014/022	Developing a rapid molecular identification technique to improve egg production based fish biomass assessments	Richard Saunders	James Cook University
2014/026	Looking at the robustness and precision of estimates of egg production and spawning biomass obtained using the daily egg production methodology (DEPM)	Tim Ward	SARDI
2014/033	Egg distribution, reproductive parameters and spawning biomass of Blue Mackerel, Australian Sardine and Tailor off the east coast during late winter and early spring	Tim Ward	SARDI (UTas, Fisheries QLD and NSW DPI)
2014/046	Technical workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery	Jim Fitzgerald Crispian Ashby Colin Buxton	FRDC & CB and Associates

An overview of the projects and their status at the conclusion of the project is follows:

Project 2013/028 – Review and update harvest strategy settings for the Commonwealth Small Pelagic Fishery – Single species and ecosystem considerations

This project was completed and a final report was published in January 2015.
http://frdc.com.au/research/Final_Reports/2013-028-DLD.pdf

This study undertook ecosystem and population modelling to evaluate and provide advice on the reference points (e.g. biomass depletion levels) and settings (e.g. exploitation rates) for the four main target species in the harvest strategy of the Commonwealth Small Pelagic Fishery (SPF) – Jack Mackerel *Trachurus declivis*, Redbait *Emmelichthys nitidus*, Blue Mackerel *Scomber australasicus* and Australian Sardine *Sardinops sagax*. The project was developed at the request of the Resource Assessment Group for the SPF (SPFRAG). The focus was to improve the harvest strategy for the fishery to make it fully compliant with the Commonwealth Harvest Strategy Policy (HSP).

The study used a new variant of the Atlantis ecosystem model (Atlantis-SPF). Findings on the effects of fishing the four SPF target species on other parts of the food chain are clear. Both singly and in combination, depleting these target species has only minor impacts on other parts of the ecosystem. Unlike some other regions which show higher levels of dependence on similar species, such as in Peru and the Benguela systems, the food web in southern and eastern Australia does not appear to be highly dependent on SPF target species. None of the key higher trophic level predators in SE Australia, such as seals, penguins and tunas, has a high dietary dependence on these species. Studies using other ecosystem models such as Ecosim in the same region have reached similar conclusions.

The findings have implications for the target and limit reference points that should be selected for the main commercial species in the SPF. Equilibrium BMSY for these species ranged from about 30 to 35% of unfished levels. However, these levels are uncertain and it may be more appropriate to use the default values from the HSP with BMSY set at B40 (40% of unfished levels) and the default BMEY set at 1.2 times this level, close to B50. This study suggests that the target reference point for these SPF target species should be set at B50 and the limit reference point at B20, in line with the HSP default settings. The results presented in this report, combined with evidence from other studies, suggest that these levels are safe from an ecosystem perspective and provide reasonable levels of yield relative to MSY.

Population modelling suggests that target exploitation rates (ERs) for the SPF should be species-specific and possibly even stock-specific. The current average Tier 1 harvest rate of 15% appears to be too high for eastern Redbait. Taking account of some of the sensitivity scenarios, it may also be too high for western Redbait and Jack Mackerel.

Our results help inform the choice of suitable ERs for each of the species and stocks. For Tier 1, the analyses focus on achieving the reference points recommended by the ecosystem modelling, that it is to achieve a median depletion of 0.5 or B50, while maintaining less than a 10% chance of falling below the suggested limit reference point of B20. The base case exploitation rates that achieve this target, assuming surveys every five years, are as follows:

- Eastern Redbait 9%
- Western Redbait 10%
- Jack Mackerel 12%
- Eastern Blue Mackerel 23%
- Western Blue Mackerel 23%
- Eastern Sardine 33%
- Western Sardine 33%

In the current harvest strategy Tier 2 rates are set at half the Tier 1 rate. We assumed that the Tier 2

rate would only be applied after 5 years of exploitation at Tier 1, and that no further surveys would take place. It is generally not safe to apply Tier 2 for long periods of time unchecked. Particularly for the shorter lived species (Blue Mackerel and Sardine), this can result in unacceptable probabilities of depletion in quite short periods of time (5 or 6 years), while the period is on the order of 20 years for the other two species. An alternative approach would be make the Tier 2 rate more precautionary (i.e. less than half the Tier 1 rate) and/or reduce the period over which it is applied (e.g. not more than 5 years).

Project 2013/053 – Summer spawning patterns and preliminary Daily Egg Production Method survey of Jack Mackerel and Sardine off the East Coast

This project was completed and a final report published in March 2015.
http://frdc.com.au/research/Final_Reports/2013-053-DLD.pdf

This study was the first dedicated application of the Daily Egg Production Method (DEPM) to Jack Mackerel, *Trachurus declivis*. It successfully collected large numbers of samples of eggs and adults concurrently from the key spawning area off eastern Australia during what has been previously identified as the main spawning period. The study established an effective method for sampling adult Jack Mackerel and provides the first estimate for this species of the adult reproductive parameters required for application of the DEPM. The spawning biomass of Jack Mackerel off eastern Australia during January 2014 was estimated to be approximately 157,805 t (95% CI = 59,570 – 358,731).

This was also the first study to investigate the spawning habitat of Australian Sardine *Sardinops sagax* off eastern Australia during summer. It showed that during January 2014 spawning occurred between northern Tasmania and southern Victoria. The spawning biomass at this location during this period was approximately 10,962 t. This estimate should be treated with caution as adult samples were not collected during the study. It is also important to note that this is not an estimate of the total adult biomass of Australian Sardine off eastern Australia. It is only an estimate of the portion of the population that was spawning in this southern part of the range during that period. The main spawning area of Australian Sardine off eastern Australia occurs off southern Queensland and northern NSW during late winter and early spring.

Jack Mackerel and Australian Sardine are the only two Small Pelagic Fishery species that have not been subject to dedicated DEPM surveys off eastern Australia. This project was conducted to acquire the knowledge needed to support ongoing ecologically sustainable management of these species. Knowledge of the summer spawning patterns of Jack Mackerel and Australian Sardine is needed to underpin future assessment of these stocks. The DEPM was used to estimate the population size of Jack Mackerel and Australian Sardine off eastern Australia because this was the preferred stock assessment technique specified in the harvest strategy for the SPF and considered to be the most appropriate for this species.

Results from the present study provides insights into the catch levels that may be suitable for any developmental fishery that may be established in the Tasmanian and Bass Strait region. Egg samples collected in the present and related studies (e.g. FRDC Project 2014/033) could potentially be used to support a cost-effective study of the stock structure of Australian Sardine off eastern Australia.

This study made some crucial technical developments (e.g. established an adult sampling method for Jack Mackerel) and filled several key knowledge gaps (e.g. provided the first estimates of adult reproductive parameters for Jack Mackerel). However, a follow up study is required to fill both remaining gaps (e.g. the size-fecundity relationship for Jack Mackerel) and those identified during

the course of the project (e.g. spatial, temporal and size-related variations in spawning fraction of Jack Mackerel) and to further improve the accuracy of the work.

Project 2013/063 - Benchmarking Australia's small pelagic fisheries against world's best practice

This project was completed and a final report published in Dec 2015
http://frdc.com.au/research/final-reports/Pages/2013-063-DLD.aspx

Discussions at the technical workshop suggested that the assessment and management frameworks for Australia's fisheries for small pelagic species, especially the South Australian Sardine Fishery (SASF), are consistent with world's best practice with respect to:

- application of fishery-independent stock assessment techniques such as the Daily Egg Production Method (DEPM);
- establishment and use of formal harvest control rules or operational management procedures (i.e. harvest strategies);\
- assessment of the ecosystem effects of fishing;
- mitigation of operational interactions with wildlife.

Participants in the technical workshop also considered that it was appropriate that the Commonwealth Small Pelagic Fishery (SPF) is building on the approaches that have supported the successful development of the SASF. It was generally agreed that concerns regarding the risks of localised depletion in the SPF may be best addressed by establishing precautionary harvest guidelines based on existing knowledge.

Participants in the stakeholder forum considered that the assessment and management framework for the SASF compared well to other fisheries worldwide. Most concerns related to the introduction of a large freezer-trawler into the SPF. Industry expressed concerns about political intervention into fisheries management related to introduction of this vessel and "unrealistic" expectations regarding the level of scientific information required prior to the commencement of the fishery. Other stakeholders expressed concerns that non-industry views were not given adequate consideration by fisheries management agencies or scientists and that more research was needed before the SPF is developed. It was widely agreed that effective communication among stakeholders and a genuine co-management approach should be re-established in the SPF.

The workshop identified several areas of research that should be undertaken to improve the assessment and management frameworks of Australia's fisheries for small pelagic fisheries, including: 1) comparing estimates of adult parameters obtained using gill-nets, purse-seine nets and trawl nets; 2) reviewing approaches taken to estimating spawning fraction; and 3) examining the benefits and limitations of using a population model and/or DEPM estimates of spawning biomass to sets TACs.

Project 2014/022 - Developing a rapid molecular identification technique to improve egg production based fish biomass assessments

This project is ongoing. The aim of the project is to develop a low cost DNA-based egg identification method for fish species in N Australia and to assess its application to the DEPM for biomass estimation.

To date two Milestone Progress Reports have been submitted (Jan 2015). Species specific primers have been developed for mackerels and bead array is working for mackerels.

Project 2014/026 - Improving the precision of estimates of egg production and spawning biomass obtained using the Daily Egg Production Method

This project is ongoing. The aim is to compare the performance of current and developmental statistical methods for estimating egg production using long-term datasets for several species and through simulation modelling establish improved methods for estimating daily egg production in applications of the DEPM.

To date the first Milestone Progress Report had been submitted (Jan 2015). Refined methods for estimating egg production have been developed (exponential model, a log-linear model and several generalised linear models. Alternative approaches are currently being explored. These approaches have been applied to Australian Sardine Jack Mackerel and latter to Australian Anchovy, Blue Mackerel and Redbait.

Project 2014/033 – Egg distribution, reproductive parameters and spawning biomass of Blue Mackerel, Australian Sardine and Tailor off the east coast during late winter and early spring

This project was completed and a final report published in Dec 2015.
http://frdc.com.au/research/final-reports/Pages/2014-033-DLD.aspx

The spawning biomass of Blue Mackerel off eastern Australia during August-September 2014 was estimated to be ~83,300 t (95% CI = 35,100 - 165,000 t). Most estimates of spawning biomass obtained in the sensitivity analyses were mainly 50,000 t and 100,000 t. The estimate of spawning biomass should be treated with caution as adult samples were not collected during the study. Sampling intensity for estimates of egg production in the region was higher than in exploratory surveys conducted in 2003 and 2004. Current estimates of egg production and spawning area are likely to be more robust than those previously reported.

The spawning biomass of Australian Sardine off eastern Australia during August-September 2014 was estimated to be ~49,600 t (95% CI = 24,200 - 213,300 t). Most estimates of spawning biomass obtained in sensitivity analyses were between 30,000 t and 110,000 t. Credible values for only one parameter (spawning fraction) provided estimates of spawning biomass that were outside that range; this parameter was estimated with a high degree of confidence in the present study. The proportion of the adult biomass of Australian Sardine off eastern Australia that occurred outside the survey area during the survey period is unknown.

This study made some crucial technical developments (e.g. established a robust method for ageing fish eggs from field surveys) and filled several key knowledge gaps (e.g. estimates of adult reproductive parameters for Australian Sardine and Tailor off the east coast). However, further study is required to fill remaining gaps (e.g. adult parameters for Blue Mackerel off the east coast

and egg production/spawning area and batch fecundity for Tailor) and those identified during the course of the project (e.g. spawning habitat and egg stages of Tailor).

Project 2014/046 – Technical workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery

This project was completed and a final report published in Jul 2015
http://frdc.com.au/research/final-reports/Pages/2013-063-DLD.aspx

The report outlines the presentations, discussions and recommendations of a technical workshop held in Melbourne on the 25th - 26th June on marine mammal interactions and potential mitigation options for the Small Pelagic Fishery (SPF).

The workshop was organised by Jim Fitzgerald, Crispian Ashby and Colin Buxton and chaired by Colin Buxton.

Based on the workshop presentations and subsequent discussions, ten recommendations were agreed to by the workshop participants. These recommendations were split into eight short term and two medium to long term objectives to allocate the timeframe for their adoption and action. The adoption and actioning of these recommendations will be dependent on the availability of resources to undertake the activity.

In the first instance the industry and the fisheries management agency will need to assess activities the recommendations that could be addressed in the immediate and short term. It was noted that some of these recommendations are already being considered. The medium and longer term recommendations will require further discussion and collaboration between government agencies (DA, EA, AFMA), FRDC and industry on how they could be actioned.

Objective 2. To review project proposals to ensure stakeholder relevance

Only one proposal was submitted for review during the life of the project:

2014/046 Technical workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery.

Objective 3. To review milestone reports and final reports

Through the life of the project milestones and draft final reports for the projects outlined above were reviewed by the PI.

Objective 4. To facilitate and chair meetings of the SP Technical Group

The Terms of Reference for the SPTG were:

- To devise an appropriate research response to specific research questions and needs.
- To assess new research pre-proposals and recommend budget allocations for selected projects.

- To recommend changes to projects and where necessary make recommendations on the termination of projects.
- To act as a discussion forum and to provide regular internal peer review of project progress

The establishment of the SPTG was however delayed until the findings of the Lack Review[1] were released in 2014.

The SPTG comprising the PIs on each of the projects was established as follows:

Colin Buxton (2014/029)
Tony Smith (2013/028)
Tim Ward (2013/053; 2013/063; 2014/026; 2014/033)
Richard Saunders (2014/022)
Crispian Ashby (FRDC)

In addition to these members Mike Steer was invited to attend as his work on DEPM methods for snapper (FRDC 2014/022) was relevant.

The SPTG met in Melbourne on 25th March 2015.

Objective 5. To ensure appropriate liaison between beneficiaries and research providers

See below report on FRDC 2013/063 *Benchmarking Australia's small pelagic fisheries against world's best practice* held in Adelaide, and FRDC 2014/046 *Small Pelagic Research Coordination Program: Technical Workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery* held in Melbourne.

Objective 6. To provide advice to FRDC, DAFF, AFMA and other stakeholders on SP research

Activities included:

- Advice to the FRDC, DAWR, AFMA and the Minister's office on matters relating to the SPF research on several occasions during the life of the project.
- Attended the SPFRAG on 4th September 2014.
- Project briefings on SPF research were provided to several stakeholder groups including Brett Cleary (AGFA), Rob Pennicott (RP cruises), Mark Nikolia (Tarfish), Robert Gott (DPIPWE), John Harris (WAFIC) and Paul Watson (SASIA).
- Represented FRDC at a SPF MSC Session with SCS Global Services on 12/12/2014 (see Appendix 1).
- Provided input to the FRDC submission to the assessment of the Declared Commercial Fishing Activity (Small Pelagic Fishery) and the FRDC submission to the Senate inquiry into large capacity fishing vessels.

[1] Report of the Expert Panel on a Declared Commercial Fishing Activity: Final (Small Pelagic Fishery) Declaration 2012 (http://www.environment.gov.au/marine/fisheries/commonwealth/small-pelagic)

Objective 7. To communicate findings of SP research through:

7.1 Research meetings (possibly held in conjunction with a major conference such as ASFB or Seafood Directions)

During the life of the project the PI attended two major international conferences on behalf of the FRDC,

144th Meeting of the American Fisheries Society – August 17-21 2014 Quebec City Canada

The purpose of this visit was to attend a Forage Fish Symposium entitled: *Pelagic Fish Stocks on the Move and in the News: Collapse, Recovery, or Something Else?*

Together with Jeremy Lyle (IMAS) a paper was presented entitled: *Small Pelagics in the News: Emerging Importance of Social Licence in the Australian Fisheries Landscape*

Abstract: The arrival of a factory trawler in Australian waters to fish in the Commonwealth Small Pelagic Fishery (SPF) followed a significant period of fisheries management planning and research aimed at ensuring that this activity was sustainable. However, in response to an intense social media campaign led by international conservation groups, some politicians and recreational fishers, the Australian government imposed a moratorium on the operations of this vessel. This presentation documents the history and events that led to the government's rejection of its own independent science-based fisheries management process in what was clearly a contentious political decision. In the context of the scientific framework for the SPF it explores the risks that Australian fisheries face when political expediency overrides evidence based fisheries policy and management, highlighting the emerging importance of social licence in fisheries landscape.

A copy of the presentation is provided as Appendix 2.

IUCN World Parks Congress 2014 – 12-19 November 2014 at Sydney Olympic Park.

