

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

19<sup>th</sup> October 2020

Dear Committee Secretary

**Re: Proof of Hansard and addressing questions raised through the “Impacts of seismic testing on fisheries and the marine environment” Senate Inquiry sitting on the 22<sup>nd</sup> September 2020**

Thank you for the opportunity to present at the Senate Inquiry and provide further detail related to questions raised and taken on notice.

Items ASBTIA would like to see progressed as outcomes of this Inquiry:

1. Recognition that there is a real risk of seismic survey activity in some areas to the marine environment and its current users/uses; and that in some areas the risks and consequences will outweigh the benefits. Australia might consider, like other developed 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 because of the importance of these areas to fisheries and tourism.
  - It is worth quoting from the recently completed Great Australian Bight 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”
2. There is a clearly defined limit to the number of ‘Suspension and Extension’ and ‘Variation’ applications allowed for an Exploration Permit (maybe 3). Where-upon once reached the Title Holder/Operator falls into “non-compliance”. For Permits issued prior to the

introduction of the mandatory Acreage Release public consultation period that have not yet fulfilled any part of the workplan - these be defaulted back to the Crown.

3. The Regulator needs to encourage the adoption of lower impact technologies and promote having mitigation measures that target the risks in place as part of the ALARP assessment.
4. Adoption of fishery considerate exclusion times and/or exclusion zones as occurs for certain whales in Australia and currently exist for fisheries overseas (for example in Norway). Points 3 and 4 are achievable now, and it is worth noting that Conoco Phillips is proposing to adopt aspects of each to proactively try to reduce their currently proposed seismic survey's impact on fisheries in the Otway area. This approach does not eliminate the risks but it does show welcome progress towards adopting lower impact techniques to reduce conflict.
5. ALARP assessment fully recognises the risks and consequences of any activity. Noting that Australia has an international duty of care when it comes to administering development and activities in critical habitat (including prey fields) for transboundary stocks (and migratory species) like SBT.
6. Data access and sharing arrangements are improved so that seismic surveys are required and undertaken only once, not duplicated or repeated by multiple operators in quick succession.
7. There is a guaranteed compensation and remediation fund in place.
8. Promoting and prioritising 'Good Standing Arrangement' penalties going towards regional studies and addressing knowledge gaps (rather than upgrading [2D to 3D] and repeating seismic surveys).
9. There is a requirement introduced to notify NOPSEMA of the intent of preparing an Environmental Plan as the first step of starting the consultation process. This would facilitate early identification that there may be multiple seismic surveys proposed in the same or adjacent areas. This could go some way to reducing the onerous consultation burden placed upon fishers before the Regulator is even aware that multiple EP's are being developed. At the moment NOPSEMA can only assess individual applications – not wider duplication, cumulative impact from multiple or successive surveys, or from a regional context.
10. A final item the Senate may wish to consider is the problem 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.

Specifically addressing questions raised and the “inaudible” sections of the Hansard

**Hansard Page 21 –**

**Senator URQUHART:** “I’ll talk a little bit about some of the things that they said. On page 3 of their submission, they said that the results of studies on the impact of seismic surveys on fisheries have been variable and, in some cases, contradictory. They went on to say:

Some studies report significant mortality and declines in catches, while others report no significant deleterious impacts across a range of fish and invertebrate species.

So what would be your response to CSIRO, particularly in relation to that part of their submission?”

**My response:**

Upon reading page 3 of CSIRO’s submission – Yes, I would agree with those comments and many others made by CSIRO (see below). The majority of the work has been on marine mammals, with few studies on impacts to fish, fisheries, invertebrates and important components of the wider ecosystem. There are various scenarios reported in the literature from both here and overseas. This really just highlights the need for more research to be undertaken and the inherent problems that currently occur. At the moment where there is an absence of definitive information there is an assumption of no or a limited impact with the assumption of only a short term behavioural response. This generally underestimates the possibility that an impact might not become apparent until after the survey is finished or that behavioural change can be important to a fishery like ours that relies on a particular behavioural trait. An absence of information or disagreement over the significance of that impact should trigger a requirement from the Regulator to close the knowledge gap (particularly if the creator of the risk does not want to adjust the survey plan or adopt measures to reduce the impact).

