AUSTRALIAN SOUTHERN BLUEFIN TUNA
INDUSTRY ASSOCIATION LTD (ASBTIA)

Stephen Palethorpe
Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
Parliament House
Canberra ACT 2600

10th January 2020

Dear Committee Secretary

Re: Submission on the "Impacts of seismic testing on fisheries and the marine environment" Senate Inquiry

The Australian Southern Bluefin Tuna Industry Association (ASBTIA) welcomes the opportunity to comment on the *Inquiry into the Impact of seismic testing on fisheries and the marine environment*.

ASBTIA wishes to confirm its affiliation and agreement with the positions of both the Commonwealth Fisheries Association (CFA) and Seafood Industry Australia (SIA). Further, ASBTIA agrees with the breadth of concerns raised by the Western Australian Fishing Industry Council's (WAFIC) submission. Our submission focuses on SBT because that is where our most expertise lies, as well as the wider ecosystem of the Great Australian Bight (GAB).

As the Australian Government and community know, ASBTIA support sustainable natural resource utilisation – including in our own backyard in the Bight. The fishing and ranching of Southern Bluefin Tuna is entirely based on utilising the renewable natural resources of the GAB that are replenished EVERY year. These resources are totally reliant on the GAB's 'sardine driven' ecosystem being maintained in its current functional, balanced and unpolluted state.

We examine every petroleum exploratory and development application on its risks and potential consequences and we detail our concerns throughout each consultation. From the Regulator, NOPSEMA, all we ask is that:

- Any assessment is based on an ALARP which fully recognises the risks/consequences of any activity.
- That there are mitigation measures in place which effectively target the risks.
- Approvals promote adoption of 'world's best practice' – and for seismic surveys this includes use of new lower impact technologies where they exist to reduce the volume and sound signal frequency drift.
- There is a guaranteed compensation fund in place.
- That the debate be evidence based.

The purpose of this submission is to:

1. Identify the risk/consequences of seismic survey activity in the Great Australian Bight.
2. In identifying the risks/consequences, provide a background to Southern Bluefin Tuna (SBT) and the International Management of the SBT fishery. The SBT fishery is sustainable, renewable, expanding and in Australia it is high value added and no by catch.
3. Highlight some of issues encountered already encountered with GAB seismic surveys.
4. Suggest areas for improvement.

Again, we note that we do not oppose other natural resource development or marine park declarations. What we request is that each decision fully assesses the risks/consequences of each application. This is what every other country does – for example, in Norway, large areas are not open for oil and gas exploration or development because of the risks and consequences for the current marine environment and industries.

Key Points

(1) SBT is a highly migratory and internationally managed resource – with the global catch quota shared between Australia and Japan (35% each), Indonesia, NZ, South Africa, Taiwan and Korea. The global catch is automatically set by a scientific formula – and has increased by 55% since 2012 when the formula was first used.

(2) On its annual migratory path from South Africa to NZ, the SBT spend December/March in the Bight, where the major sardine feed resource provides up to 80% of SBT's annual global growth. Australia has "an international duty of care'' in this regard.

(3) Australia pioneered global tuna ranching in 1990 – adding value to a limited resource. Only Australia adds value to the catch by capturing the SBT live and ranching them. It requires large continuing investment in people, capital equipment and regional infrastructure.

(4) SA companies bought the catch quota Rights from other States and countries. Ranching in SA generates 980 FTE's, is Australia's largest aquaculture export and expanding, is high value added and is totally Australian owned. Despite storm disasters and long periods of low prices (2013 2020), the industry has never sought or received any public funding.

(5) The Bight is a "sardine driven ecosystem" and sardines eat zooplankton. Results published from a recent in ocean study at a location with similar water temperatures to the Bight showed that discharges from seismic survey airguns kills zooplankton.

(6) Prior to 3D seismic surveys in the Bight the forage locations chosen by migrating SBT were highly predictable because there was very little inter annual variation between fishing seasons for the entire period since SBT fishing began in 1949, and then the first 20 years of tuna ranching from 1991. After the large scale, deep water 3D seismic surveys (2012 2015) the predictability of forage sites and aggregating locations no longer exists.

(7) We have systematically assessed whether there are alternative explanations for the new unpredictability. The two most obvious alternative explanations are first, any change in water temperature in the Bight, and second an impact of a recovering SBT stock:

a. On the first, we know from all the scientific data that the physical characteristic of sea temperature has remained highly suited to SBT throughout those seismic survey areas indicating the reduced attractiveness is biological and relevant to apex predators.

b. On the second, the normal impact of a recovering stock is a "range extension," not a contraction as appears in this case.

(8) Outcome with NOPSEMA with SBT > We have supplied all this information to NOPSEMA over the last two years – and this led to NOPSEMA, in its latest approval for a seismic survey in the Bight (January 2019), imposing the Conditions:

The survey must take place 1 September to 30 November 2019 or the same period in 2020. This is outside the main SBT residence period in the Bight.

a) "The petroleum activity may only be carried out in a manner that ensures no interference with the migration of southern blue fin tuna (SBT) (*Thunnus maccoyii*) into the Great Australian Bight.

b) PGS will develop and implement a process to detect the migration of SBT into areas within and adjacent to the operational area during November 2019 and/or 2020. This detection process is to be designed on the advice of a suitably qualified and experienced person for the purpose of detecting SBT aggregations within 30 km of the operational area.

c) In the event that SBT aggregation(s) are detected within 30km of the operational area, SBT behaviour is to be monitored and should SBT aggregations be detected within 20 km of the operational area operation of the acoustic array will cease for the remainder of Period A (Sept/Nov 2019), or if the activity is occurring in Period B (Sept/Nov 2020), the activity will cease and not recommence."

PGS decided not to proceed in 2019 but their approval still has the option to proceed in 2020.