The format of this congress was different to usual academic conferences in that the focus was on networking and information sessions relating to the many marine reserve activities and initiatives around the world. Clearly some delegates were there to attend many other side meetings of the IUCN, WWF etc.

Few of the talks attended focussed specifically on the interaction of fisheries and marine reserves. Perhaps the most interesting was a talk by Serge Garcia, Chair of the IUCN Fisheries Group who was promoting his new book *Governance of Marine Fisheries and Biodiversity Conservation: Interaction and Coevolution*. He noted that fisheries and conservation agreed on the endpoint but differed on how to get there. However, he believed that after many years of divergence, fisheries management and conservation were now converging.

The issue of targets for no-take MPAs was a topic raised in the media https://theconversation.com/now-is-our-chance-to-deliver-on-the-30-ocean-protection-target-34127. This promoted lively discussion.

Interestingly, although I attended most of the sessions relating to the Marine Cross-cutting theme, I was unaware of any discussion around targets or their recommendations which were finalised post congress. The recommendations from participants in the Marine Cross-cutting Theme (http://worldparkscongress.org/downloads/approaches/ThemeM.pdf) aim to create a fully sustainable ocean, at least 30% of which has no-extractive activities. This target has significant

potential to impact fisheries although importantly the Australian government does not subscribe to this or any target for that matter.

7.2 Specialist workshops aimed at stakeholders on topics identified through the course of the program; and

Benchmarking Australia's small pelagic fisheries against world's best practice (FRDC 2013/063)

The PI chaired the international workshop and stakeholder forum on fisheries for small pelagic species was held at the South Australian Aquatic Sciences Centre from 14-18 July 2014. The objective of the workshop was to benchmark Australia's fisheries for small pelagic species against world's best practice. The objective of the stakeholder forum was to provide stakeholders with an opportunity to compare approaches taken in Australia's small pelagic fisheries with those taken elsewhere.

The PI also gave a talk entitled: *Loss of the social licence to fish: Commonwealth Small Pelagic Fishery* co-authored by Dr Jeremy Lyle of the Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, 7001, Australia (see Appendix 3)

Abstract: The Commonwealth Small Pelagic Fishery (SPF) encompasses Commonwealth waters (3-200 nm from the Australian coastline) from southern-eastern Queensland around southern Australia to Western Australia and is divided into two management sub-areas. The target species include blue mackerel (*Scomber australasicus*), three species of jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*), redbait (*Emmelichthys nitidus*) and Australian sardine (*Sardinops sagax*).

Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Significant fishing for jack mackerel occurred in the 1980s and 1990s, with most fishing activity centered off Tasmania because of limitations on the vessel range and the port facilities. It has involved both purse seine (targeting jack mackerel) and mid-water trawl activity (targeting redbait and jack mackerel) with over 100,000 t taken in three years during the 1980s and catches throughout the 1990s averaging over 10,000 t per annum.

The fishery substantially reduced in scale and catch during the 2000s and 2010s because it was very marginal economically. This strengthened the resolve to introduce factory trawling into the fishery, something that was first mooted in 2004. It was resisted at the time because it was felt that there was not an appropriate management framework, nor sufficient understanding of the stocks. What followed was an intensive period of research and policy development which led to the introduction of a Management Plan, Ecological Risk Assessment, Harvest Strategy, accreditation under the Environmental Protection and Biodiversity Conservation Act, export permission and ITQ Statutory Fishing Rights. In effect the SPF management regime was completed in 2012.

Following a period of consultation with the Commonwealth Government and AFMA in 2011, a local fishing company, Seafish Tasmania, announced plans to introduce the Margiris, a large Dutch-owned factory trawler, into the SPF. At the same time Seafish provided written briefings to the government (Labour and Liberal), and advised peak industry bodies and ENGOs of their plans.

The announcement that the Margiris was to leave Europe bound for Australia precipitated a Greenpeace led petition and protest against its potential to overfish Australian waters. This action was joined by several other Australian ENGOs and the recreational fishing fraternity, who mounted an intense social media campaign against the so-called supertrawler.

Much of the social media and other commentary was fuelled by misinformation and a disregard of the science underpinning the fishery. However, the campaign forced the Commonwealth Government to change legislation and to back down from their initial support of factory trawling in the SPF, implementing a two year moratorium on vessels over 130m pending the outcome of a review into the fishery. This effectively stopped the Margiris.

This presentation examines the loss of social licence to fish and the lessons learned from the campaign against the introduction of factory trawling into the SPF. It concludes that although the science behind the SPF was relatively robust, science communication was ineffective in the public debate. Allowing political pressure to override policy is seen as a backward step and, while it can be a positive that interest groups are becoming more engaged, if they are misinformed or they misinform the general public, their influence may be negative on established governance systems, potentially leading to undesirable outcomes for society as a whole.

Technical workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery

The report outlines the presentations, discussions and recommendations of a technical workshop held in Melbourne on the 25th - 26th June on marine mammal interactions and potential mitigation options for the Small Pelagic Fishery (SPF). The workshop was chaired by Prof Colin Buxton.

7.3 Relevant articles in the media and Fish magazine

SBS News 26 November 2014 Super trawlers could be back in Australian waters soon http://www.sbs.com.au/news/article/2014/11/26/super-trawlers-could-be-back-australian-waters-soon

SBS Ethnic Radio – Sarah Abo report on super trawlers 27 Nov 2014

ABC News – 25 June 2015 Factory trawler Geelong Star operators Seafish Tasmania in workshop on how to avoid killing sea mammals http://www.abc.net.au/news/2015-06-25/factory-trawler-operator-in-mammal-kill-workshop/6571406

Landline – 22 Feb 2015 They're Back http://www.abc.net.au/news/2015-06-25/factory-trawler-operator-in-mammal-kill-workshop/6571406

Mercury – 27 April 2015 Researcher dismisses recreational fishers' fears over trawler Geelong Star http://www.themercury.com.au/news/tasmania/researcher-dismisses-recreational-fishers-fears-over-trawler-geelong-star/news-story/0be6fc21dbd2fbba83f2495d1846d3e4?sv=6df803edc977c8ca26ce05fcbb455380

FISH Small size, big role
http://frdc.com.au/stories/Pages/28_Small-size-big-role.aspx

Implications

The outputs and outcomes of each of the projects in the SPF portfolio are provided in individual final reports. The workshops were both well received and have lead to practical outcomes for the fishery for example the adoption of mitigation devices in the fishery and the establishment of an expert group to evaluate mammal population estimates.

From a broader perspective project 2013/064 was able to co-ordinate stakeholder interaction and media responses as well as provide support to Commonwealth agencies and the Minister's office when needed.

Extension and Adoption

The project was extended and communicated to end users (managers, other researchers, industry and the broader community) through workshops, media and verbal presentations at several conferences.

References

Bulman, C.M., Condie, S.A., Neira, F.J., Goldsworthy, S.D. & Fulton ,E.A. 2011. *The trophodynamics of small pelagic fishes in the southern Australian ecosystem and the implications for ecosystem modelling of southern temperate fisheries*. FRDC 2008/023 Final Report. 101pp.

Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. (2012) *Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs*. Lenfest Ocean Program. Washington, DC. 108 pp. http://www.oceanconservationscience.org/foragefish/

Smith, A.D.M., Brown, C.J., Bulman, C.M., Fulton, E.A., Johnson, P., Kaplan, I.C., Lozano-Montes, H., Mackinson, S., Marzloff, M., Shannon, L.J., Shin, Y-J. and Tam, J. (2011) Impacts of fishing low-trophic level species on marine ecosystems. *Science*, 333: 1147-1150.

Ward, T.M, Ivey, A. & Gorman, D. 2013. *Commonwealth Small Pelagic Fishery Assessment Report 2012*. Report to the Australian Fisheries Management Authority. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No F2010/000270-4. SARDI Research Report Series No 696. 100pp.

Ward, T.M, Burch, P. & Ivey, A.R. 2012. *South Australian Sardine (*Sardinops sagax*) Fishery: Stock Assessment Report 2012*. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No F2007/000765-4. SARDI Research Report Series No 667. 101pp.

Appendices

Appendix 1: SCS Global Services Assessment Meeting

Appendix 2: Presentation to 144th American Fisheries Society Symposium: Pelagic Fish Stocks on the Move and in the News: Collapse, Recovery, or Something Else?

Appendix 3: Presentation to Benchmarking Australia's small pelagic fisheries against world's best practice (FRDC 2013/063)

AGENDA FOR ONSITE ASSESSMENT MEETING

OF THE AUSTRALIAN SMALL PELAGIC FISHERY

12th Hobart, Australia
15th -16th Canberra, Australia

Meeting will be conducted by the SCS Global Services (SCS) Assessment Team to establish whether the Blue Grenadier Fishery, defined by the Unit of Certification in Table 1, may be certified as sustainable in accordance with the Marine Stewardship Council (MSC) Principles.

Table 1: Unit of Certification

	3 Units of Certification
Species	1. Redbait (*Emmelichthys nitidus*), 2. Jack mackerel (*Trachurus declivis*) and 3. Blue mackerel (*Scomber australasicus*)
Geographical Area	Southern Ocean within Australian EEZ
Method of Capture	Mid-water trawl
Stock	Commonwealth Trawl Sector biological stock
Management System	Input controls: limited entry, gear restrictions, move on requirement for sensitive species, temporary spatial closures. Output controls: TAC
Client	Small Pelagic Fishery Industry Association (SPFIA)

CLIENT REPRESENTATION: Mr. Gerry Geen, Executive Member SPFIA

ASSESSMENT TEAM: Dr. Sabine Daume (Team Leader), Dr. Carlos M. Alvarez Flores, Dr Klaas Hartmann and Kevin McLoughlin (Team Members).

SCOPE: The SCS Assessment Team will conduct will conduct the assessment of the fishery using the default assessment tree (CR v1.3, January 2013). Performance Indicators will be scored based on the Scoring Guideposts (PISG) and MSC guidelines (CR v1.3, January 2013).

Table 2: Expected Meeting Attendees

Name	Role	Affiliation
Sabine Daume	Assessment Team Leader	SCS Global Services
Klaas Hartmann	Principle 1 Team member	UTAS
Carlos M. Alvarez Flores	Principle 2 Team member	Consultant
Kevin McLoughlin	Principle 3 Team member	Consultant
Gerry Geen	Client Representative	Small Pelagic Fishery Industry Association
Tim Ward Jeremy Lyle (TBC)	Stock status/ harvest strategy	SARDI UTAS
Steve Shanks	Management	AFMA
Toby Patterson	Ecosystem/ ERA	CSIRO

Beth Fulton	Ecosystem modelling/ ERA	CSIRO
Mike Gerner	Ecosystem/ ERA	AFMA
Fiona Hill	Fisheries Management (Observer)	Parliamentary Secretary to the Minister for Agriculture
Jon Bryan/ Rebecca Hubbard	Stakeholders	Tasmanian Conservation Trust/ Environment Australia - The Conservation Council
Mark Nikolai Graham Pike	Stakeholders	TARFISH (Tasmanian Association for Recreational Fishing) Recfish Australia (by phone)
Adrian Gutteridge	Observer	MSC

DAY 1

12th December 2014, 0900 – 1600
TBC, IMAS, Battery Point, Hobart

0900 – 1000 Orientation with the Assessment Team
(Assessment Team, SCS and client representative)

1000 – 1100 Stakeholder engagement (Assessment Team SCS and stakeholders, Tasmanian Conservation Trust, Environment Tasmania, Tarfish and Recfish Australia)

1100 – 1200 Principle 1 data review
(Assessment Team SCS, CSIRO and UTAS Staff and client representative)

1200 – 1300 Break

1300 – 1500 Principle 2 data and document review
(Assessment Team, SCS, CSIRO and UTAS Staff and client representative)

1500 – 1600 Review of first day and planning for meetings in Canberra
(Assessment Team, SCS and client representative)

DAY 2

15th December 2014, 0900 – 1700
Conference Room, Level 6, AFMA, Level 6, 73 Northbourne Ave, Canberra

0900 – 1000 Orientation with the Assessment Team
(Assessment Team, SCS and client representative)

1000 – 1200	Principle 3 data and document review (Assessment Team, SCS, SARDI AFMA Staff and client representative)
1200 – 1300	Break
1300 – 1500	Principle 1 and 2 data and document review cont. (Assessment Team, SCS, SARDI, AFMA Staff and client representative)
1500 – 1700	Review of second day with client and request of further info and documents if required (Assessment Team, SCS and client representative)

DAY 3

16th December 2014, 0900 – 1600
Meeting Room, AFMA, Canberra

0900 – 1000	Potential additional stakeholder meeting or consultation over phone (Assessment Team, SCS and stakeholder only)
1000 – 1500	Scoring meeting (Assessment Team, SCS only)
1500 – 1600	Closing meeting with the Client (Assessment Team, SCS and client representative)

Loss of social license to fish: Commonwealth Small Pelagic Fishery

Colin D. Buxton & Dr Jeremy Lyle
Fisheries, Aquaculture and Coasts Centre, IMAS

Address to **American Fisheries Society**

18-19 August 2014, Quebec City CANADA.

Abstract

The arrival of a factory trawler in Australian waters to fish in the Commonwealth Small Pelagic Fishery (SPF) followed a significant period of fisheries management planning and research aimed at ensuring that this activity was sustainable. However, in response to an intense social media campaign led by international conservation groups, some politicians and recreational fishers, the Australian government imposed a moratorium on the operations of this vessel. This presentation documents the history and events that led to the government's rejection of its own independent science-based fisheries management process in what was clearly a contentious political decision. In the context of the scientific framework for the SPF it explores the risks that Australian fisheries face when political expediency overrides evidence based fisheries policy and management, highlighting the emerging importance of social licence in fisheries landscape.

The Commonwealth Small Pelagic Fishery (SPF) encompasses Commonwealth waters (3-200 nm from the Australian coastline) from southern-eastern Queensland around southern Australia to Western Australia and is divided into two management sub-areas. The target species include blue mackerel (*Scomber australasicus*), three species of jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*), redbait (*Emmelichthys nitidus*) and Australian sardine (*Sardinops sagax*).

Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Significant fishing for jack mackerel occurred in the 1980s and 1990s, with most fishing activity centered off Tasmania because of limitations on the vessel range and the port facilities. It has involved both purse seine (targeting jack mackerel) and mid-water trawl activity (targeting redbait and jack mackerel) with over 100,000 t taken in three years during the 1980s and catches throughout the 1990s averaging over 10,000 t per annum.

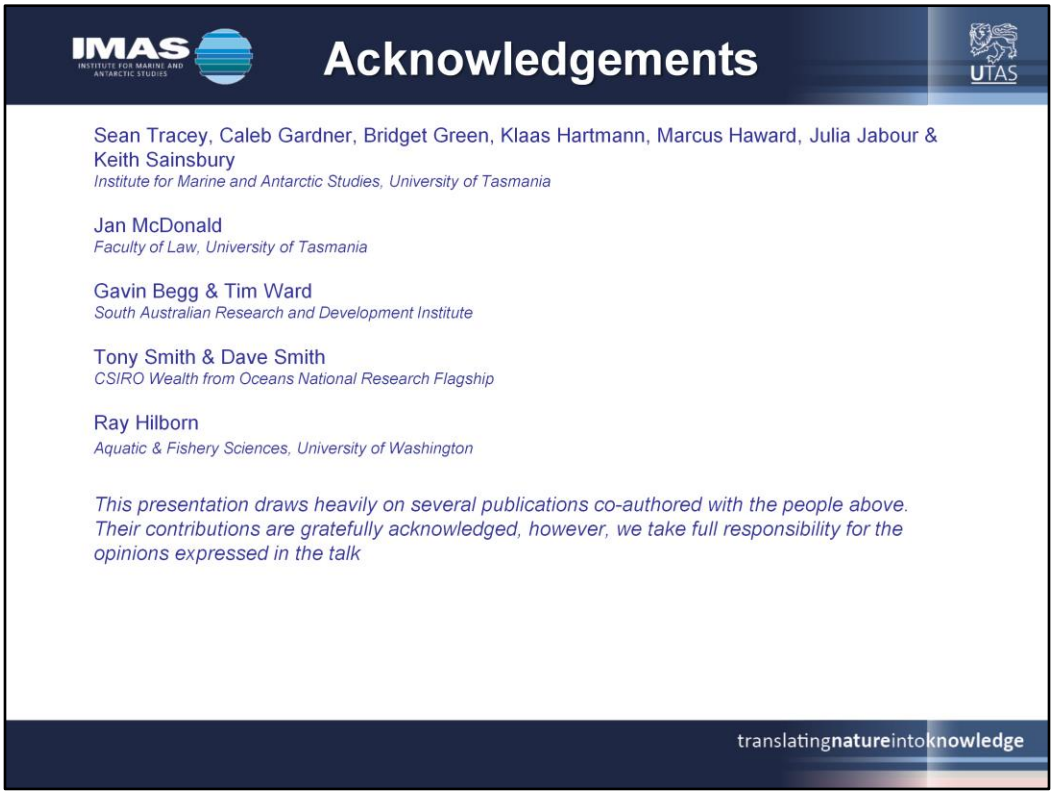
The fishery substantially reduced in scale and catch during the 2000s and 2010s because it was very marginal economically. This strengthened the resolve to introduce factory trawling into the fishery, something that was first mooted in 2004. It was resisted at the time because it was felt that there was not an appropriate management framework, nor sufficient understanding of the stocks. What followed was an intensive period of research and policy development which led to the introduction of a Management Plan, Ecological Risk Assessment, Harvest Strategy, accreditation under the Environmental Protection and Biodiversity Conservation Act, export permission and ITQ Statutory Fishing Rights. In effect the SPF management regime was completed in 2012.