The potential for delayed or on-going impact highlights another deficiency in the system where there should be a requirement to lodge a bond to cover any impact that may not become apparent until after the survey vessel has gone. There is a real need for more research that is relevant to local conditions and is species-specific and fishery specific. Many of our waters DO NOT have the constant noise pollution that occurs in Northern Hemisphere locations and it would be entirely expected that different species of fish and invertebrates would react differently to loud noise and persistent interruption of their normal activities. The lack of locally relevant information and likely different levels of impact for different species and life-stages really highlights the need for the Regulator to require BACI design research programs particularly for the large scale and long duration surveys and for ALARP to be assessed in a very precautionary manner.

Specifically, of relevance from Page 3 of CSIRO’s submission –

- the general increase through time in the energy sources used by seismic surveys – this may explain why impacts are more noticeable in recent times.

- that sound is important for most marine animals, for communication, locating particular features, prey and peers, and for short and long-range navigation – these have particular relevance for a migrating species like southern bluefin tuna that travel vast distances between feeding areas.

## Hansard Page 21 –

**Senator URQUHART:** “If you have anything else you would like to add to that, certainly I'm happy for you to take that on notice. I again go to the CSIRO submission. On page 17 they say that they evaluated the southern bluefin tuna studies about oil and gas activities and concluded that the use of aerial surveys to establish the presence of juvenile southern bluefin tuna were inappropriate, because the sea surface temperature and wind speed influenced how many tuna could be counted. Are you aware of the research that they cited within that context? I think it was Eveson and Farley 2016.”

### **My response:**

Upon reading page 17 of CSIRO's submission – These comments merely highlight the need for dedicated research that is designed to measure the type and extent of the potential impact of seismic surveys overlapping critical habitat and the physical locations of fisheries that are known to occur in the region. And these studies must occur before during and after the survey boat is operating.

Items amongst CSIRO's submission raise a number of additional important points that are relevant to assessing seismic survey impact on fisheries:

1. The use of spatial overlays - for example, the purse-seine fishery in Australian waters, as shown by figure 11 of CSIRO's submission does not accurately represent the number of vessels (and people) actually involved in that fishing operation. Nor does it reflect the true value or volume of the fishery operation; nor the specific sensitivities and intricacies involved – *all of which are very relevant to determining what might constitute ALARP in the approval assessment process*. Figure 1 below visually demonstrates how many fully crewed vessels are associated with the operation of each purse-seine vessel.
2. Further, it is worth noting - page 7 - of CSIRO's submission – the long range of sound transmission from a high power (4,130 cubic inch sound source) 3D seismic survey in the Great Australian Bight “out to nearly 300km”. And while some specific sound levels are cited from a report undertaken while the seismic vessel was undertaking the seismic survey, it is worth noting that these levels are still considerably louder (20-50dB) than noise levels recorded from the region when there is no seismic vessel and survey in the area.
3. Page 8 – of CSIRO's submission – the number of 2D and 3D surveys that occurred in the

Bight over the 52-years from 1960 to 2012 shows that up until the first 3D seismic survey that occurred in 2012 the spatial footprint and consequently impact on fisheries and the environment that supports those fisheries was very low. Which probably explains why the effect of the 2012 seismic survey was so noticeable.

It is interesting and relevant to note from Professor McCauley's evidence relating to the different effects of particle motion for different orientations and exposure of the fish (horizontal vs vertical). This may also go some way to explaining why tuna as a frequently deep diving highly mobile fish that regularly traverses the water column (surface to at least 500m+) appear to be more reactive than other species. Please see Figure 2 which shows examples of 3-day snapshots of an SBT's diving behaviour recorded with an electronic tag implanted in a free-roaming wild tuna whilst it was located within the Great Australian Bight. When diving the fish do not remain in a horizontal position, they actively swim vertically up and down through the water profile. This regular diving behaviour is another factor that is less able to be addressed by strict rules around sight-ability and flying only in certain wind conditions when considering method limitations for assessing stock biomass to set catch limits. And why CSIRO and the International Governing body CCSBT have transitioned to using genetic methods (Gene-tagging) for assessing the tuna stock's recovery and spawning biomass.