Possible Recommendations by the Senate Committee

The Committee might consider the following:

(1) Recognising that there is a real risk of seismic activity in some areas to the marine environment and its current uses – and that in some areas the risks and consequences will outweigh the benefits. Australia might consider, like most other countries, not opening these areas to oil exploration and development. For example, Equinor is 67% owned by the Norwegian Government which in turn does not allow oil and gas exploration or development in large parts of their own marine zone – but now is proposing drilling in the Arctic and in the Bight.

(2) Supporting (1), it is worth quoting from the recently completed GAB Research Program (main participants CSIRO, SARDI, BP):

> "The GAB is a region of global conservation significance, supporting valuable fishing and aquaculture industries and important regional ecotourism industries"

> "The GAB supports a high number and diversity of migratory and resident apex predators, including many that are internationally significant and threatened species"
>
> "More than 85% of the known species of fish, molluscs and echinoderms in the waters off Australia's southern coast are found nowhere else in the entire world"
>
> "The GAB's physical characteristics make it globally unique and quite distinct from the adjacent seas east and west of Australia".

(3) That the ALARP principles that apply to development applications under the OPGGS also generally apply to exploration such as seismic surveys. These principles were applied to some extent in the January 2019 NOPSEMA decision on a Great Australian Bight survey (see (8) above).

(4) An example of (3) above the adoption of technical progress in moderating the noise and other impacts from seismic operations appears to have been very limited compared with other technologies. Lower impact technologies are available. The Regulator needs to encourage adoption of these as part of the ALARP assessment. There is a seismic provider company that regularly undertakes proprietary and multi client seismic surveys within Australia that has exclusive rights to two known lower impact technologies that substantially reduce the volume and sound signal frequency drift – two aspects of seismic surveys that could potentially reduce the impact on other stakeholders and the environment. The e source "air gun mufflers" are able to be retrofitted to existing equipment, at a relatively minor cost. Adoption of these types of technologies is achievable and will only benefit the seismic company across the world once installed (concerns about seismic survey impacts are NOT confined to Australia).

(5) Incorporating in OPGGS Regulations, consistent financial compensation and remediation provisions – like most new legislation on natural resource activities (e.g. fish farms). The reality is that the world's worst two oil spills in history have occurred in the last eleven years. One in North America has only just been finally settled, and the one in the Australian Zone (Montara, August 2009) is still not settled. It is anomalous that in Australia, a bond or bank guarantee is required for a one hectare fish farm but nothing is required for an oil development or seismic survey, let alone a proportionate amount.

(6) There needs to be an increased focus and prioritization of adopting and utilising techniques like regional data merging – for example the current project on the North West Shelf 'phase matching all open fold database information from various surveys and merge/phase match existing 2D and geomagnetics making a big 3D data set'. Whilst we acknowledge that this does not necessarily replace the need to undertake 3D seismic, it provides information so that the actual survey can be targeted and therefore required over a much smaller area and able to be completed in a much shorter timeframe. It potentially reduces the conflict with other stakeholders like fishers, and minimising environmental disturbance to other environmental functions including disruptions to migratory species, calving of Southern Right Whales, calving and feeding of Pygmy Blue Whales, migration and feeding of SBT etc

(7) Another criterion that needs to be required in assessment of applications is the number of seismic surveys and whether they have led to actual development, and successful

development. The greatest uncertainty facing current long term users of the Bight is the continual flow of applications for seismic surveys and development. This happens despite there being no evidence from the thirteen previous drills that there is viable or any reserves – and despite global oil majors surrendering leases in the Bight (e.g. BP and Chevron) in the last two years. There were many more before that. Sometimes a survey application is to upgrade from 2D to 3D – but often it is probably due to global excess capacity of seismic vessels, and penalties incurred for not developing other locations.

(8) Where ambient noise levels are "not available" there needs to be a requirement to measure this prior to survey starting and to have control measures written into the Environmental Plan (EP) to update sound modelling if the sound output from the seismic survey is at variance to what modelling suggested. It is not appropriate to use numbers from Northern Hemisphere locations that are subjected to excessive anthropogenic noise pollution or choose the highest end of an Australian recorded spectrum as the background figure to measure seismic survey performance. Modelling of sound exposure levels must report spatial range to the known and published ambient soundscape of the region, for the Bight this is 50 to <95dB across relevant frequency bands. Modelling of sound exposure levels must include masking as an impact threshold criteria. Whilst the exact cues and navigational aids used by SBT for the returning migrations into precise locations within the GAB have not been well studied, it is thought that bathymetry, ocean currents, auditory signals from topographic features including the unique soundscape at the shelf slope interface and the onset of fish choruses could all play a role. And it is the prey fields of the deep scattering layer that are a significant driver of both horizontal and vertical distribution. Noise emitted from seismic surveys (and MODU thrusters, drilling, and tender vessels) has the potential to interfere with or mask auditory cues and prey signals. The biota of the deep scattering layer includes multiple species of zooplankton including copepods, krill, eupausiids, mysiids, ostracods, larval fish, larval crab and other crustaceans and decapods – species that are at risk of shattering with seismic surveys.

We also request the Senate Committee to consider:

a) The problems arising from the current lease allocation system – where a successful tenderer may later not wish to proceed with actual seismic surveys. Under the current system, the cost of maintaining good standing can lead to just speculative surveys – to the potential cost for the marine environment and current users.

b) The data withholding period allowed for 'multi client' marine seismic surveys – this can lead to different companies repeating seismic surveys over the same area to collect a data set of their own; multiplying impact on fishers and the environment. An example of this is currently in the Otway Basin area where there are 3 separate seismic surveys approved which overlap in space and time (see later in attachment 4). With a multi client survey the data that is collected is the exclusive property of the (multi national) seismic company and can be on sold for a period of 15 years. This incurs a significant delay until there is contribution and benefit to the Australian data and knowledge base. And results in amplified and cumulative impact on fisheries and the marine environment.

c) NOPSEMA is in the position that it can only assess individual applications – not wider duplication, cumulative impact from multiple or successive surveys or from a regional context.

d) The number of "suspension and extensions" that can be sought for an exploration permit – either the Title Holder has serious intent and means to progress a work plan or not. Applicants are already approved with a range of dates to do the survey – so how can extensions be justified?