Following a period of consultation with the Commonwealth Government and AFMA in 2011, a local fishing company, Seafish Tasmania, announced plans to introduce the *Margiris*, a large Dutch-owned factory trawler, into the SPF. At the same time Seafish provided written briefings to the government (Labour and Liberal), and advised peak industry bodies and ENGOs of their plans.

The announcement that the Margiris was to leave Europe bound for Australia precipitated a Greenpeace led petition and protest against its potential to overfish Australian waters. This action was joined by several other Australian ENGOs and the recreational fishing fraternity, who mounted an intense social media campaign against the so-called supertrawler.

Much of the social media and other commentary was fuelled by misinformation and a disregard of the science underpinning the fishery. However, the campaign forced the Commonwealth Government to change legislation and to back down from their initial support of factory trawling in the SPF, implementing a two year moratorium on vessels over 130m pending the outcome of a review into the fishery. This effectively stopped the *Margiris*.

We conclude that although the science behind the SPF was relatively robust, science communication was ineffective in the public debate. Allowing political pressure to override policy is seen as a backward step and, while it can be a positive that interest groups are becoming more engaged, if they are misinformed or they misinform the general public, their influence may be negative on established governance systems, potentially leading to undesirable outcomes for society as a whole.



BUXTON, C.D, BEGG, G., LYLE, J.R., WARD, T., SAINSBURY, K., SMITH, T. & SMITH, D. 2012. The Commonwealth Small Pelagic Fishery: General background to the scientific issues. 2012. IMAS Report: 27pp. https://www.researchgate.net/publication/255787553_THE_COMMONWEALTH_SMALL_PELAGIC_FISHERY_GENERAL_BACKGROUND_TO_THE_SCIENTIFIC_ISSUES?ev=prf_pub

Colin Buxton, Caleb Gardner, Jeremy Lyle & Ray Hilborn. 2013. Super trawler gone but is fisheries management in trouble? *Conversation*. http://theconversation.com/super-trawler-gone-but-is-fisheries-policy-in-trouble-12755

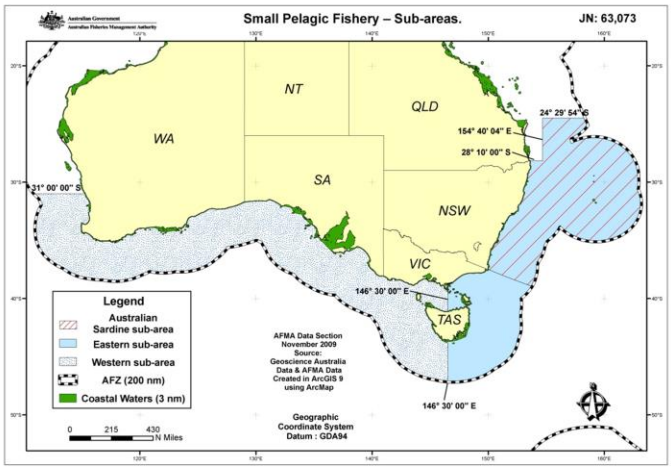
TRACEY, S.R., BUXTON, C.D., GARDNER, C., GREEN, B., HARTMANN, K., HAWARD, M., JABOUR, J., LYLE, J. & MACDONALD, J. 2013. Super Trawler Scuppered in Australian Fisheries Management Reform. *Fisheries* 38(8): 345-350.

Talk outline

- Small Pelagic Fishery
- Factory trawling
- Social media campaign
- Conclusions & lessons learned

translatingnatureintoknowledge

Small Pelagic Fishery (SPF)



From: http://www.afma.gov.au/managing-our-fisheries/fisheries-a-to-z-index/small-pelagic-fishery/maps/

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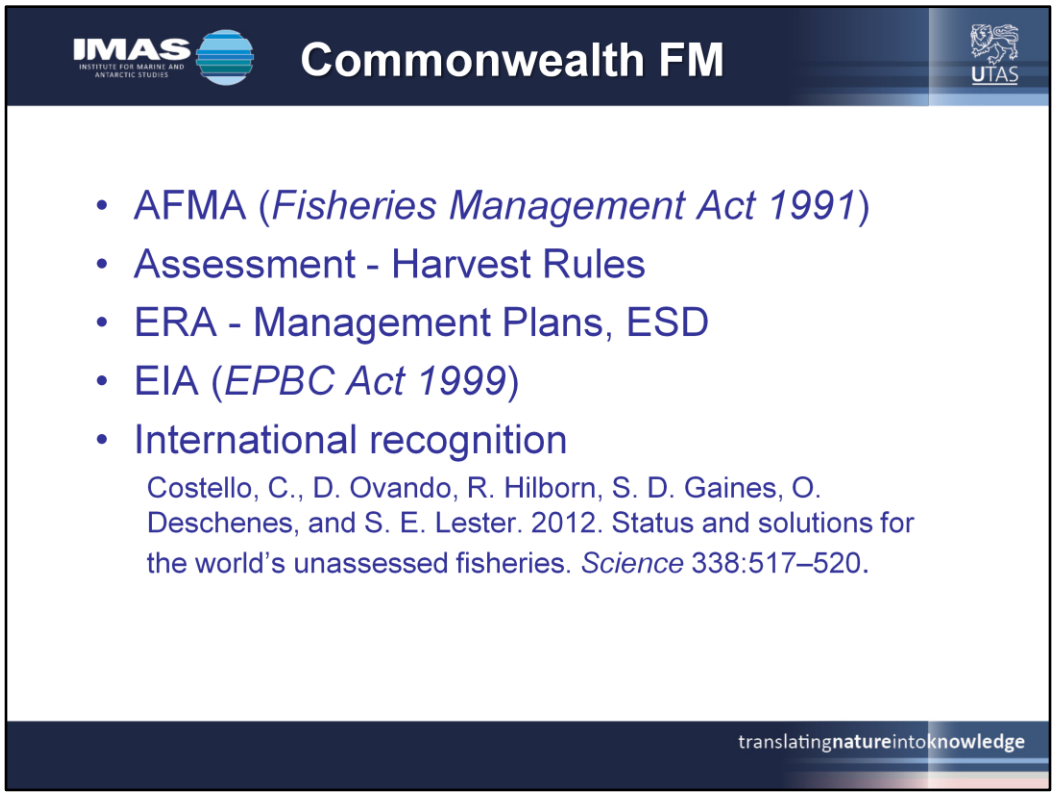
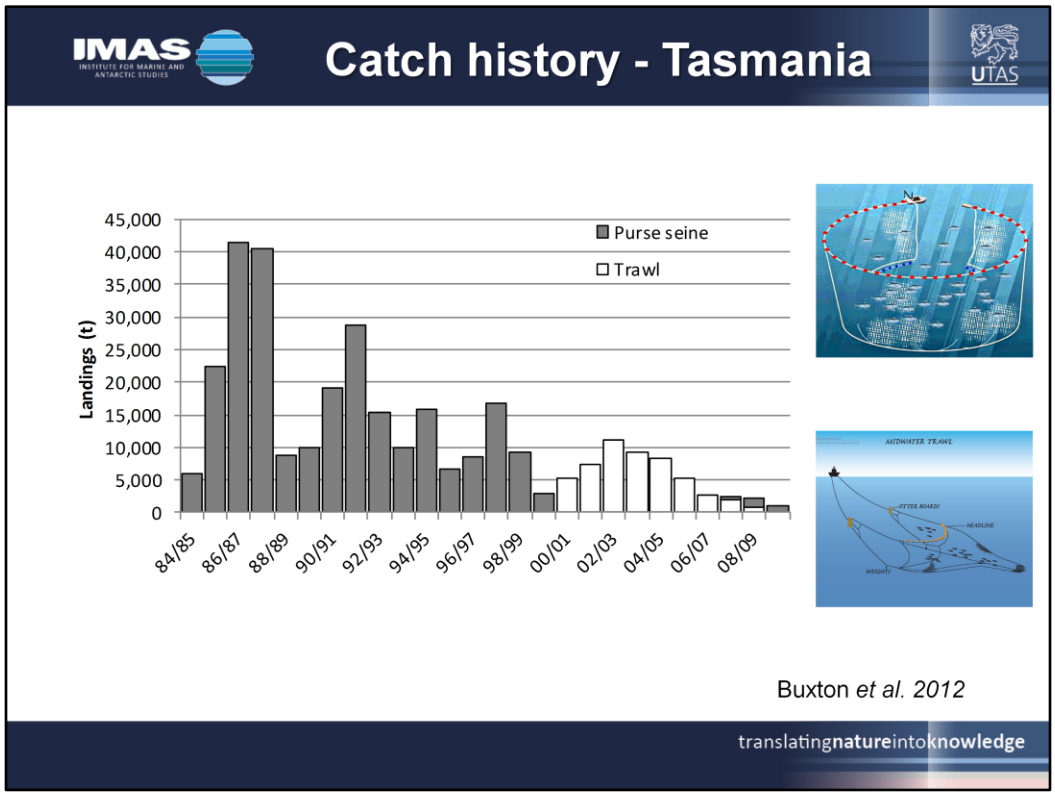
The Commonwealth Small Pelagic Fishery (SPF) encompasses Commonwealth waters (3-200 nm from the Australian coastline) from southern-eastern Queensland around southern Australia to Western Australia and is divided into two management sub-areas (Figure 1). The target species include blue mackerel (*Scomber australasicus*), 3 species of jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*), redbait (*Emmelichthys nitidus*) and Australian sardine (*Sardinops sagax*).



The management of Australia's Commonwealth fisheries falls under the *Fisheries Management Act* 1991 which is administered by the Australian Fisheries Management Authority (AFMA), a Statutory Authority responsible for the day-to-day management of fisheries under Commonwealth jurisdiction. This management framework requires independent stock assessments to set catch levels using prescribed rules along with a risk assessment of the fisheries management plans against an ecologically sustainable development (ESD) framework. Strategic environmental impact assessments are undertaken for all Commonwealth fisheries under the *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). This management system has been recognized internationally as having a rigorous base of scientific research and extensive monitoring and compliance (Costello et al. 2012).

Costello, C., D. Ovando, R. Hilborn, S. D. Gaines, O. Deschenes, and S. E. Lester. 2012. Status and solutions for the world's unassessed fisheries.
Science **338**:517–520.



Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Most previous activity has been centered off Tasmania because of limitations on the vessel range and the port facilities, and has involved both purse seine (targeting jack mackerel) and mid-water trawl activity (targeting redbait and jack mackerel).

The previous significant fishing for jack mackerel off Tasmania occurred in the 1980s and 1990s. Over 100,000 t was taken in three years during the 1980s and catches throughout the 1990s averaged over 10,000 t per annum.

It has been claimed that fishing in the 1980s and 1990s caused overfishing of jack mackerel, with a subsequent loss of surface schools of jack mackerel which have never recovered. Scientific interpretation of these events (e.g. Young *et al.* 1993, Hobday *et al.* 2008, Poloczanska *et al.* 2008, McLeod *et al.* 2012, Watson *et al.* 2012) suggest that it was not overfishing that caused the loss of jack mackerel surface schools rather it was due to changes in the plankton caused by the warming that has been observed in waters off eastern Tasmania over the past 40 years. This

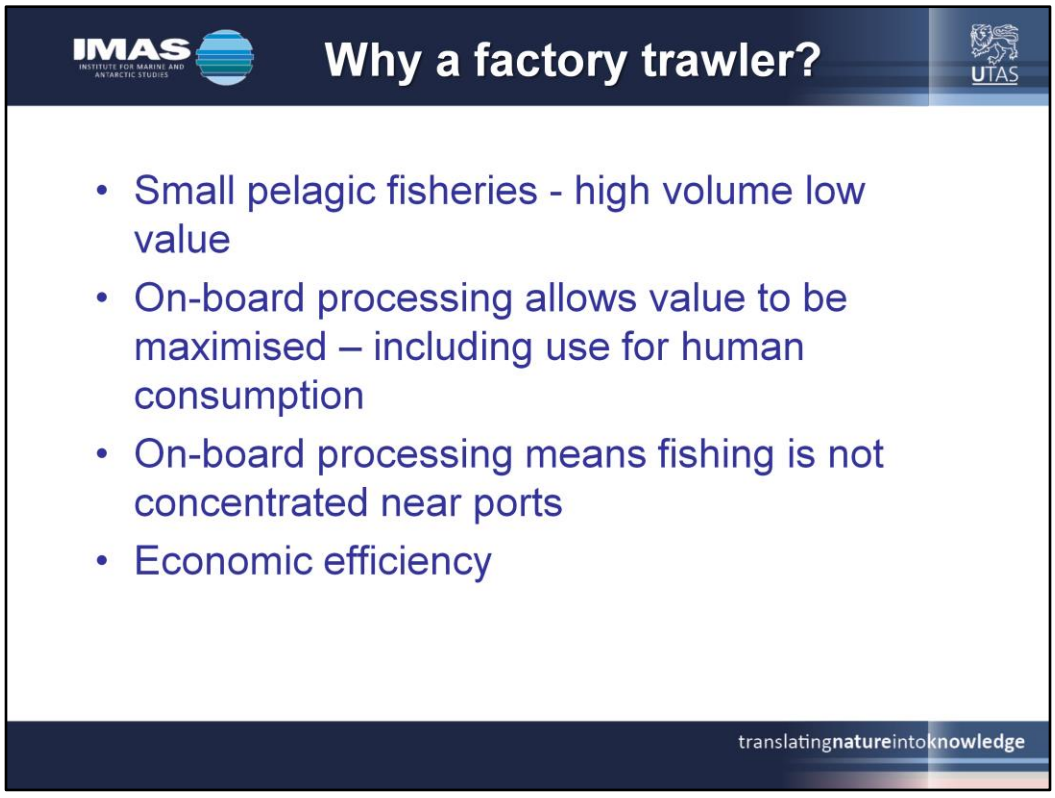
warming has caused many ecological changes, including increase in the redbait population and changes in the zooplankton composition. This warming has changed the structure of the zooplankton in many ways, including greatly reducing the surface schooling of Australian krill. The surface schools of jack mackerel targeted in this earlier fishery were aggregations feeding on the surface schools of krill. When the krill stopped surface schooling so did the jack mackerel (Young *et al.* 1993).

Thus this change appeared not to be related to the SPF, though the timing was coincidental. The jack mackerel were still present but they were subsurface – where they could still be detected acoustically and as a result the fishery switched from surface capture (purse seine) to mid-water capture (pelagic trawl).

Fishing activity since the mid-2000s has been limited, with five or fewer vessels operating (out of over 70 licences) and taking less than about 5,000 tonnes per annum since 2007-08 out of the combined fishery total allowable catch (TAC) of over 35,000 tonnes (Moore et al. 2011).

The fishery substantially reduced in scale and catch during the 2000s and 2010s because it was very marginal economically – and this is where factory trawling comes into the picture.