#### **Hansard Page 24 –**

**CHAIR:** "You say in your submission: Prior to 3D seismic surveys in the Bight the forage locations chosen by migrating SBT— southern bluefin tuna— were highly predictable because there was very little inter annual variation between fishing seasons ... After the large scale, deep water 3D seismic surveys (2012-2015) the predictability of forage sites and aggregating locations no longer exists. Can you give us a bit more background to that statement, please?"

#### **My response:**

Further background to comments provided on the 22<sup>nd</sup>, please see Figure 3 below. The water temperature of that historically important and predictable aggregating and fishing location remain comparable now/recently to the period before 3D seismic surveys occurred. But as clearly evident by the catch locations shown on the map in Figure 4 – the fishery has been displaced by 100's of kilometres.

#### **Hansard Page 24 –**

**CHAIR:** "Will you accept findings of Quadrant GSA research project?"

#### **My response:**

It is very welcome to have such large and comprehensive well-resourced studies researching multiple aspects of the ecosystem. These sorts of programs should occur before an area is opened up for seismic surveys, as the baseline study by which to measure the seismic survey's environmental performance. However, in the situation of the North-West Shelf environmental study - the results are only applicable to that shallow water ecosystem and those fish types that were studied under the conditions that were tested. In this case it was a small seismic air gun array (2,600cui) similar to the volume used for seismic surveys historically in the Bight, and the survey was 5-days (the short time frame does not allow measurement of repeated cumulative sound exposure from large surveys which operate continuously over periods of 90-180+days).

**Are the results applicable to the Southern Bluefin Tuna (SBT) fishery – the short answer is NO.**

The Quadrant-Santos GSA funded research program studied DEMERSAL SITE ATTACHED fish species --> SBT is a MIGRATORY PELAGIC fish species. Indeed, the researchers themselves emphasised that the results of this large study "DO NOT APPLY TO PELAGIC FISH and SHOULD NOT BE USED to assess impact on PELAGIC FISH". Other major limiting factors on applying these results to the Bight include water depth of the study area (50-70m), survey duration (5-days), and size/volume of the air-gun array (2,600cui vs 4,130-5,265cui which were used in the Bight).

Yours Sincerely

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Steps involved in the live-capture of SBT for tuna ranching as viewed from tuna spotting aircraft, for scale the length of the purse-seine vessel in each of these images is 41.2m (photos from Kim Mundy, Kirsten Rough, Luke Stevens, Kiwi White 2015-2019). Photo 1: the chum vessel with a school of SBT (yellow arrow); approaching purse-seine vessel (red arrow); standby vessel that will be used as a skiff to hold the purse-seine vessel in position after the net is set (green arrow). Photo 2: the purse-seine vessel deploying the net around the chum vessel and tuna school (yellow arrow) some of the individual tuna can be seen as they roll and their underside shines in the sun. Photo 3: the 'squared-off' net enclosing a school of SBT, note the 6 smaller vessels preventing the net from closing and damaging the tuna; the individual fish are visible within the net. Photo 4: aerial view of the entire 'fishing unit', the red arrow at the top of the image shows the towing pontoon slowly progressing towards the purse-seine vessel which is holding the live fish in the squared-off net (yellow arrow); the pink arrow shows the skiff now in position attached to and preventing the purse-seine vessel from drifting over the squared-off net. Photo 5: aerial view of the entire 'fishing unit' as the tow pontoon is brought into position, the red arrows show the towing vessel and the towing pontoon; the purse-seine vessel which is holding the live fish in the squared-off net (yellow arrow); the pink arrow shows the skiff in position attached to and actively preventing the purse-seine vessel from drifting over the squared-off net. Photo 6: view from the purse-seine vessel as the tuna are swimming from the purse-seine net into the towing pontoon.

Figure 1: Steps and number of vessels involved in each and every fishing event to live-capture southern bluefin tuna for ranching purposes.