Yours sincerely,

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Attachment One

SBT Biology, Migration and Natural Behaviour

SBT are a long lived (40 years) species with a single genetic stock, that start reproducing from 7 to 8 years of age. The species is highly migratory and seasonably abundant at particular locations within its range across the southern temperate oceans between latitudes 30 50°S. Summarised SBT movements and distribution are shown in Figure 1 and Figure 2. SBT make annual cyclical journeys of 5,000 to 16,000km between the Great Australian Bight and other areas across the Southern and Indian Ocean and into the Tasman Sea. It is essential that these fish are able to adequately 're fuel their tanks' whilst in the Bight to manage and survive these long distance journeys. Anything that compromises the time spent or the quality of food supply in this vital area risks adversely impacting SBT migrations, and the population.

While in the GAB, SBT exhibit a unique rippling surface behaviour that is not expressed at any other location throughout its range. It is considered that high levels of solar insolation warm the very surface layer of the GAB (top 1 3m of the water column), the increased ambient water temperature in turn results in significant warming of SBT viscera (and body) for several hours, speeding up digestive processes and keeping muscle tissue primed for rapid response to shoaling sardines and mackerel. The surfacing behaviour in the GAB provides juvenile SBT with a thermal refuge from which they can make excursions into subsurface colder water to forage on the zooplanktons, fish, and crustacean larvae of the deep scattering layer as well as the dense aggregations of squid and myctophids that colonise the slope area and canyons. The energy derived from heating associated with long periods of rippling and surface schooling contributes significantly to the energy available for growth. SBT accrue 80% of their annual growth while in the GAB over summer months.

Juvenile SBT return to the GAB seasonally (through Spring and Summer), every year for multiple years of their life. The GAB is also a staging ground for mature adult fish on route to the only known spawning area that is in the tropical waters south of Indonesia. As such, disruption to migration and damage to the GAB ecosystem has the potential to impact many critical life stages of SBT. Whilst the exact cues and navigational aids used by SBT for the returning migrations into precise locations within the GAB have not been well studied, it is thought that bathymetry, ocean currents and auditory signals from topographic features and fish choruses could all play a role. Marine seismic surveys emitting loud sound pulses every 8 10 seconds 24 hours a day 7 days a week for weeks to months at a time potentially interfere with or mask auditory cues used by SBT to find the feeding areas of the GAB.

(Refs: Magnuson, 1978; Caton, 1991; Bushnell and Jones, 1994; Brill, 1996; Grewe *et al*., 1997; Leigh and Hearn, 2000; Gunn and Block, 2001; Korsmeyer and Dewar, 2001; Davis and Stanley 2002; Bestley *et al*., 2009; Hobday *et al.*, 2009; Willis *et al.,* 2009; Bestley *et al*., 2010; Fujioka *et al*., 2010; Basson *et al.*, 2012; Hobday *et al.*, 2015; McCauley *et al.,* 2015; McCauley, 2016a; McCauley, 2016b; Bailleul *et al.,* 2017; Eveson *et al.*, 2018; Patterson *et al*., 2018a; Patterson *et al*., 2018b).

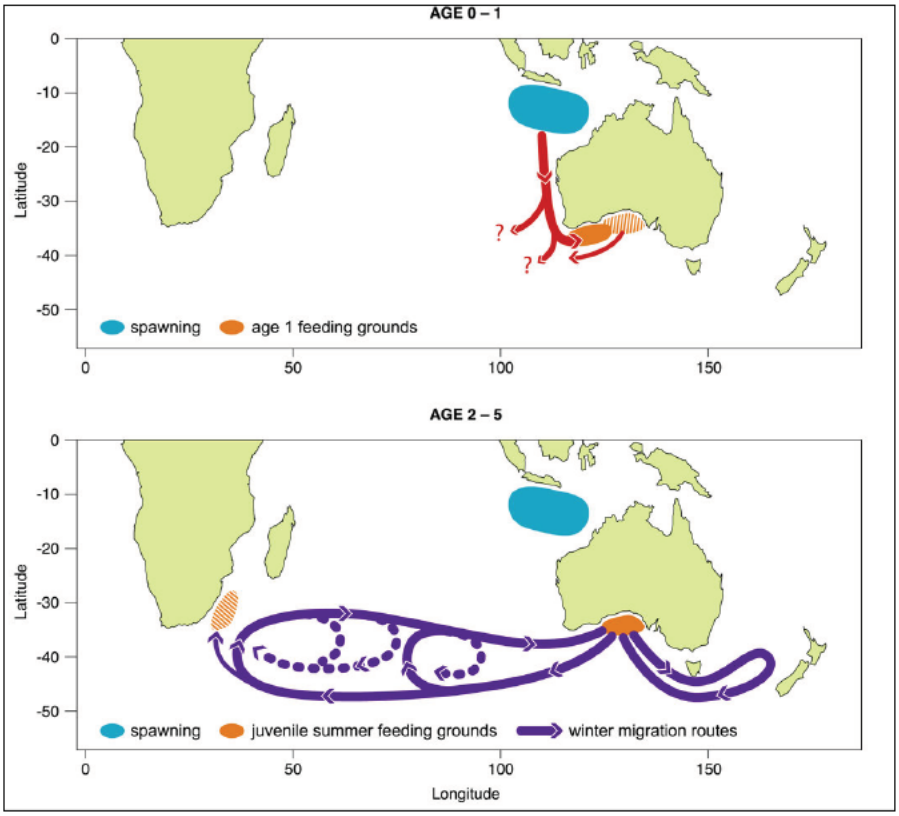

Figure 1: Global movement and distribution of juvenile SBT (Basson *et al* , 2012).