BUXTON, C.D, BEGG, G., LYLE, J.R., WARD, T., SAINSBURY, K., SMITH, T. & SMITH, D. 2012. The Commonwealth Small Pelagic Fishery: General background to the scientific issues. **And references therein**

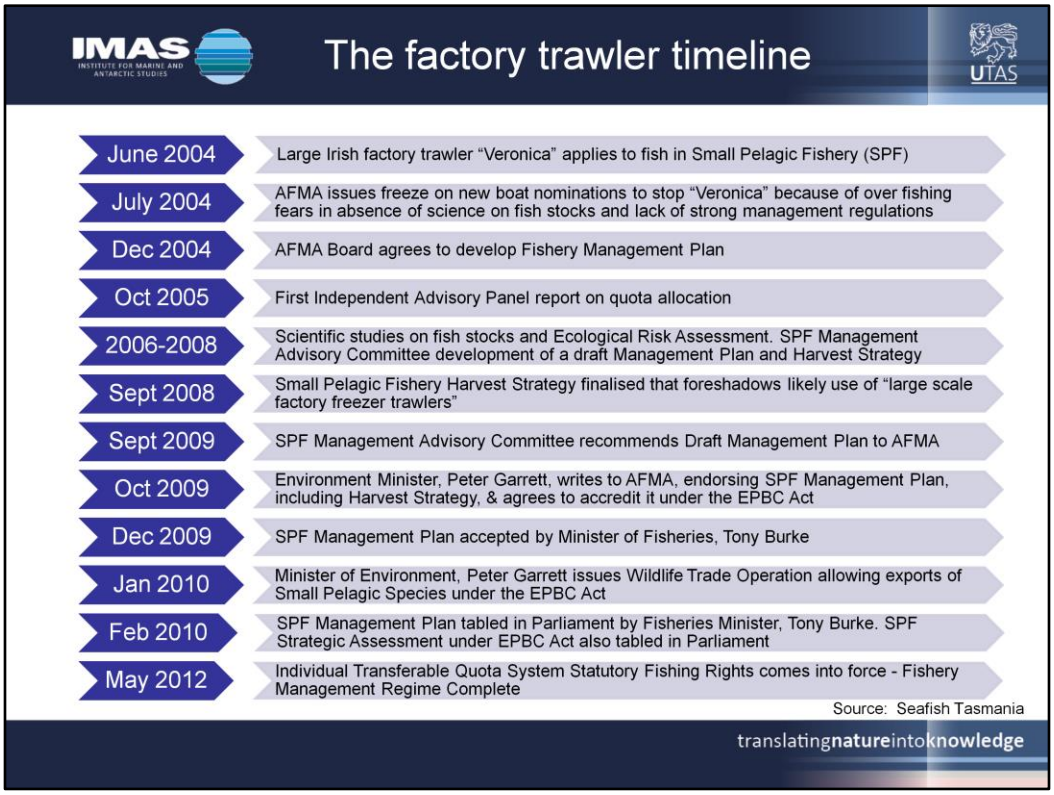


Forage fish fisheries tend to be high volume and relatively low value. Due to their a high oil content they are typically reduced for fish oil and fish meal, bait and aquaculture feed and unless processed quickly turn rancid.

Because of this our fishery tended to be concentrated close to available processing capabilities at Triabunna on the east coast of Tasmania.

On board processing allows the value to be maximised, including freezing for human consumption. It also meant that the fishery could operate over a greater spatial range.

Thus for economic efficiency reasons factory trawling was proposed for the SPF.



To understand how factory trawling was introduced one needs to understand the timeline.

The first attempt back in 2004 was resisted because it was felt that we did not have an appropriate management framework, nor sufficient understanding of the stocks. What followed was an intensive period of research and policy development which led to the introduction of a Management Plan, ERA, development of a Harvest Strategy, accreditation under the EPBC, export permission and finally ITQ SRFs. In effect the SPF management regime was completed in 2010.

In 2011 Dutch and Greek fishing company representatives were introduced to AFMA to discuss the possibility of using large freezer trawlers in the SPF.

In 2012 Seafish Tasmania announced plans to introduce the Margiris under a joint venture arrangement, at the same time providing written briefings to the government (Labour and Liberal), advising peak industry bodies and ENGOs and holding public meetings.

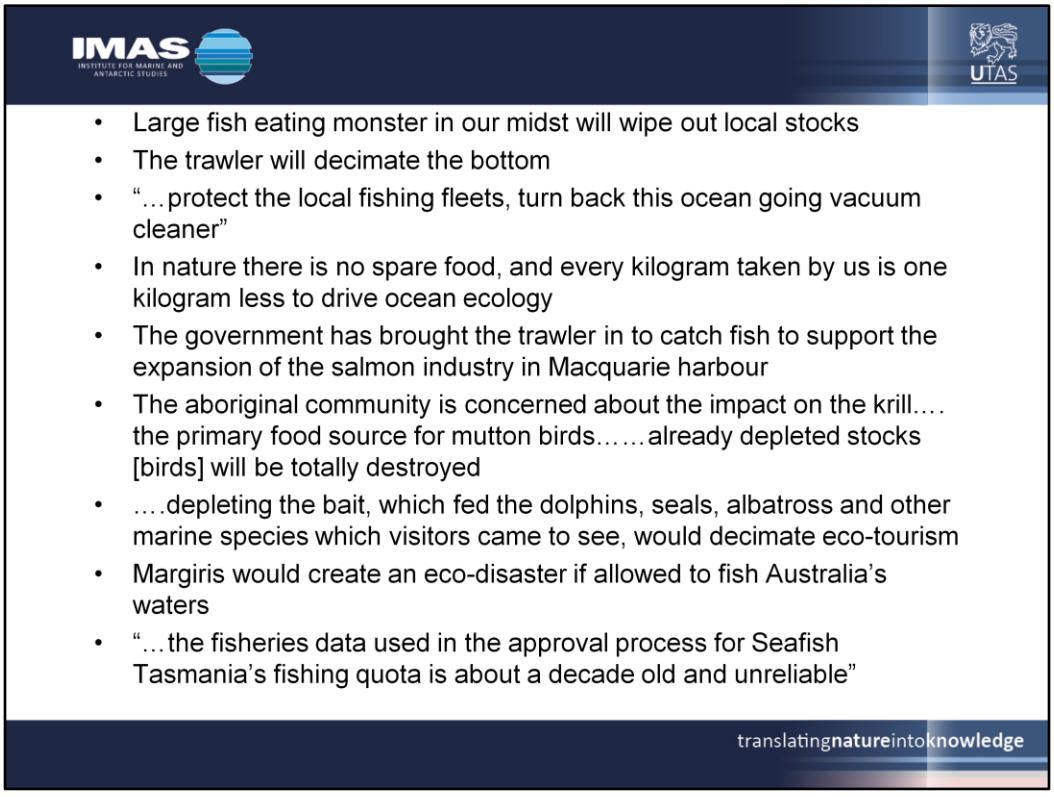
The fishing company and the government believed it had put all the steps in place to conduct factory trawling in the SPF.

The announcement that the Margiris was to leave Europe bound for Australia precipitated a Greenpeace led petition and protest against its potential to overfish Australian waters. This was based primarily on the vessel's previous fishing history especially in Africa, where it was seen to contribute to the collapse of some East African fisheries. They argued that subsidised super trawlers like the Margiris killed more than just fish – dolphins, seals, sea birds are at risk and believed the only solution was to ban all super trawlers.

The Greenpeace campaign was joined by several other Australian ENGOs, who mounted an intense social media campaign against the so-called supertrawler, arguing that if allowed to fish in Australian waters "it could vacuum up everything in its path, killing dolphins, seals, migratory birds and other protected species."

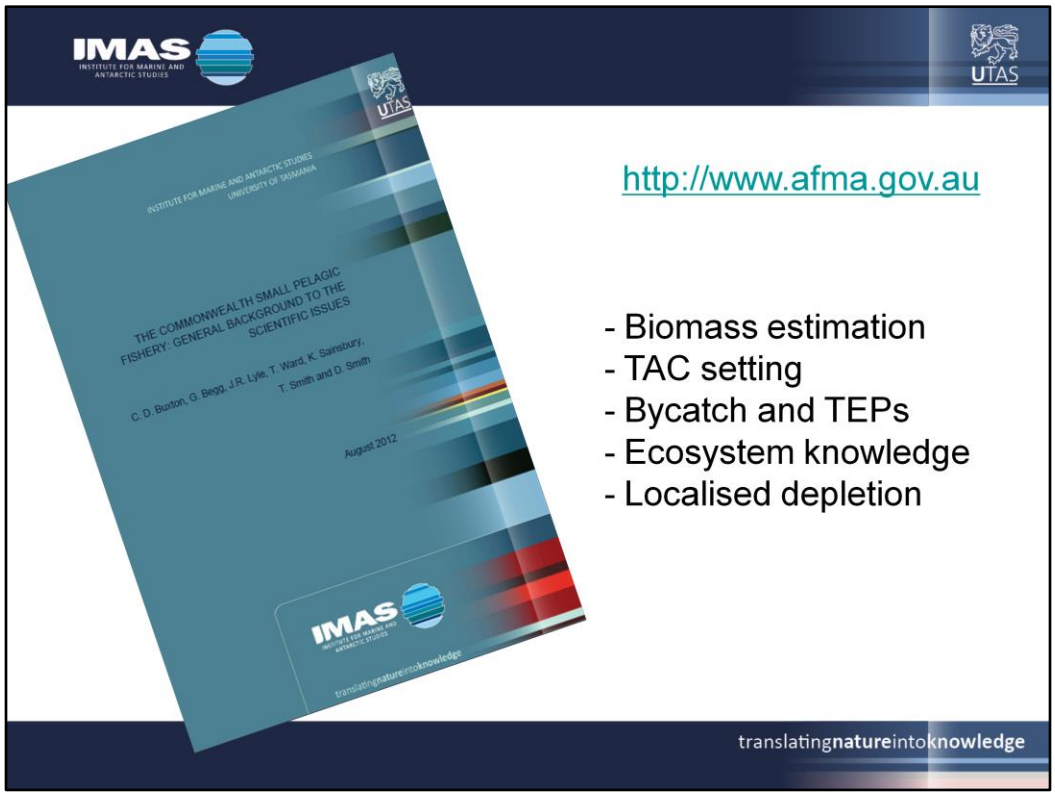
They were joined by some of the recreational fishing fraternity in Tasmania who saw a potential threat to their growing SBT tuna fishery.

Without attempting to trivialise their concerns they seemed at the time to be frightened of the sheer size of the boat and its reputed fishing power, fuelled of course be emotive statements like "…protect the local fishing fleets, turn back this ocean going vacuum cleaner"



What followed was an intense period of social and media commentary. Some of the popular misconceptions and concerns reported by the newspapers included the following.

Those in quotes are from local politicians who saw the large public outcry as an opportunity to win votes… the fishery was being played for politics by a government desperate to win the green vote.

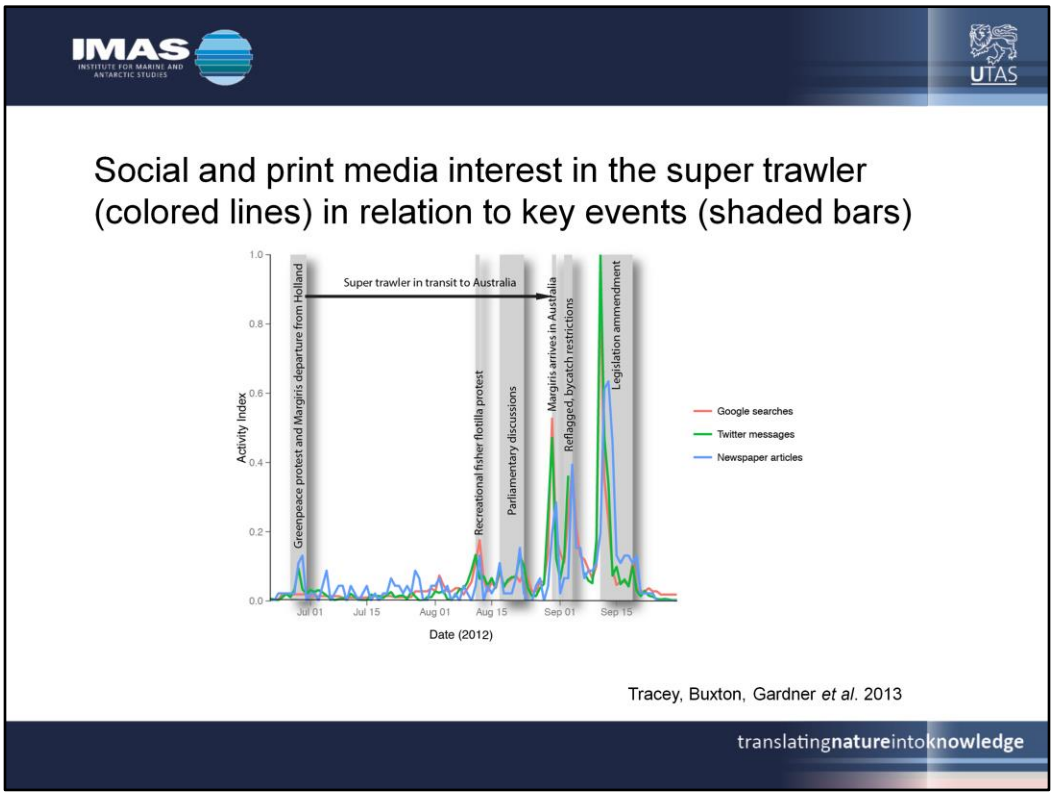


Discounting comments about messing up the bottom, supporting the salmon industry, removing krill etc.etc., all based on misinformation and perhaps ignorance, we felt there was a desperate need to provide information to the public on the state of knowledge relating to the SPF.

Colleagues from CSIRO, Utas and SARDI agreed to synthesise this information to inform the public debate, concentrating on:

- biomass estimation
- TAC setting
- Localised depletion
- Ecosystem knowledge
- Bycatch and TEPs

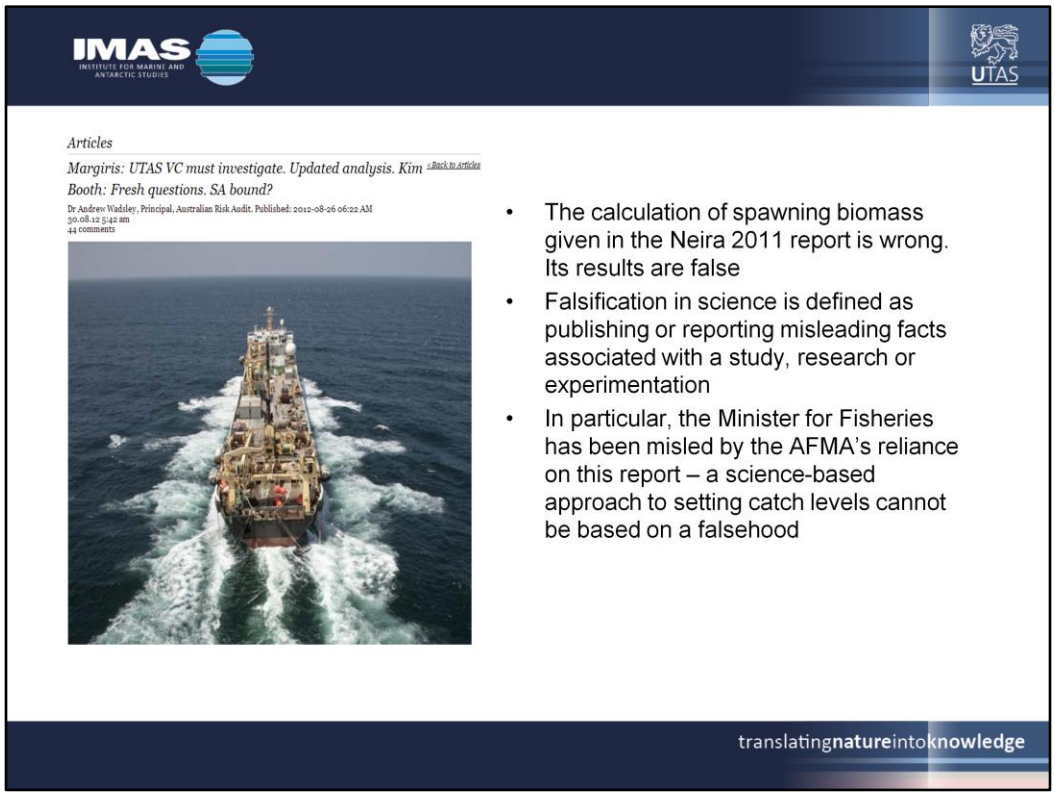
This document summarised over 50 scientific papers and reports – many from the peer reviewed literature.



But the science was ignored. In fact ENGO mounted a careful campaign to discredit the science.

Public interest in the super trawler grew slowly during its transit from Europe to Australia. Local protests and parliamentary debate resulted in clear peaks of media interest. Interest spiked with the arrival of the super trawler in Australia and its reflagging (which suggested impending commencement of fishing). Interest peaked dramatically as legislation was amended to permit a moratorium on the trawler. In Australia this peak is on par with other major issues during this period. For example a similar number of Google searches related to the collapse of Australia's biggest forestry company and twice as many to the worst day of Australian casualties in the Afghan conflict.