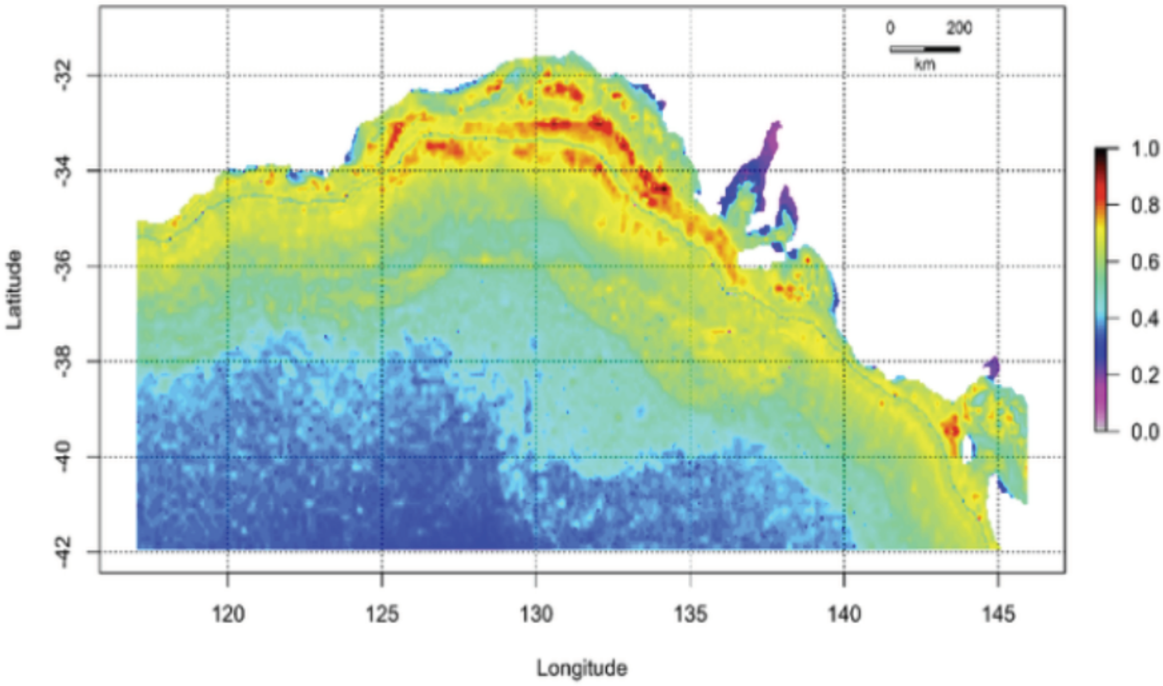

Figure 2: Standardised probability of potential occurrence at-sea of SBT. Warmer colours indicate a higher probability of occurrence. Suitable habitats are mainly located in the central and eastern GAB (Bailleul *et al.,* 2017)

Attachment Two

SBT Fishery and International and Australian Management

SBT is the focus of a large, high value commercial fishery of many countries throughout the species range. SBT was overfished through the period from the 1950's to 1970's; the annual global catch peaked at 80,000 tonnes in the early 1960's. This historic unregulated heavy fishing effort resulted in a significant decline in the numbers of mature (breeding) fish and subsequent declines in annual catches. By the mid 1980's it was apparent that a global recovery plan of management and conservation was required. The main fishing nations at that time (Australia, Japan and New Zealand) began to apply strict quotas (catch limits) to their fishing fleets to enable the SBT stocks to rebuild. After thirty five years of restricted fishing effort the population is rebuilding and is a clear example of the very long term planning and commitment that is required for sustainable global management of a renewable resource. Catch limits are set by science and based on population recruitment.

The predictable and reliable migration and surfacing behaviour that SBT exhibit in the Great Australian Bight means this is the only place where population recruitment can be measured – recruitment is the key indicator used to assess the status of the global SBT population as well as set the global catch limit for multiple countries including Australia. This is why noise interfering with natural migration and pollution compromising this global feeding area, has potential for much wider international consequences.

Population recruitment is determined by gene tagging, which is a new and novel method that involves tagging (taking a biopsy) and releasing large numbers of 2 year old SBT in the GAB every year. The live tagged 2 year old juveniles are returned immediately to the school they were captured from and allowed to undertake their normal population mixing and migrations into winter feeding areas and then back into the GAB the following spring/summer. Large numbers of 3 year old ranched SBT are also sampled annually from the harvest and the DNA extracted and compared to the data bank of material collected from 2 year olds. The number of matches gives a fishery independent measure of SBT abundance that is not susceptible to reporting biases of other mark recapture methods.

The genetic material collected from recruited 2 year old juveniles in the GAB is also matched against a database of genetic samples collected from adults captured from the Indonesian fishery. This enables the determination of Parent Offspring Pairs giving a measure of spawning biomass.

These two genetic methods are used as inputs to the Operating Model (OM) of the CCSBT to assess the status of the stock and to evaluate possible Management Procedures (MP), i.e. rules for setting future catch limits depending on incoming data. Both of these key data sets rely on spatial and temporal consistency of SBT migrations and predictable utilisation of the GAB. The large scale global studies show that juvenile SBT return to the GAB feeding grounds seasonally every year. This means that external factors such as seismic surveys, dynamic positioning system noise masking migratory cues or oil spills can result in major distortions in the data so making them of limited use. The further problem is that these distortions affect migration and feeding for many years. When this happens, and quotas are reduced, the collateral value of the ITQs automatically reduces – leading to bankruptcies and major job losses (see later).

There is a third data set that inputs to the OM; the fishery dependant measure of Japanese catch rate on the high seas (Catch Per Unit Effort or number of fish caught per 1000 hooks used). The

CPUE is a measure of survival between the juvenile and adult growth stages of SBT. However, revelations of “unreported catches” through a period until 2006, and operational changes in the Japanese long line fleet make this data set difficult to interpret and standardise.

Each data set uses the most recent 5 year index and the result is compared with a base period, to produce a projection that will achieve a certain target for the stock. The target is to rebuild the adult stock to 20% of the pre fishing (Year 1932) adult biomass with 70% probability by 2035. The quota will move up or down as the MP computes which quota will meet the target. The global quota is currently 17,647 tonnes and shared between 8 CCSBT Member countries, of which Australia and Japan (with 6,165t each) have the largest share. The remaining 30% is shared between Korea, Taiwan, New Zealand, Indonesia, South Africa and the European Union.