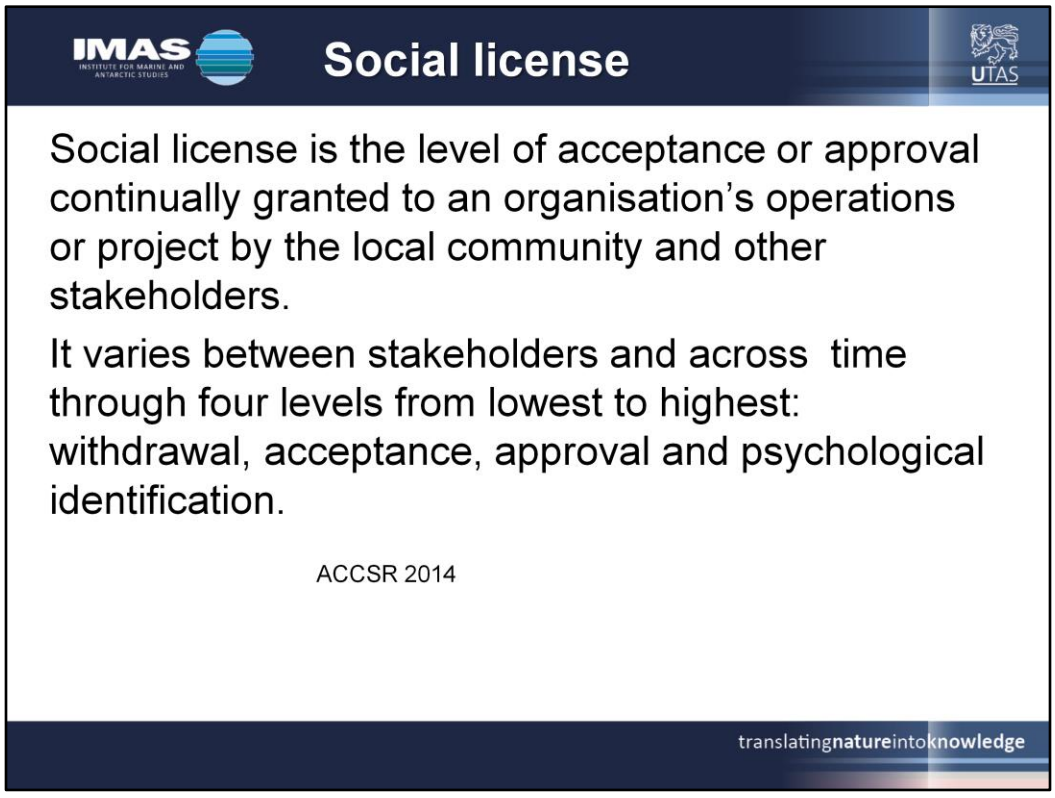
TRACEY, S.R., BUXTON, C.D., GARDNER, C., GREEN, B., HARTMANN, K., HAWARD, M., JABOUR, J., LYLE, J. & MACDONALD, J. (2013) Super Trawler Scuppered in Australian Fisheries Management Reform. *Fisheries* **38(8)**: 345-350.



One blog caused particular concern. This was a report in the Tasmania Times that amongst other things suggested that the science (IMAS) was wrong, unrepeatable, misleading and contrary to established scientific norms. What made this worse was that a complaint was levelled at the VC of Utas, through the blog and in writing, that accused IMAS academics of fraudulent behaviour.

It took two independent reviews to show that this was rubbish – but by then the damage was done.

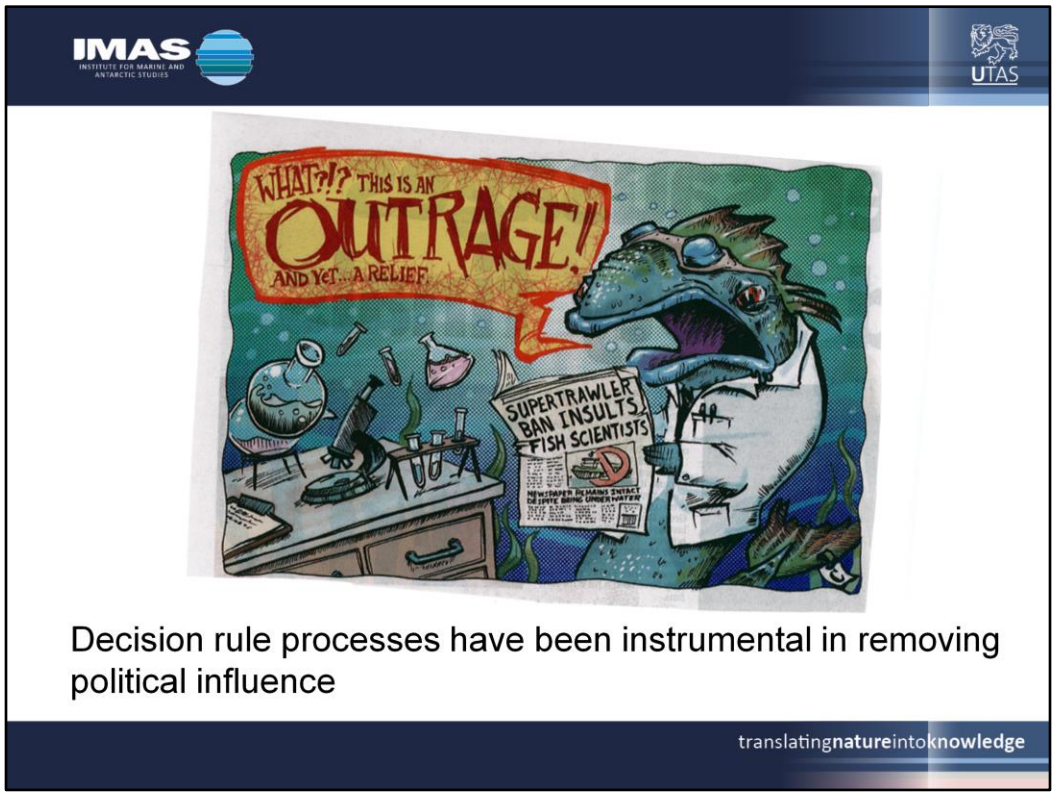
The government changed the laws and banned the fishing operation for two years – while a review of the science and risks were undertaken.



Social licence, a term taken from the mining industry describes the community acceptance of a particular operation.. The SPF clearly had it as it has a fairly long history of development. But this was lost with the advent of the supertrawler (although some argue it was never earned).

The lack of social license to operate a factory trawler in Australian waters was based in part on perceived deficiencies in the science underpinning harvest management as well as negative perceptions about the use of large factory trawlers more broadly. All the circumstances combined to successfully impart on the public the view that 'super trawlers' are an ecological disaster waiting to happen.

Australian Centre for Corporate Social Responsibility definition of social licence to operate
http://www.accsr.com.au/html/sociallicense.html



In the 1980s and 1990s fisheries in most developed countries were suffering from extensive overfishing and poor management systems. In Australia, for example, fisheries for southern bluefin tuna and orange roughy collapsed. Political pressure from fishing companies led to maintenance of catches far above the scientific advice.

In the mid-1990s, a shift began. Political influence on fisheries decisions was diminished and policies began to be supported by good science. This transformation has been most thorough in the US, Canada, Australia, New Zealand, Iceland and Norway, all places where overfishing is being eliminated. In Australia, assessed fish stocks are rebuilding and our evidence based fishery management framework is internationally recognised.

These "decision rule" processes have been instrumental in removing political influence. Under these processes, scientific data is used to set catches by pre-agreed rules.

Removing political interference has contributed to the independent third party certification for sustainability (MSC) for several large wild capture fisheries that supply imported seafood such as New Zealand blue grenadier, southern blue whiting, and Alaskan Pollock. Each of these coincidentally involves the use of factory trawlers.

And shifting politics out of fisheries decision-making does not mean the community loses control of their resources. Rather, political involvement occurs more

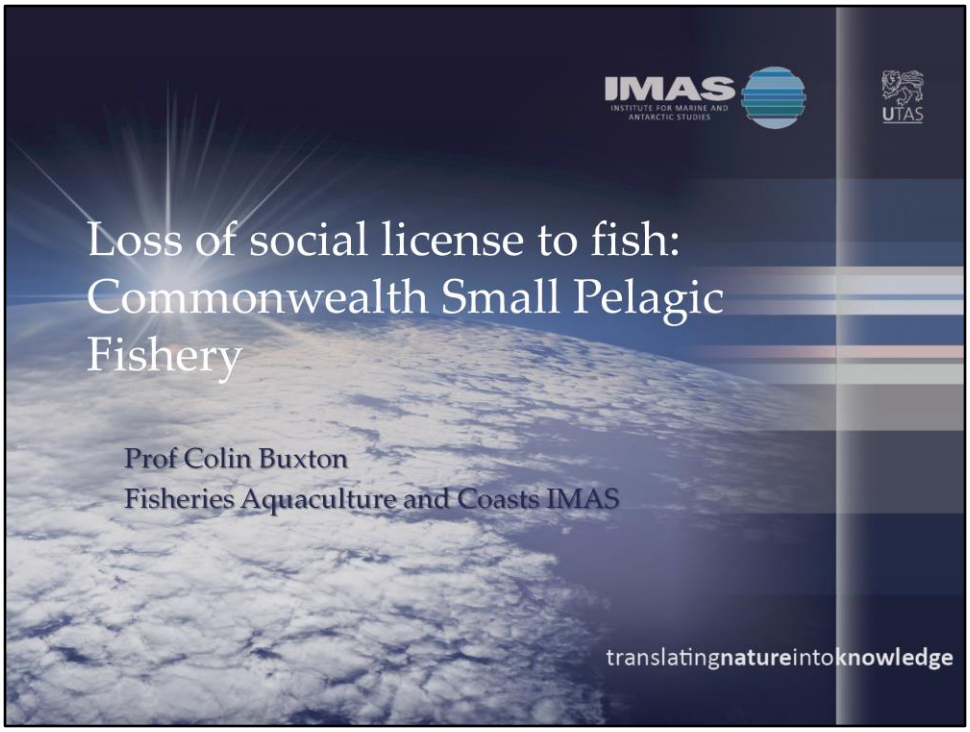
appropriately at the level of policy across fisheries.

This distinction broke down in the case of the supertrawler.

- We maintain that the scientific understanding of the SPF was relatively robust, for both the target species and other species in the ecosystem. The analyses and conclusions were sound, although qualified. They were certainly not flawed or fraudulent.
- It is clear, however, that we didn't have an effective way to conduct science discussions in a public policy or public debate context. This was particularly evident where the anti-trawler campaigns exploited scientific differences to selectively support a position, which undermined the basis for action and undermined the value of science to public policy.
- Some may consider the legislative override as the appropriate outcome in broad democratic terms – the ultimate avenue through which to reflect public concern. While it can be a positive that interest groups are becoming more engaged, if they are misinformed or they misinform the general public, their influence may be negative on established governance systems, potentially leading to undesirable outcomes for society as a whole.

- The decision to prevent the vessel fishing pending further research raises the question of whether it is ever possible to reach the level of certainty the general public and decision makers would require, and the impossibly-high bar this now seems to set for ecosystem-based fisheries management. For example, it is hard to see how additional research can address uncertainties about the impact of factory trawlers, without actually allowing a factory trawler to operate under very strict conditions and assessing those impacts.

- We suggest that Australia has taken a backward step by allowing political pressure to override established fisheries policies in the case of the factory-trawler. If political expediency dictates how fisheries are to be managed and if ministers have total discretion to override science-based management policies, what is to prevent a return to the bad old days of the 1980s, where pressure from fishing companies saw catches maintained at much higher levels than the scientific advice?



Loss of social license to fish: Commonwealth Small Pelagic Fishery

Prof Colin Buxton
Adjunct Professor
Fisheries, Aquaculture and Coasts, IMAS

Address to **TECHNICAL WORKSHOP AND STAKEHOLDER FORUM ON SMALL PELAGIC FISHERIES**

14-18 July 2014, SARDI Aquatic Sciences Adelaide.

Abstract

The Commonwealth Small Pelagic Fishery (SPF) encompasses Commonwealth waters (3-200 nm from the Australian coastline) from southern-eastern Queensland around southern Australia to Western Australia and is divided into two management sub-areas. The target species include blue mackerel (*Scomber australasicus*), three species of jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*), redbait (*Emmelichthys nitidus*) and Australian sardine (*Sardinops sagax*).

Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Significant fishing for jack mackerel

occurred in the 1980s and 1990s, with most fishing activity centered off Tasmania because of limitations on the vessel range and the port facilities. It has involved both purse seine (targeting jack mackerel) and mid-water trawl activity (targeting redbait and jack mackerel) with over 100,000 t taken in three years during the 1980s and catches throughout the 1990s averaging over 10,000 t per annum.

The fishery substantially reduced in scale and catch during the 2000s and 2010s because it was very marginal economically. This strengthened the resolve to introduce factory trawling into the fishery, something that was first mooted in 2004. It was resisted at the time because it was felt that there was not an appropriate management framework, nor sufficient understanding of the stocks. What followed was an intensive period of research and policy development which led to the introduction of a Management Plan, Ecological Risk Assessment, Harvest Strategy, accreditation under the Environmental Protection and Biodiversity Conservation Act, export permission and ITQ Statutory Fishing Rights. In effect the SPF management regime was completed in 2010.

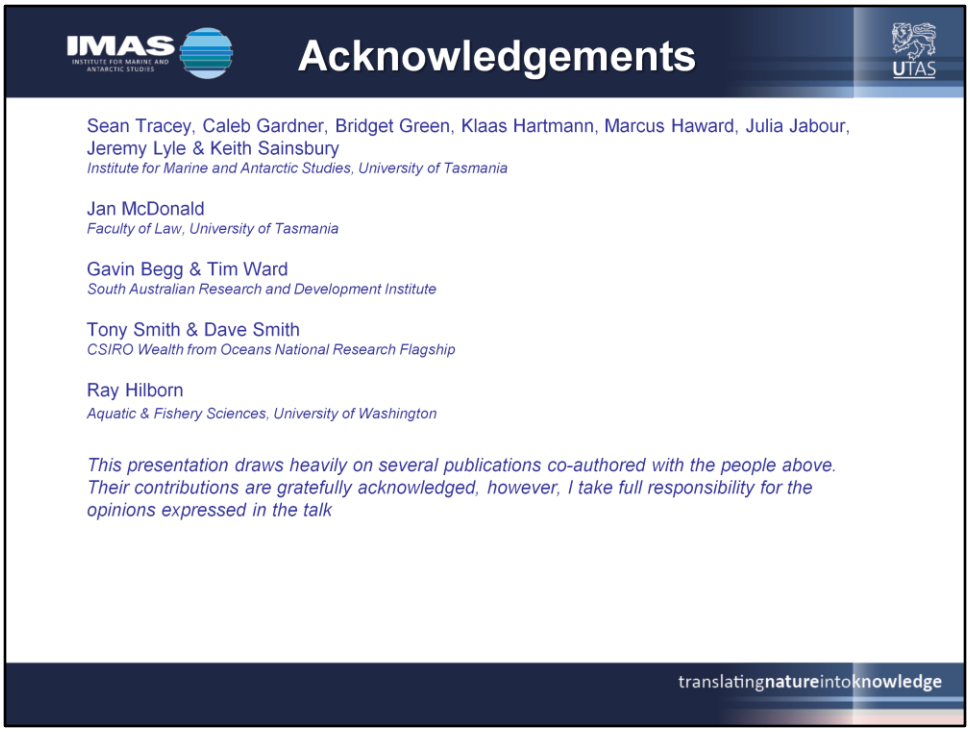
Following a period of consultation with the Commonwealth Government and AFMA in 2011, a local fishing company, Seafish Tasmania, announced plans to introduce the *Margiris*, a large Dutch-owned factory trawler, into the SPF. At the same time Seafish provided written briefings to the government (Labour and Liberal), and advised peak industry bodies and ENGOs of their plans.

The announcement that the Margiris was to leave Europe bound for Australia precipitated a Greenpeace led petition and protest against its potential to overfish Australian waters. This action was joined by several other Australian ENGOs and the recreational fishing fraternity, who mounted an intense social media campaign against the so-called supertrawler.

Much of the social media and other commentary was fuelled by misinformation and a disregard of the science underpinning the fishery. However, the campaign forced the Commonwealth Government to change legislation and to back down from their initial support of factory trawling in the SPF, implementing a two year moratorium on vessels over 130m pending the outcome of a review into the fishery. This effectively stopped the *Margiris*.

This presentation examines the loss of social licence to fish and the lessons learned from the campaign against the introduction of factory trawling into the SPF. It concludes that although the science behind the SPF was relatively robust, science communication was ineffective in the public debate. Allowing political pressure to override policy is seen as a backward step and, while it can be a positive that interest groups are becoming more engaged, if they are misinformed or they misinform the

general public, their influence may be negative on established governance systems, potentially leading to undesirable outcomes for society as a whole.



BUXTON, C.D, BEGG, G., LYLE, J.R., WARD, T., SAINSBURY, K., SMITH, T. & SMITH, D. 2012. The Commonwealth Small Pelagic Fishery: General background to the scientific issues. 2012. IMAS Report: 27pp. https://www.researchgate.net/publication/255787553_THE_COMMONWEALTH_SMALL_PELAGIC_FISHERY_GENERAL_BACKGROUND_TO_THE_SCIENTIFIC_ISSUES?ev=prf_pub

Colin Buxton, Caleb Gardner, Jeremy Lyle & Ray Hilborn. 2013. Super trawler gone but is fisheries management in trouble? *Conversation*. http://theconversation.com/super-trawler-gone-but-is-fisheries-policy-in-trouble-12755

TRACEY, S.R., BUXTON, C.D., GARDNER, C., GREEN, B., HARTMANN, K., HAWARD, M., JABOUR, J., LYLE, J. & MACDONALD, J. 2013. Super Trawler Scuppered in Australian Fisheries Management Reform. *Fisheries* 38(8): 345-350.

Talk outline

- Small Pelagic Fishery
- The factory trawler
- The science behind the SPF
- Conclusions & lessons learned

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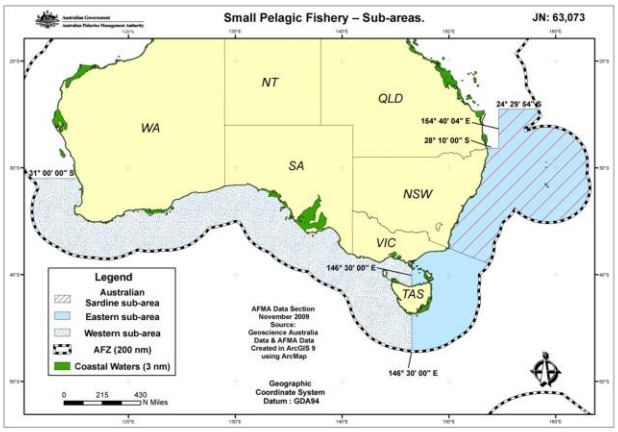
Small Pelagic Fishery (SPF)



From: http://www.afma.gov.au/managing-our-fisheries/fisheries-a-to-z-index/small-pelagic-fishery/maps/

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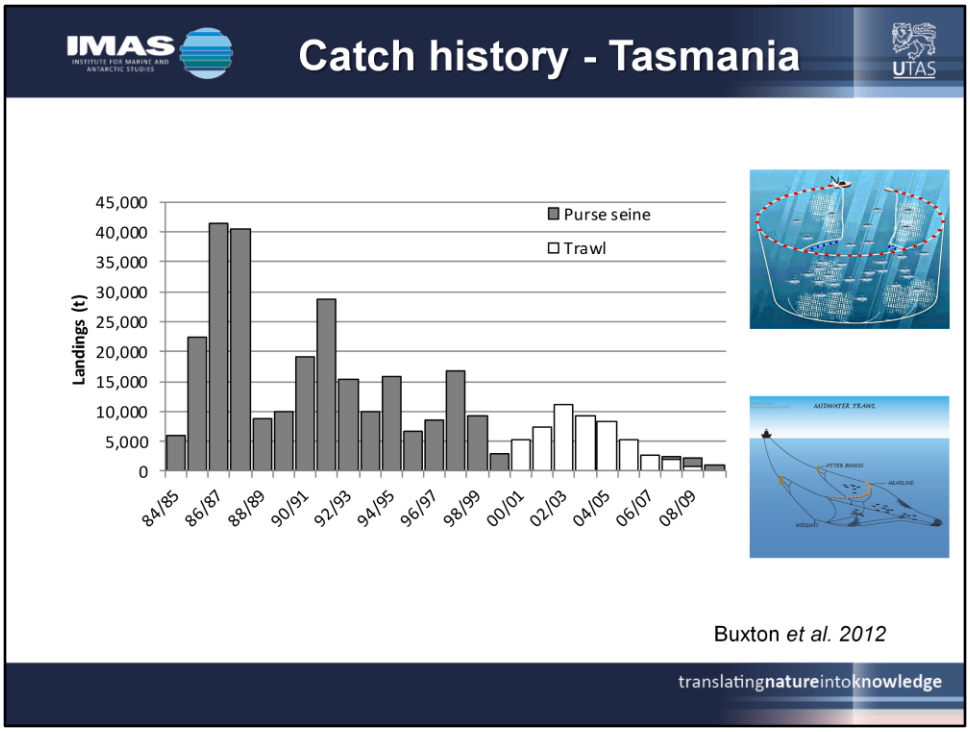
The Commonwealth Small Pelagic Fishery (SPF) encompasses Commonwealth waters (3-200 nm from the Australian coastline) from southern-eastern Queensland around southern Australia to Western Australia and is divided into two management sub-areas (Figure 1). The target species include blue mackerel (*Scomber australasicus*), 3 species of jack mackerel (*Trachurus declivis, T. symmetricus, T. murphyi*), redbait (*Emmelichthys nitidus*) and Australian sardine (*Sardinops sagax*).

The management of Australia's Commonwealth fisheries falls under the *Fisheries Management Act* 1991 which is administered by the Australian Fisheries Management Authority (AFMA), a Statutory Authority responsible for the day-to-day management of fisheries under Commonwealth jurisdiction. Strategic environmental impact assessments are undertaken for all Commonwealth fisheries under the *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act), providing further scrutiny on the ecosystem impacts of a given fishery. This management framework requires independent stock assessments to set catch levels using prescribed rules along with a risk assessment of the fisheries management plans against an ecologically sustainable development (ESD) framework by the environment agency that considers impacts on non-target species and habitats. This management system has been recognized internationally as having a rigorous base of scientific research and extensive monitoring and compliance (Costello et al. 2012).

Costello, C., D. Ovando, R. Hilborn, S. D. Gaines, O. Deschenes, and S. E. Lester. 2012. Status and solutions for the world's unassessed fisheries.
Science **338**:517–520.



Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Most previous activity has been centered off Tasmania because of limitations on the vessel range and the port facilities, and has involved both purse seine (targeting jack mackerel) and mid-water trawl activity (targeting redbait and jack mackerel).

The previous significant fishing for jack mackerel off Tasmania occurred in the 1980s and 1990s. Over 100,000 t was taken in three years during the 1980s and catches throughout the 1990s averaged over 10,000 t per annum.

It has been claimed that fishing in the 1980s and 1990s caused overfishing of jack mackerel, with a subsequent loss of surface schools of jack mackerel which have never recovered. Scientific interpretation of these events (e.g. Young *et al.* 1993, Hobday *et al.* 2008, Poloczanska *et al.* 2008, McLeod *et al.* 2012, Watson *et al.* 2012) suggest that it was not overfishing that caused the loss of jack mackerel surface schools rather it was due to changes in the plankton caused by the warming that has been observed in waters off eastern Tasmania over the past 40 years. This warming has caused many ecological changes, including increase in the redbait population and changes in the zooplankton composition. This warming has changed the structure of the zooplankton in many ways, including greatly reducing the surface schooling of Australian krill. The surface schools of jack mackerel targeted in this earlier fishery were aggregations feeding on the surface schools of krill. When the krill stopped

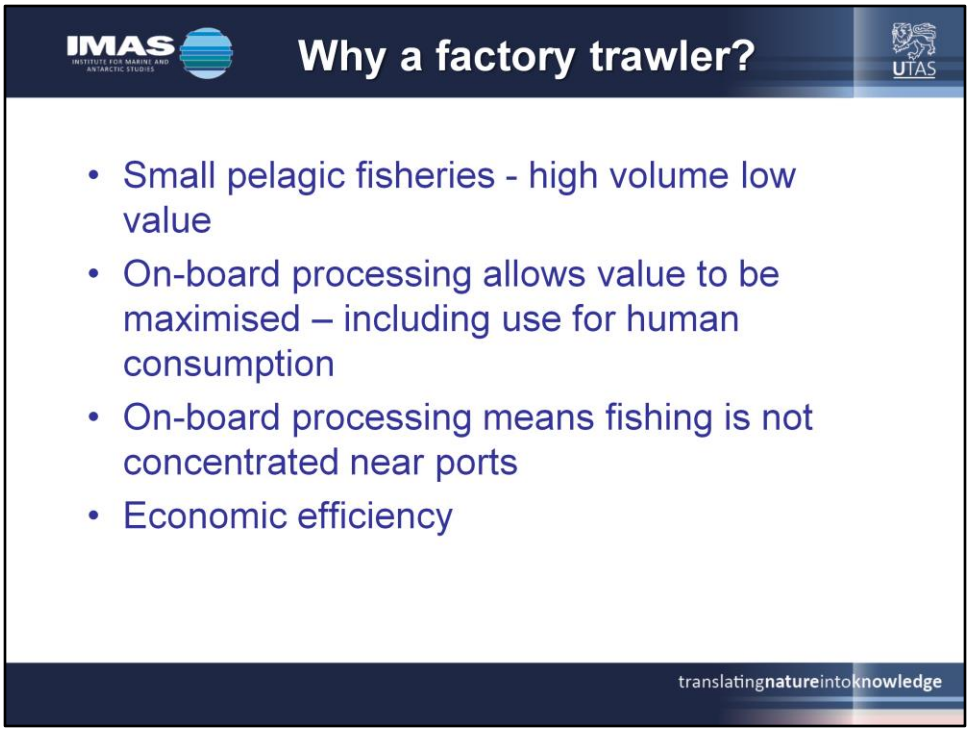
surface schooling so did the jack mackerel (Young *et al.* 1993).

Thus this change appeared not to be related to the SPF, though the timing was coincidental. The jack mackerel were still present but they were subsurface – where they could still be detected acoustically and as a result the fishery switched from surface capture (purse seine) to mid-water capture (pelagic trawl).

Fishing activity since the mid-2000s has been limited, with five or fewer vessels operating (out of over 70 licences) and taking less than about 5,000 tonnes per annum since 2007-08 out of the combined fishery total allowable catch (TAC) of over 35,000 tonnes (Moore et al. 2011).

The fishery substantially reduced in scale and catch during the 2000s and 2010s because it was very marginal economically – and this is where factory trawling comes into the picture.

BUXTON, C.D, BEGG, G., LYLE, J.R., WARD, T., SAINSBURY, K., SMITH, T. & SMITH, D. 2012. The Commonwealth Small Pelagic Fishery: General background to the scientific issues. **And references therein**

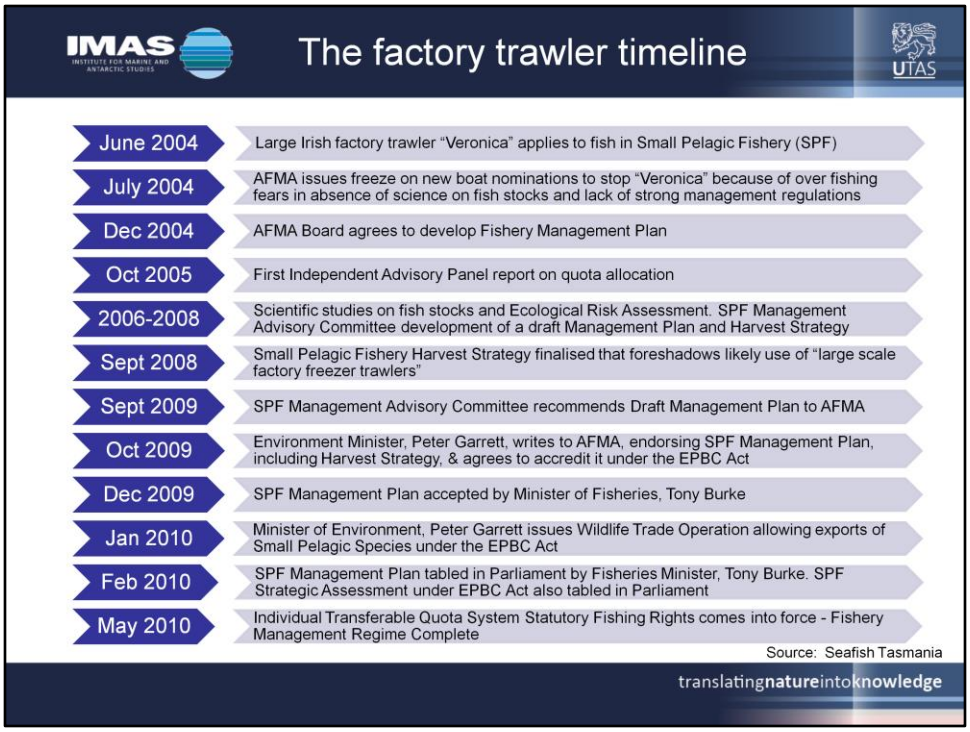


Forage fish fisheries tend to be high volume and relatively low value. Due to their a high oil content they are typically reduced for fish oil and fish meal, bait and aquaculture feed and unless processed quickly turn rancid.

Because of this our fishery tended to be concentrated close to available processing capabilities at Triabunna on the east coast of Tasmania.

On board processing allows the value to be maximised, including freezing for human consumption. It also meant that the fishery could operate over a greater spatial range.

Thus for economic efficiency reasons factory trawling was proposed for the SPF.



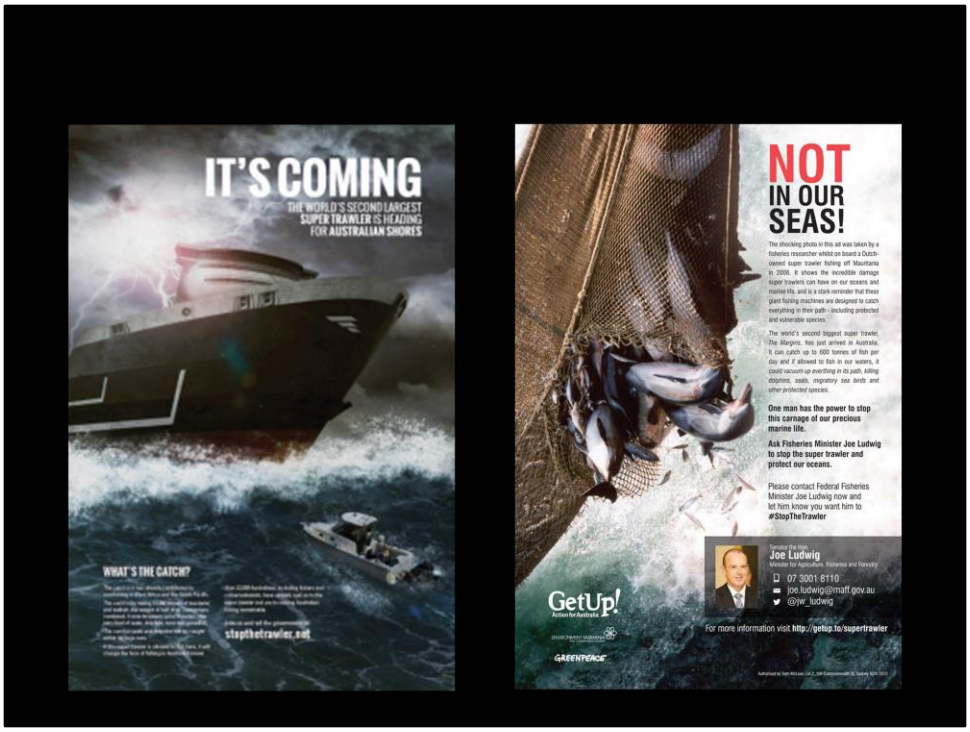
To understand how factory trawling was introduced one needs to understand the timeline.

The first attempt back in 2004 was resisted because it was felt that we did not have an appropriate management framework, nor sufficient understanding of the stocks. What followed was an intensive period of research and policy development which led to the introduction of a Management Plan, ERA, Harvest Strategy, accreditation under the EPBC, export permission and ITQ SRFs. In effect the SPF management regime was completed in 2010.

In 2011 Dutch and Greek fishing company representatives were introduced to AFMA to discuss the possibility of using large freezer trawlers in the SPF.

In 2012 Seafish Tasmania announced plans to introduce the Margiris under a joint venture arrangement, at the same time providing written briefings to the government (Labour and Liberal), advising peak industry bodies and ENGOs and holding public meetings.