Management of SBT in Australia. All major fisheries in Australia are managed by Individual Tradeable Rights. They can have a different formal name but are the same principles. Commonwealth legislation calls them Statutory Fishing Rights (SFRs). These were first issued in Australia in 1984, oddly enough for SBT. They were then used as the foundation for other fisheries and then Water Rights.

There is normally a fixed number of SFRs in a fishery – legislated through a Management Plan (see www.afma.gov.au/SBT). Tonnage catch limits (quotas) are then set for single or multi years – and issued to each SFR owner in the same proportion as their share of the total SFRs in the fishery.

The basic strategy behind Rights based management is that the industry will trade Rights with the following benefits to the fishery, the community and the industry:

a. The Rights will be used as the dominant collateral for borrowings to fund purchase of Rights from those who want/need to leave the industry, for working capital, for capex to invest in the capacity to expand, to invest in value add, and for currency hedging for exporters where required.

b. The Rights will allow the industry to ***autonomously*** adjust (restructure) by trading Rights without relying on any government/community assistance.

Individual Transferable Quotas (ITQs) are still widely seen as the best way to manage fisheries. ITQs remain the prescribed method of management in the Commonwealth Fisheries Management Act 1991.

The SBT industry is a good example of how the fisheries management system of successive Commonwealth Governments and State Governments has been successful in achieving the core aims of the Policy. For example:

a. The SBT industry has never sought or received any government assistance since Rights were introduced in 1984. This is despite quota cuts of 67% in 1989 1991, and the further quota reduction of 24% in 2009; a 1996 storm which killed over 65% of the stock in the tuna farms; the high mortalities in 2009 2011 from a disease; and record low prices 2013 2019 (www.frdc.com.au).

b. The industry has rationalised by quota trading – and each Right has turned over 2.6 times since 1984 (www.afma.gov.au). As the Policy anticipated, the Rights have been bought by the most efficient operators (farming) and those most able to use the Rights to leverage borrowings with lending institutions.

c. The industry has invested heavily in adding value. The new global technology of tuna farming was invented in Port Lincoln in 1991.

d. Despite all the difficulties the industry has survived – and Australia's SBT catch quota has been increased by 52% since 2012 as the global stock recovers. The global catch quota is set by a scientific formula (www.ccsbt.org).

(refs: Industries Assistance Commission, 1984; Commonwealth Government, 1989; Geen and Nayar, 1989; Kaufmann *et al.*, 1999; Rose, 2002; Townsend, 2004; Hilborn *et al.,* 2005; Grafton *et al.,* 2006; Libecap, 2009; Macintosh and Bonyhady, 2009; Anon, 2010; Olson, 2011; Basson *et al*., 2012; Commonwealth Government, 2012; Bravington *et al.,* 2013; Bennett, 2015; Haward and Bergin, 2016; Melnychuk *et al.,* 2016; Pons *et al.,* 2016; Productivity Commission, 2016; CCSBT, 2019).

ASBTIA and SBT Ranching

All of the owners of Southern Bluefin Tuna (SBT) catch quota belong voluntarily to the Australian Southern Bluefin Tuna Industry Association (ASBTIA). Over 90% of the entire Australian quota is owned and ranched/farmed in South Australia, and 95% of this ranched product is exported (therefore generating new money into SA).

As the Great Australian Bight is the only place throughout the SBT's global range where the fish form aggregated schools at the sea surface through daylight hours, it is the reason why the GAB/Port Lincoln is the only place where SBT ranching can occur. The modern SBT ranching industry is an Australian success story pioneered by fishermen of Port Lincoln. Since 1990, the industry has steadily transitioned from a short seasonal wild capture fishery to the value adding of live caught tuna through ranching. This enables increased economic return from a restricted access, quota limited wild resource through investment in fixed infrastructure, high value adding and employment stability for regional families. It is the single most valuable sector of South Australia's aquaculture industry and Australia's largest aquaculture export.

The industry produces up to 9,000 tonnes of processed SBT annually with an estimated annual value of between AUD$150 AUD$300 million (PIRSA 2019). The variation is largely due to Japanese currency exchange fluctuations and market price. Direct and indirect employment in Port Lincoln is over 980 FTE (Econsearch 2019); in addition to this local tuna operators invest in multiple other unrelated businesses in the region these collectively employ a further 1,000 FTEs.

Therefore, we cannot stress enough how important the 1st December to 31st March fishing period is to our entire year's operations. If we do not catch SBT while they are within the Bight we do not have stock for value adding through ranching for the remainder of the year. The threats to catching SBT are multifaceted –

- of primary significance is unimpeded migration from the Indian Ocean into the GAB feeding grounds;
- specific to successful fishing is the unique schooling at the sea surface behaviour that SBT only exhibit in the Bight;

- specific for stock acquisition for ranching purposes is allowing SBT to become resident and stationary at forage sites for extended periods of time (to allow positioning and movement of towing pontoons especially after the initial transfer of stock, these can only travel at a speed of 1 knot).

- The historical predictability of the stock migrations and residence in the Bight.

Prior to 3D seismic surveys in the Bight the forage locations chosen by migrating SBT were highly predictable because there was very little inter annual variation between fishing seasons for the entire period since fishing began in 1952 and then the first 20 years of tuna ranching from 1991. After the large scale, deep water 3D seismic surveys (2012 2015) the predictability of forage sites and aggregating locations no longer exists.

What we have come to recognise is that the behavioural responses of SBT to seismic surveys do pose a very real threat to fishing operations and there are implications beyond simple physical vessel and gear interactions in the period that the seismic survey is underway. The fact that SBT migrating into the Bight now were not born when these large scale 3D seismic surveys were undertaken, suggests a fundamental change in the ecosystem rendering it no longer attractive to hungry migrating juvenile SBT. Note that the physical characteristic of sea temperature has remained highly suited to SBT throughout those seismic survey areas indicating the reduced attractiveness is biological and relevant to apex predators.