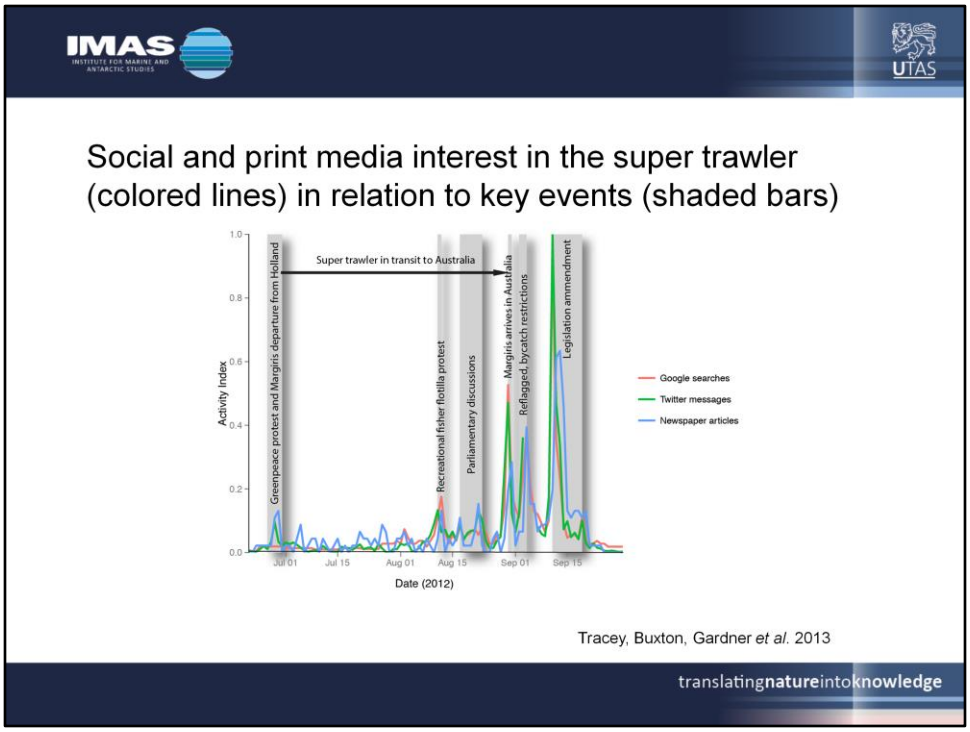
The announcement that the Margiris was to leave Europe bound for Australia precipitated a Greenpeace led petition and protest against its potential to overfish Australian waters. This was based primarily on the vessel's previous fishing history especially in Africa, where it was seen to contribute to the collapse of East African fisheries. They argued that super trawlers like the Margiris killed more than just fish – dolphins, seals, sea birds are at risk and believed the only solution was to ban all super trawlers.



The Greenpeace campaign was joined by several other Australian ENGOs, who mounted an intense social media campaign against the so-called supertrawler, arguing that if allowed to fish in Australian waters "it could vacuum up everything in its path, killing dolphins, seals, migratory birds and other protected species."

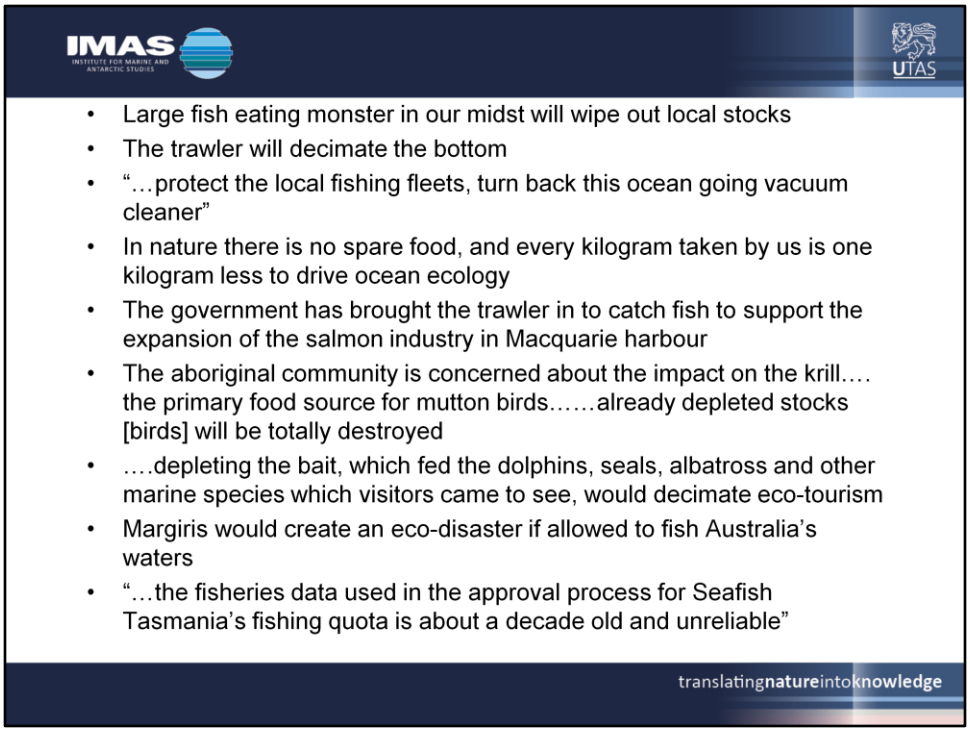
They were joined by some of the recreational fishing fraternity in Tasmania who saw a potential threat to their growing SBT tuna fishery.

Without attempting to trivialise their concerns they seemed at the time to be frightened of the sheer size of the boat and its reputed fishing power, fuelled of course be emotive statements like "…protect the local fishing fleets, turn back this ocean going vacuum cleaner"



Public interest in the super trawler grew slowly during its transit from Europe to Australia. Local protests and parliamentary debate resulted in clear peaks of media interest. Interest spiked with the arrival of the super trawler in Australia and its reflagging (which suggested impending commencement of fishing). Interest peaked dramatically as legislation was amended to permit a moratorium on the trawler. In Australia this peak is on par with other major issues during this period. For example a similar number of Google searches related to the collapse of Australia's biggest forestry company and twice as many to the worst day of Australian casualties in the Afghan conflict.

TRACEY, S.R., BUXTON, C.D., GARDNER, C., GREEN, B., HARTMANN, K., HAWARD, M., JABOUR, J., LYLE, J. & MACDONALD, J. (2013) Super Trawler Scuppered in Australian Fisheries Management Reform. *Fisheries* **38(8)**: 345-350.



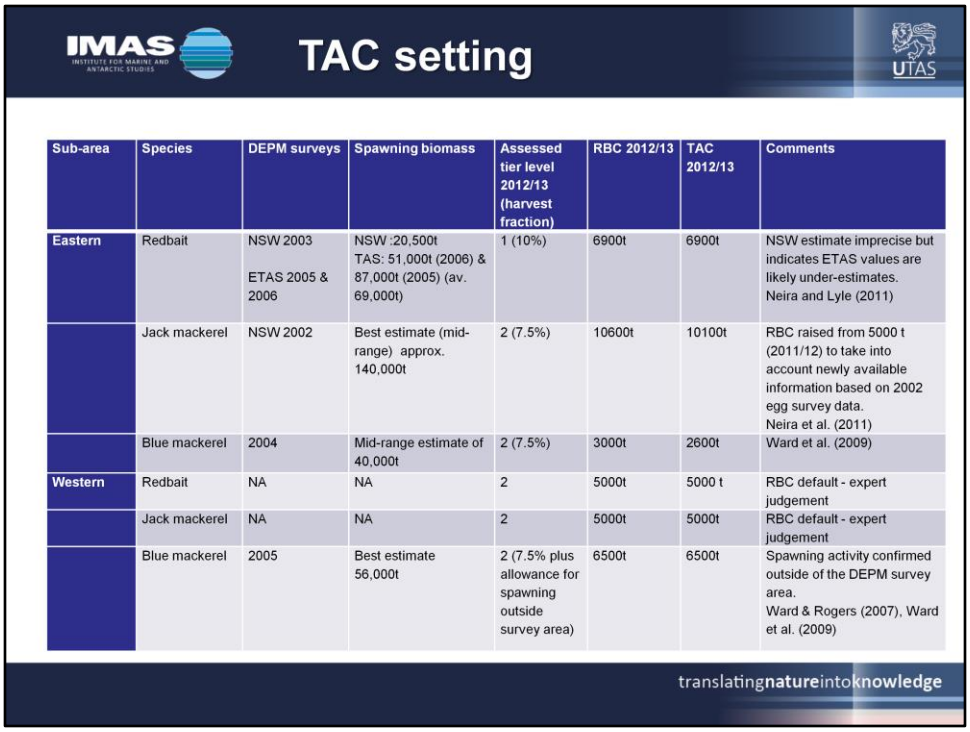
What followed was an intense period of social and media commentary. Some of the popular misconceptions and concerns reported by the newspapers included the following.

Those in quotes are from local politicians who saw the large public outcry as an opportunity to win votes… the fishery was being played for politics.

Discounting comments about messing up the bottom, supporting the salmon industry, removing krill etc.etc., all based on misinformation and perhaps ignorance, we felt there was a desperate need to provide information to the public on the state of knowledge relating to the SPF.

Colleagues from CSIRO, Utas and SARDI agreed to synthesise this information to inform the public debate, concentrating on:

- biomass estimation
- TAC setting
- Localised depletion
- Bycatch and TEPs



Sub-area	Species	DEPM surveys	Spawning biomass	Assessed tier level 2012/13 (harvest fraction)	RBC 2012/13	TAC 2012/13	Comments
Eastern	Redbait	NSW 2003 ETAS 2005 & 2006	NSW :20,500t TAS: 51,000t (2006) & 87,000t (2005) (av. 69,000t)	1 (10%)	6900t	6900t	NSW estimate imprecise but indicates ETAS values are likely under-estimates. Neira and Lyle (2011)
	Jack mackerel	NSW 2002	Best estimate (mid-range) approx. 140,000t	2 (7.5%)	10600t	10100t	RBC raised from 5000 t (2011/12) to take into account newly available information based on 2002 egg survey data. Neira et al. (2011)
	Blue mackerel	2004	Mid-range estimate of 40,000t	2 (7.5%)	3000t	2600t	Ward et al. (2009)
Western	Redbait	NA	NA	2	5000t	5000 t	RBC default - expert judgement
	Jack mackerel	NA	NA	2	5000t	5000t	RBC default - expert judgement
	Blue mackerel	2005	Best estimate 56,000t	2 (7.5% plus allowance for spawning outside survey area)	6500t	6500t	Spawning activity confirmed outside of the DEPM survey area. Ward & Rogers (2007), Ward et al. (2009)

Perhaps most important and certainly most relevant to our deliberations this week was the criticism levelled at the TAC and the estimation of jack mackerel biomass in the eastern zone.

The SPF Harvest Strategy uses a tiered approach that recognises the ecological importance of the small pelagic species and takes an explicitly conservative approach to setting harvest levels (i.e. proportion of spawning biomass) and hence TACs. The tiered approach recognises that harvest rates must be low when there is limited information available on the status of the stocks but can be increased as improved information becomes available.

Tier 1 – applies to stocks for which spawning biomass estimates are no more than 5 years old, with harvest rates set between 10-20% of spawning biomass; the actual harvest rate is reduced as the 'age' of the biomass estimate increases. Spawning biomass is estimated using the Daily Egg Production Method (DEPM) which is a survey method that is independent of the fishery. It has been successfully applied nationally and internationally in other small pelagic fisheries to assess the size of spawning stocks.

Tier 2 – either set at a maximum of 7.5% of the most recent estimate of spawning biomass or where biomass has not been assessed at a level based on expert judgement that is considered to be conservative when previous fishing history,

species distributional range and life history characteristics are taken into account.

Tier 3 – applies to species for where there is limited information; TACs are set at very low levels but do not exceed 500 t for the species.

TAC setting

Sub-area	Species	DEPM surveys	Spawning biomass	Assessed tier level 2012/13 (harvest fraction)	RBC 2012/13	TAC 2012/13	Comments
Eastern	Redbait	NSW 2003 ETAS 2005 & 2006	NSW :20,500t TAS: 51,000t (2006) & 87,000t (2005) (av. 69,000t)	1 (10%)	6900t	6900t	NSW estimate imprecise but indicates ETAS values are likely under-estimates. Neira and Lyle (2011)
	Jack mackerel	NSW 2002	Best estimate (mid-range) approx. 140,000t	2 (7.5%)	10600t	10100t	RBC raised from 5000 t (2011/12) to take into account newly available information based on 2002 egg survey data. Neira et al. (2011)
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It was the doubling of the eastern Jack mackerel quota that really got this going.

Articles

Margiris: UTAS VC must investigate. Updated analysis. Kim Booth: Fresh questions. SA bound? ↑Back to Articles

Dr Andrew Wadley, Principal, Australian Risk Audit. Published: 2012-08-26 06:22 AM
30.08.12 5:42 am
44 comments

- The calculation of spawning biomass given in the Neira 2011 report is wrong. Its results are false
- Falsification in science is defined as publishing or reporting misleading facts associated with a study, research or experimentation
- In particular, the Minister for Fisheries has been misled by the AFMA's reliance on this report – a science-based approach to setting catch levels cannot be based on a falsehood

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One blog caused particular concern. This was a report in the Tasmania Times that amongst other things suggested that the science (IMAS) was wrong, unrepeatable, misleading and contrary to established scientific norms. What made this worse was that a complaint was levelled at the VC of Utas, through the blog and in writing, that accused IMAS academics of fraudulent behaviour.

The FV Margiris Quota: a case of Lies, Damned Lies and Statistics

< Back to Articles

Dr Andrew Wadsley, Principal, Australian Risk Audit
10.09.12 4:39 am
19 comments

The results are not exactly the same: the analysis here calculates a 2002 jack mackerel spawning mass between 25,000 tonne and 35,000 tonne depending on which egg-incubation model is used.

Nevertheless, these numbers are seriously lower than the 140,000 tonne given as the "best-estimate" by the fishery scientists and the IMAS 2011 study.

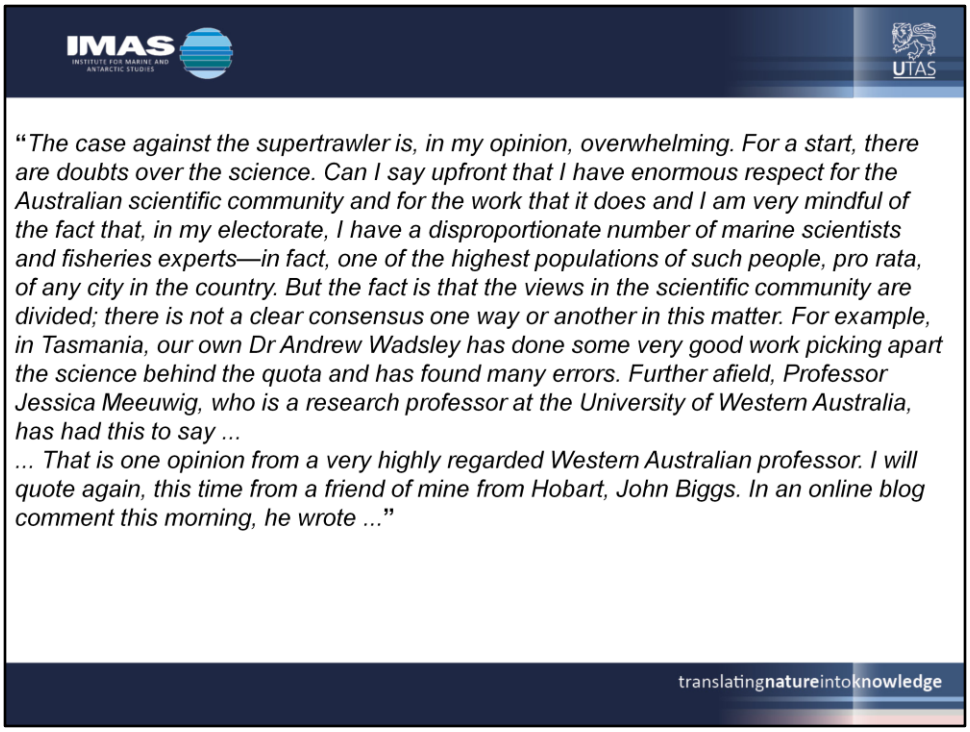
I doubt there is a single statistician, economist, biologist or social scientist in Australia – those people who use statistics in their day job – who, looking at these diagnostics, would support the results of the IMAS analysis, let alone base the quota for the jack mackerel fishery on it.

Approving the proposed TAC of 10,100 tonne, when the recommended precautionary quota should be no greater than 2,250 tonne (and most likely less), would be like legislating that pi = 3.