The tuna industry totally relies on the tuna migrating annually through the GAB from the Indian Ocean. The background is:

(1) The tuna leave the winter foraging sites through September, start arriving in the GAB from around October each year and start to leave the area after March. The GAB is the major global feeding ground for young wild SBT.

(2) From December/January, we capture around 300,000 fish live – average around 17 kg – and tow them in large pontoons to the farming Zones off Port Lincoln. Catching is staggered over the entire period that SBT aggregate in the GAB (December through to mid March) and towing operations continue for a period up to 2 3weeks after the actual catch date (depending on catch location).

(3) With ranching the wild captured live tuna are grown out for an extra 5 6 months and then harvested for export – value ranges $130 290 million fob. The most recent publicly available report, the 2017/18 financial year[1] shows the ranching sector value as $261 million. We rely heavily on the farms using the sardine stock in the region – and that stock is the largest tonnage fishery in Australia, see below.

(4) The industry is high value added with static infrastructure. FTE's generated by the industry are over 980 on Eyre Peninsula, plus all the associated businesses in the region.

(5) The annual tuna catch is restricted by quota (which has a very minor under or carry over allowance as the quota captured is recorded by the batches of live fish counted as they are transferred from the towing pontoons).

[1] https://www.pir.sa.gov.au/aquaculture/publications

(6) The fishery has no choice over when and where to undertake activities like fishing to stock ranching cages – this is entirely dependent on when and where the fish choose to school on the sea surface.

Attachment Three

Sardines

The spawning biomass of sardines in SA waters is "an order of magnitude higher than elsewhere in southern Australia". Sardines are Australia's largest tonnage fishery and they underpin the most valuable pelagic fishery in Australia – SBT. However, this is not just important to SBT – as noted by the SA Government, "The GAB is a sardine driven ecosystem." (SA Department for Environment and Water, presentation to Port Lincoln City Council August 2018).

The SBT fishery and industry are almost totally dependent on the SA sardine fishery, as follows:

(1) Of the SA sardine annual catch quota (currently 42,750 tonnes), over 95% is used in the tuna farms at a cost of $4,800/tonne. This is supplemented by imports at $10,050/tonne into farms (see www.frdc.com.au) – making up 20% of total feed use. Therefore, the SA sardine fishery is central to the viability of tuna farming in Australia.

(2) The SBT come to the GAB because of a combination of water temperature and the small pelagic resource. While in the GAB, > 50% of the prey species of the tuna are sardines and this can account for 89% of SBT stomach content volume.

(3) Sardine and anchovy eggs and larvae are widely distributed in shelf waters off SA. These concentrations are highly unlikely to be available in any other area of the migratory path of SBT. The aggregation of so many year classes – from 1 to 5 year old SBT in the GAB in summer/autumn is unusual, and testament of the unique productivity of the region.

(4) Studies have shown that the GAB in summer and autumn has high densities of lipid rich sardines. Which is not surprising given that the country's largest upwelling system enriches the GAB ecosystem through that time of year. Upwelling in the ocean is equivalent to fertilising a paddock, it delivers nutrients to the free floating microscopic plants which in turn feeds an abundance of small animals – zooplankton which are the food supply of small pelagic fish like sardines and these are the basis of the GAB ecosystem.

Possible impact of seismic surveys on zooplankton

Recently published research from in the field studies of zooplankton in temperate waters raises additional concerns about seismic survey activities in productive upwelling areas. Locally caught sardines are the source of 80% of the Ranched SBT food supply, and more than 50% of the diet of sardines in South Australia are crustaceans, krill are a significant component of these. This study used a single air gun of 150 cubic inches in the natural open water environment to measure the impact of this medium sized air gun's discharge on the zooplankton populations naturally present in the water column. The result was measurable impact at a much greater distance than what was presented by seismic companies through the consultation process with potentially impacted stakeholders up until the time of that study. Many, but not all seismic proponents have embraced the findings of that study. It is worth noting that a commercial array used in the field has multiple airguns that are fired simultaneously, some of these individual airguns are up to 330 cubic inches, substantially larger than the single airgun used for the field research study.

Key conclusions of the recently completely GAB Regional Research Program were:

> "The GAB is a region of global conservation significance, supporting valuable fishing and aquaculture industries and important regional ecotourism industries"
>
> "The GAB supports a high number and diversity of migratory and resident apex predators, including many that are internationally significant and threatened species"
>
> "More than 85% of the known species of fish, molluscs and echinoderms in the waters off Australia's southern coast are found nowhere else in the entire world"
>
> "The GAB's physical characteristics make it globally unique and quite distinct from the adjacent seas east and west of Australia".

(refs: Ward *et al.,* 2006; DSEWPaC 2012; Baghurst *et al.,* 2017; McCauley *et al.,* 2017; Doubell *et al.,* 2018; Econsearch 2018; VanRuth *et al.,* 2018; Econsearch 2019)

Attachment Four

Examples of some of the issues encountered to date

In our experience these mostly involve consultation, determination of ALARP and what is considered Acceptable. There are gaps in the science and also differences in opinion on interpreting the science but the real issue is about inadequate assessment and appreciation of the risks and potentially consequences lasting beyond the physical presence of the vessel.

Consultation and consideration is currently restricted to physical overlap with the commercial species and fishing locations. In the situation of a migrating species like SBT, this ignores the wider issue of seismic surveys which potentially impact on the broader ecosystem/food supply and the core reason why the fish migrate to the area at all. Impact on these other species can have an on going influence to the annual growth, mortality and current and future migrations of the species, therefore need to be considered in the Environmental Plan.

Consultation and consideration does not extend to core critical habitat of the target species that is not fished, e.g. canyons and topographic features that are likely navigational cues for SBT – the importance of this has only become apparent after large scale 3D seismic surveys in the GAB.

Consultation practices can be misleading – opening statements to fishermen like “we use sound, just like you use sound in fishing operations,” whilst partially correct, both do use sound. The issue is that fishers use volumes and sound frequencies that do not scare fish or alter their natural behaviour.

Consultation practices and genuinely listening to concerns raised, varies considerably across companies and even between individuals within companies. Uptake and use of science also varies considerably amongst proposals.

There is a role for the Regulator to encourage wider adoption of practices demonstrated to be possible by those that genuinely listen and make an effort. And a role for the Government to take heed of stakeholder and public concern when deciding on areas for acreage release – while improvements to the system were introduced in 2018, there are a number of exploration permits issued prior to then that continue to be renewed without stakeholder or public comment despite repeated lapses of the workplan expiry dates.

There is often promotion of a ‘feel good’ perception that petroleum exploration activities and fisheries can happily co exist. The reality is that it is rarely an equitable outcome and it is the fishery operators that come out second best. The ‘co existence’ notion comes about because early phase exploration, the seismic surveys, scare the fish from an area (the fishing ground), the fisherman move to follow the fish or if the fish are gone because there is no suitable adjacent habitat then the fishermen end up using their fishing vessels to help with oil industry activities because the banks still require payments and there are no fish to pay the bills. Given a choice true fishers would rather be fishing.

Having said this, there are opportunities for compromise from both parties in <u>some</u> situations, where these are possible and identified the Regulator needs to fully consider these in the assessment process. An SBT example for this was a seismic company structuring their survey so that it started after the vast majority of the SBT migration into the Bight was completed. The weather conditions were conducive to allow an early start (and finish) to SBT fishing, the fish were captured in record time so that the vast majority were safely stocked into ranching locations before the seismic survey started. The within season impact was reduced to as good as an ALARP outcome can be if both activities are to proceed. However, there were downsides to both parties out of this example. The cost was increased for the seismic provider and the tuna stocks in subsequent years remain displaced (5+years) from what was previously a predictable and reliable tuna aggregating area. As such the residual risk and lingering consequences are still invariably borne by the fishers.

It must also be noted that seismic companies willing to incur additional cost or inconvenience to reduce impact on fishers are in the distinct minority, and it is often down to individuals within a company being prepared to genuinely listen and consider how operational plans can be modified to reduce impact. And while not wanting to generalise too much, more agreeable outcomes have generally come about when consultation is directly between operational planners and fishers/fishing association representatives rather than through external consultants.

For the future, there needs to be due consideration from the seismic companies, the Regulator and through the acreage release process that impact on fishers can remain for a long time after the physical seismic survey acquisition has finished. The period required for an area to recover is likely influenced by many factors, like the nature of the survey (2D vs 3D), spatial area of direct impact (number of transect lines and gaps between them), duration of overall survey, timing of survey, and proximity to other surveys in time and space. But none of this will be understood for improved future planning unless there is a requirement to actually measure what is in the area prior to a seismic survey starting, then monitoring what happens to those biological (and mobile) components while the survey is underway and continuing to monitor after the seismic until the pre survey conditions return. Before, After, Control, Impact (BACI) design principles should be adopted to assess the breadth of potential impact and this data used to guide mutually acceptable surveys into the future.

The Government has a role in this by promoting Regional Studies rather than repeating seismic when ‘Good Standing Arrangements’ are incurred. Prioritising data in fill processes to identify where there are REAL gaps in the current very extensive seismic data base – this could go a long way to reducing the size of the actual seismic surveys that are required to address gaps, thereby facilitating smaller and lower impact surveys (as has occurred historically).

It is frequently stated through consultation and in EP’s that *“for fish species that are free swimming (which include key commercially targeted species) it is likely that there would be no Temporary Threshold Shift effect whatsoever since fish will likely move away from the sound source”* ==> Statements like this completely disregard that this avoidance behaviour is precisely the issue for migrating fish – high intensity sound saturating the migratory route through the migratory period risks deflecting fish away from critical forage locations. And in the SBT ranching situation, risks securing the wild stock that are necessary for the on growing operations that occur for the remainder of the year.

Where BEHAVIOUR and TIMING of migrations ARE identified as core concerns for a fishery these MUST be part of the ALARP assessment for ACCEPTABILITY. This can equally apply to situations where spawning/breeding windows or spatial areas are concerned – the impact of inappropriate timing of seismic survey activities in these situations can exacerbate impacts and undermine future recruitment and fishery sustainability which are the core functions of Fishery Management Processes.

Commonly there are differences of opinion on how significant the impact is and sometimes this is even down to perspective and lack of understanding – for example in our situation surfacing behaviour, and dependence on where fish are choosing to surface are aspects that fishers have NO CONTROL OVER and must respond to in real time as oceanic conditions dictate. These are critical aspects to gather wild stock that will be transferred to ranching pens – therefore impact on fish behaviour and downplaying the significance with statements to the effect that fish will simply move away completely disregard the fact that vessels towing pontoons can only move at a speed of 1 to 1.5knots (as opposed to a seismic vessel bearing down at 4 to 5 knots sweeping fish from the area as it travels).

Soft start/ramp up (of airgun power) is often put forth as a mitigation measure to reduce impact on fauna and flora in the seismic survey area. This was a technique developed for whales that have the capacity to move out of the way; it is irrelevant to zooplankton and fish eggs and benthic animals with limited or no mobility, these are often the features that make an area biologically attractive to higher order predators. Even for fish enacting a flight response when the noise generating activity is approaching the presence of sound shadows, sound ducts and radial saturation of an area would make response difficult (a flight response down away from the surface may expose the individuals or the school to higher more damaging sound levels).