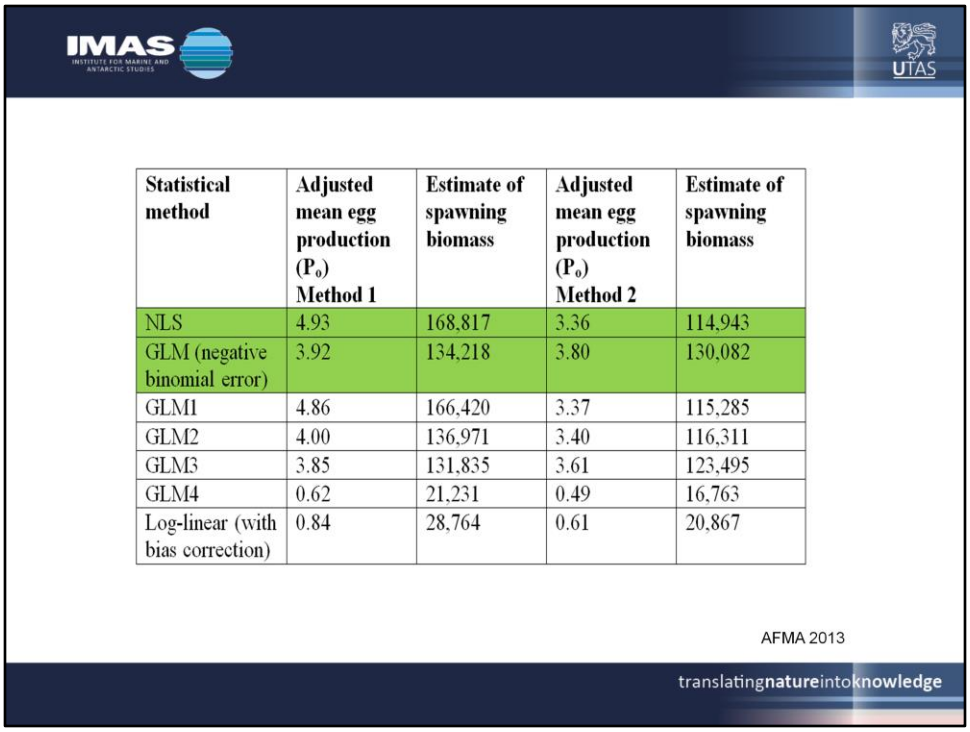
If you haven't already done so, email your State Senators now, before it's too late, and tell them the plain truth: that the 'statistics' behind the quota is wrong.

Senators will vote on what the Margiris is allowed to trawl for on Monday. Please contact them today.

"All that is necessary for the triumph of evil is that good men do nothing."



To make matters worse, and in addition to the media misconceptions, several local politicians seized on the so-called doubts in the science. This from a prominent local independent……



Statistical method	Adjusted mean egg production (P_0) Method 1	Estimate of spawning biomass	Adjusted mean egg production (P_0) Method 2	Estimate of spawning biomass
NLS	4.93	168,817	3.36	114,943
GLM (negative binomial error)	3.92	134,218	3.80	130,082
GLM1	4.86	166,420	3.37	115,285
GLM2	4.00	136,971	3.40	116,311
GLM3	3.85	131,835	3.61	123,495
GLM4	0.62	21,231	0.49	16,763
Log-linear (with bias correction)	0.84	28,764	0.61	20,867

Much of the so called lack of consensus was around the estimation of the spawner biomass of eastern Jack Mackerel.

There are several different ways of analysing raw data collected in a DEPM to give an estimate of adult populations, as summarised in a paper by Lyle *et al*. (2012). These results are shown in the table, the two highlighted methods were used in Neira (2011). The seven methods fall into two distinct biomass clusters. The estimates by Neira (2011) compare favourably with the GLM 1 – 3 methods but are substantially higher than estimates based on the GLM4 and log-linear models (Lyle *et al*. 2012).

The spawning biomass estimate (140,000 tonnes) used in 2012 as the basis for setting the Total Allowable Catch (TAC) for Jack Mackerel (east) is mid-range of the high and low spawning biomass estimates found in the Neira (2011) assessment.

The ENGOs favoured the lower biomass cluster, arguing that the TAC should be approximately 2,200t.

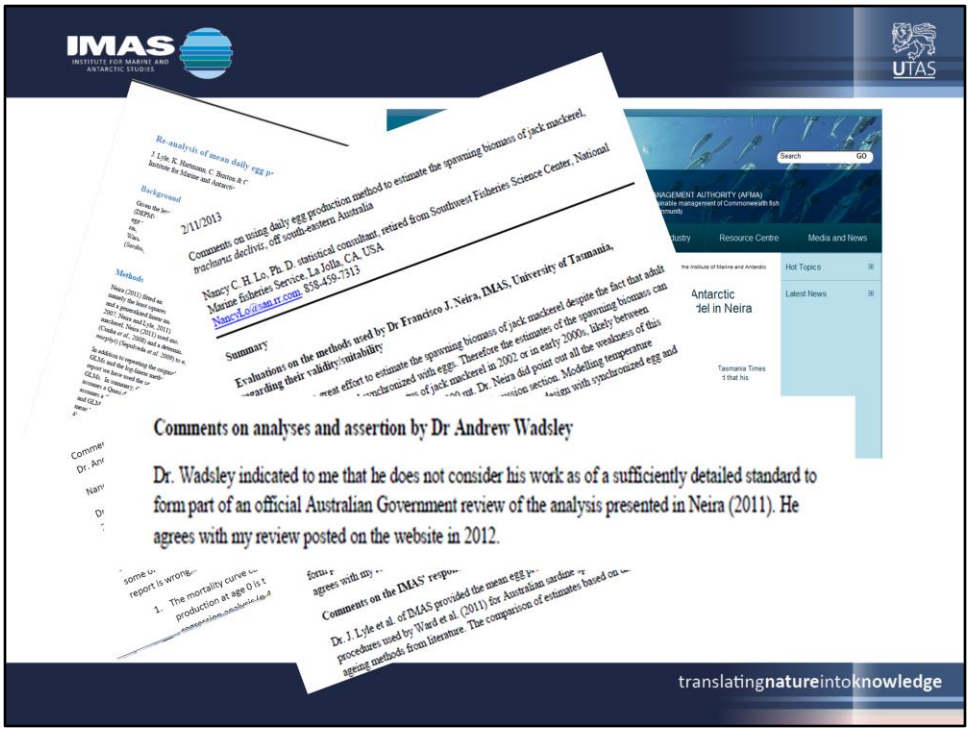
Our choice of the higher biomass was in part based on the similarity between the DEPM models estimate and the independent Atlantis estimates of SPF (see below).

Ref:

Lyle, J, Hartmann, K, Buxton, C & Gardner, C 2012, *Re-analysis of mean daily egg production in jack mackerel*, IMAS, Hobart. http://www.afma.gov.au/wp-content/uploads/2012/08/IMAS_reanalysis-of-Neira2011.pdf

Wadsley, A 2012, *The Commonwealth Small Pelagic Fishery: Review of estimates of Jack mackerel biomass,* http://tasmaniantimes.com/images/uploads/Analysis_of_jack_mackerel_biomass_estimates_(Wadsley_26Aug2012_updated).pdf

Estimates of biomass and sustainable catch levels for the Eastern Jack Mackerel stock in the Small Pelagic Fishery (2013) http://www.afma.gov.au/2012/08/super-trawler-faqs-3/



Wadsley published an analysis of Neira's mortality curve in the Tasmanian Times (TT) article: "Margiris: UTAS VC must investigate" (http://tasmaniantimes.com/index.php?/weblog/article/super-trawler-the-utas-vice-chancellor-must-investigate/) and then subsequently published additional analyses as errors in his approach were progressively identified by IMAS and others.

An independent peer review of the methodology used by IMAS provided by Nancy Lo (2013) evaluated the validity and suitability of the Neira (2011) assessment and provided comment on the evaluations conducted by Wadsley (2012) and Lyle *et al*. (2012). Lo (2013) concluded that the approach adopted in the Neira (2011) assessment was reasonable, however, other methods of assessment did produce lower estimates of biomass.

Lo (2013) had this to say about the Wadsley analysis: "Dr. Wadsley indicated to me that he does not consider his work as of a sufficiently detailed standard to form part of an official Australian Government review of the analysis presented in Neira (2011). He agrees with my review posted on the website in 2012."

Refs:

Lo, N 2012. Comments on 'the commonwealth small pelagic fishery: review of

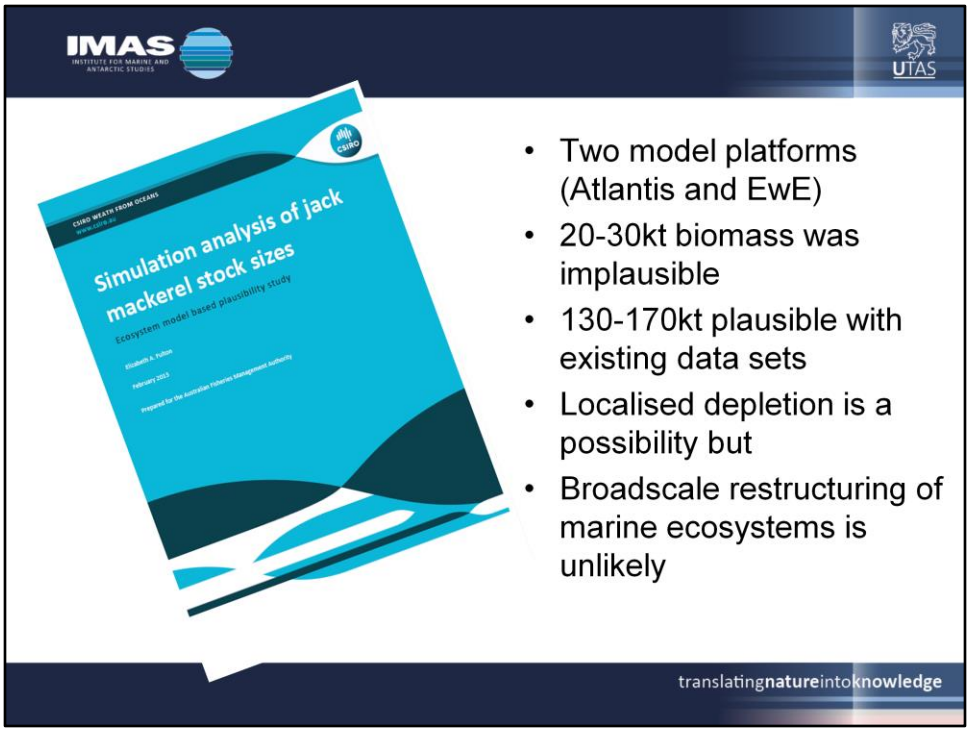
estimtes of jack Mackerel biomass' by Dr. Andrew Wadsley. http://www.afma.gov.au/wp-content/uploads/2012/09/Att-4_Comments-onwadsleyJ.mackerel.pdf

Lo, N 2013. *Comments on using daily egg production method to estimate the spawning biomass of jack mackerel, trachurus declivis, off south-eastern Australia* http://www.afma.gov.au/wp-content/uploads/2013/03/Report_Lo2.pdf

Lyle, J, Hartmann, K, Buxton, C & Gardner, C 2012, *Re-analysis of mean daily egg production in jack mackerel*, IMAS, Hobart. http://www.afma.gov.au/wp-content/uploads/2012/08/IMAS_reanalysis-of-Neira2011.pdf

Neira, FJ 2011, *Application of daily egg production to estimate biomass of jack mackerel, Trachurus declivis – a key fish species in the pelagic ecosystem of south-eastern Australia*. IMAS, Hobart. http://www.afma.gov.au/wp-content/uploads/2012/08/1.-Application-of-DEPM-to-Estimate-Biomass-of-Jack-Mackerel-Neira-2011-1.pdf

Wadsley, A 2012, *The Commonwealth Small Pelagic Fishery: Review of estimates of Jack mackerel biomass,* http://tasmaniantimes.com/images/uploads/Analysis_of_jack_mackerel_biomass_estimates_(Wadsley_26Aug2012_updated).pdf



Two ecosystem modelling platforms have been used to model the south eastern waters of Australia. Both models contain jack mackerel as a modelled group. These models were used to explore the plausibility of a range of alternative spawning biomass estimates for the stock.

Both models indicated that values of 20,000-30,000t are implausibly low given the ecology captured in the models. The simulations run at this level are either numerically impossible…..

In contrast spawning biomasses of 130,000-170,000t are plausible given existing data sets and ecological understanding of the system. If eastern jack mackerel is fished following the existing harvest strategy for the Small Pelagic Fishery (SPF) then some localised depletions are possible, but broad scale restructuring of marine ecosystems is very unlikely (it was not seen under any simulation using the plausible spawning biomasses).

Time does not permit me to go into similar detail on the potential for localised depletion and the impact of trawling on TEPs, but these will be covered elsewhere this week.

Fulton EA (2013) Simulation analysis of jack mackerel stock sizes: Ecosystem model based plausibility study. CSIRO, Australia.

In the 1980s and 1990s fisheries in most developed countries were suffering from extensive overfishing and poor management systems. In Australia, for example, fisheries for southern bluefin tuna and orange roughy collapsed. Political pressure from fishing companies led to maintenance of catches far above the scientific advice.

In the mid-1990s, a shift began. Political influence on fisheries decisions was diminished and policies were supported by good science. This transformation has been most thorough in the US, Canada, Australia, New Zealand, Iceland and Norway, all places where overfishing has been largely eliminated. In Australia, assessed fish stocks are rebuilding and our evidence based fishery management framework is internationally recognised.

“Decision rule” processes have been instrumental in removing political influence. Under these processes, scientific data is used to set catches by pre-agreed rules. Removing political interference has contributed to the independent third party certification for sustainability (MSC) for several large wild capture fisheries that supply imported seafood such as New Zealand blue grenadier, southern blue whiting, and Alaskan Pollock. Each of these coincidentally involves the use of factory trawlers.

But shifting politics out of fisheries decision-making does not mean the community loses control of their resources. Rather, political involvement occurs more appropriately at the level of policy across fisheries.

This distinction broke down in the case of the supertrawler.

- **While we patiently await the outcomes of the Lack review into the SPF we maintain that the scientific understanding of the SPF was relatively sound, for both the target species and other species in the ecosystem.**
- **It is clear, however, we didn't have an effective way to conduct science discussions in a public policy or public debate context. This was particularly evident where the anti-trawler campaigns exploited scientific differences to selectively support a position, which undermined the basis for action and undermined the value of science to public policy.**
- **The lack of social license to operate a factory trawler in Australian waters was based in part on perceived deficiencies in the science underpinning harvest management as well as negative perceptions about the use of large factory trawlers more broadly. All the circumstances combined to successfully impart on the public the view that 'super trawlers' are an ecological disaster waiting to happen. Some may consider this legislative override as the appropriate outcome in broad democratic terms – the ultimate avenue through which to reflect public concern. The Ministers actions are, however, highly unusual in Australian environmental law. The enactment of a special "moratorium" amendment to the *EPBC Act* sets a concerning precedent and is especially curious given that other avenues were potentially available by which to defer approval of the vessel. (Under the EPBC Act's Environmental Impact Assessment provisions, the Minister has the power to request a more detailed assessment of environmental impacts to protect "matters of national environmental significance".)**
- **While it can be a positive that interest groups are becoming more engaged, if they are misinformed or they misinform the general public, their influence may be negative on established governance systems, potentially leading to undesirable outcomes for society as a whole.**
- **The decision to prevent the vessel fishing pending further research raises the question of whether it is ever possible to reach the level of certainty the general public and decision makers would require, and the impossibly-high bar this now seems to set for ecosystem-based fisheries management. For example, it is hard to see how additional research can address uncertainties about the impact of factory trawlers, without actually allowing a factory trawler to operate under very strict conditions and assessing those impacts.**
- **We suggest that Australia has taken a backward step by allowing political pressure to override established fisheries policies in the case of the factory-trawler. If political expediency dictates how fisheries are to be managed and if ministers have total discretion to override science-based management policies, what is to prevent a return to the bad old days of the 1980s, where pressure**

from fishing companies saw catches maintained at much higher levels than the scientific advice?

Social license is the level of acceptance or approval continually granted to an organisation's operations or project by the local community and other stakeholders.

It varies between stakeholders and across time through four levels from lowest to highest: withdrawal, acceptance, approval and psychological identification.

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Whatever the outcomes of the review, I believe that this week's deliberations will be part of what I perceive will be a long road back to social acceptance in the SPF. I commend Tim for his leadership and foresight in organising the event and thank all of you for agreeing to participate in what promises to be an interesting few days.

Australian Centre for Corporate Social Responsibility definition of social licence to operate
http://www.accsr.com.au/html/sociallicense.html