Percentage of an area affected by petroleum exploration activities is a totally misleading representation of the risk   consider the example of a sea mount or a canyon that may only represent 1% of the permit or survey operational area, but is actually 100% of that habitat type available for a commercially targeted fish species and consequently impact the entire and often unique ecosystems that develop within these areas. This can be equally applied to the situation where there is a very seasonal aspect to the biological productivity of a region. To use zooplankton as the example in the Bight, it is frequently stated in EP's that the impact will only be very small and the area will be recolonised very rapidly – this ignores the fact that modern day seismic surveys occur over areas of 10's to 100's of thousand square kilometres and operate over entire seasonal breeding cycles. Recolonisation cannot occur when areas are repeatedly subject to airgun exposure with the race track formation of operations. Krill in particular are NOT homogeneously or evenly distributed, they occur as isolated very patchily distributed aggregations, if these are within the operational area and destroyed by airgun discharges on transect lines, there is limited opportunity for within season recolonization to biologically relevant levels to sustain the multiple apex predators that migrate to the region.

Consultancy companies preparing Environmental Plans regularly make the consultation harder than it needs to be. Understandably their performance metric is to get EP's approved by the Regulator that allow the maximum flexibility for their client, the seismic company and the minimum interruption to any seismic operational plan. There really needs to be encouragement for better practices and genuine ALARP and outcomes that are ACCEPTABLE to fishers as well as seismic companies. The attitude to use ALARP as the minimum standard that could pass acceptance criteria is disappointing. Further, this ethos creates an unnecessary consultation burden and fatigue on relevant person stakeholders. Leading to the view from fishers that engaging in consultation is not worth the effort as concerns are NOT acted upon. ASBTIA does not entirely share this view, and continues to express concerns as they arise on a case by case basis, but is fully aware of the onerous effort required to check very basic facts buried amongst 1200 to 1500+ page documents to consistently correct errors, omissions and misrepresentations of data presented.

The onerous consultation burden placed upon fishers often occurs before the Regulator NOPSEMA is even aware that multiple Environmental Plan applications are being developed for the same or similar work in the same area for the same point in time. Approvals of such surveys do not include consideration of the cumulative impacts from repeated seismic survey acquisitions in the same or consecutive years (for example consider the map for the Otway Basin in Figure 3). Resolving broader issues like this is beyond the capability of a system assessing individual Environment Plan submissions. The outcome for fisheries, fishery recruitment and the broader marine ecosystem can only improve if cumulative impact is fully assessed.

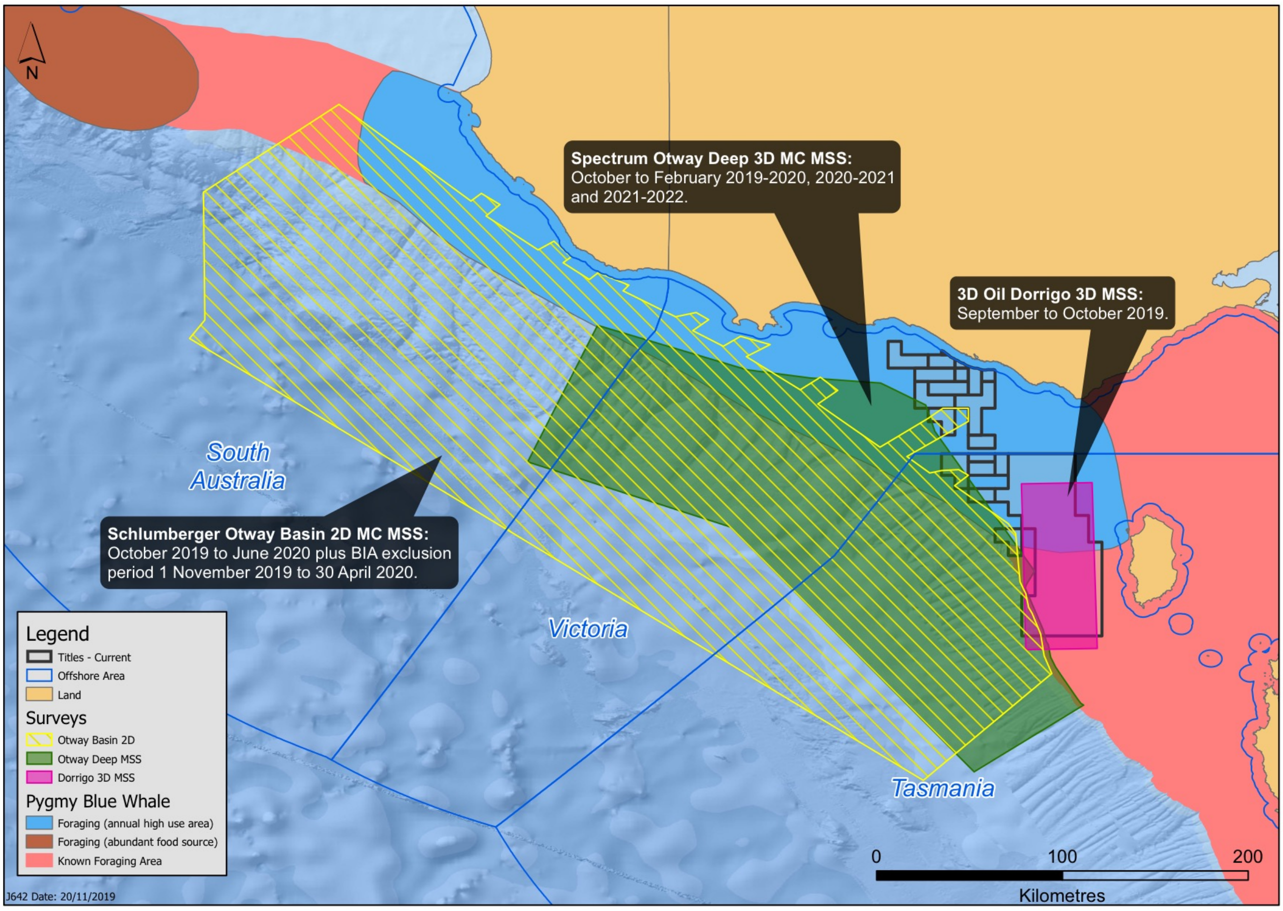

Figure 3: Marine seismic survey overlap in time and space in the Otway Basin area

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