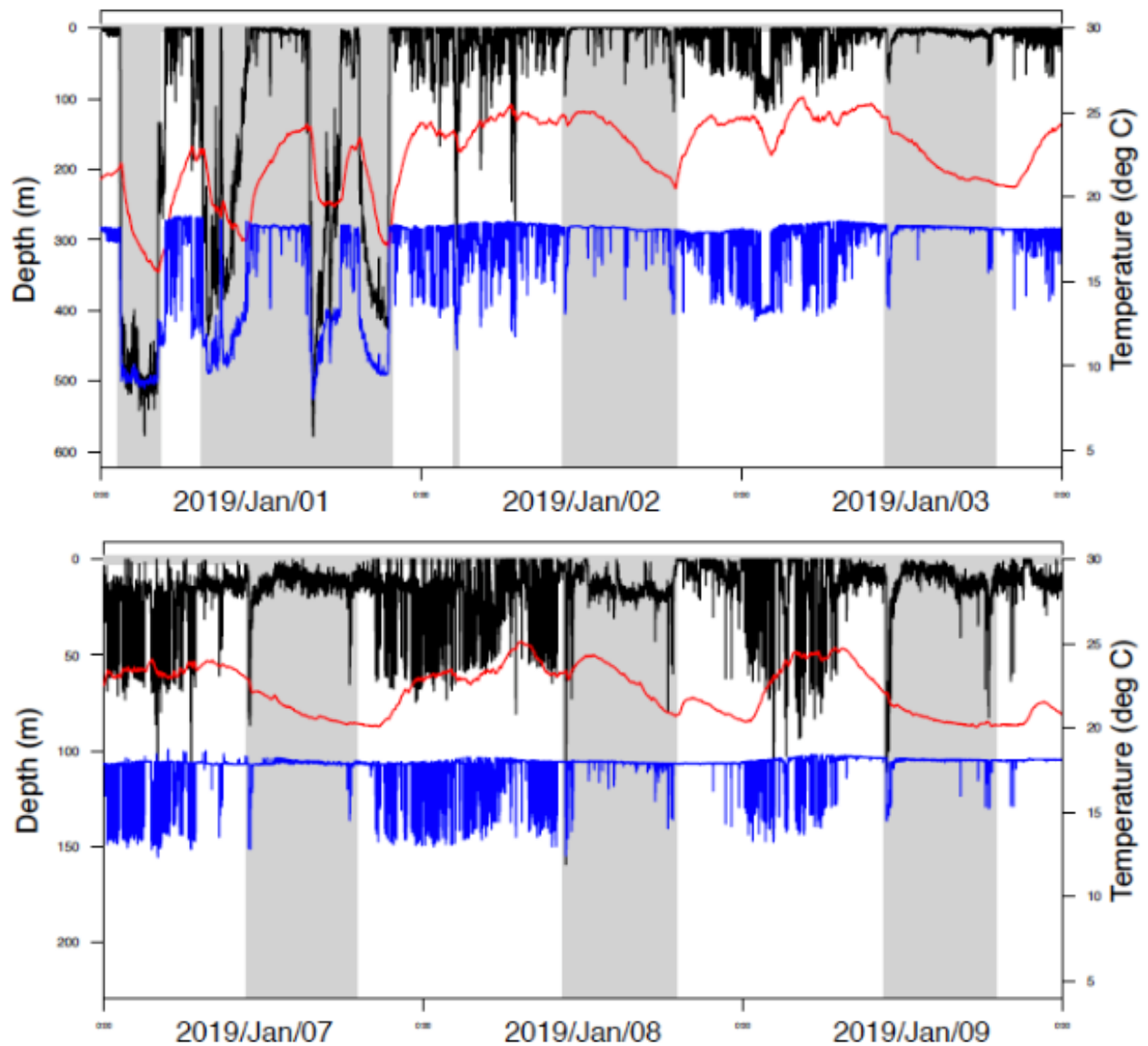


Figure 2: Daily behaviour of an SBT in the Great Australian Bight determined from measurements recorded on an electronic data-logging tag implanted inside a free-roaming wild fish, these tags have a light and one of the temperature sensors remaining on the outside of the fish. Graphs show screenshots of 2 x 3-day periods covering frequency of deep-dives (>500m) and relatively shallow dives (70-100m). The white and grey shading denote light levels, white being high as occurs in the daytime, grey representing low light as occurs with night time and also when the SBT is at great depth. The black line displays the depth measurement and is read on the left-hand Y-axis; the red and blue lines show the internal body and external water temperatures and are read on the right-hand Y-axis (data kindly supplied by the Far Seas Fishery Research Agency of Japan).



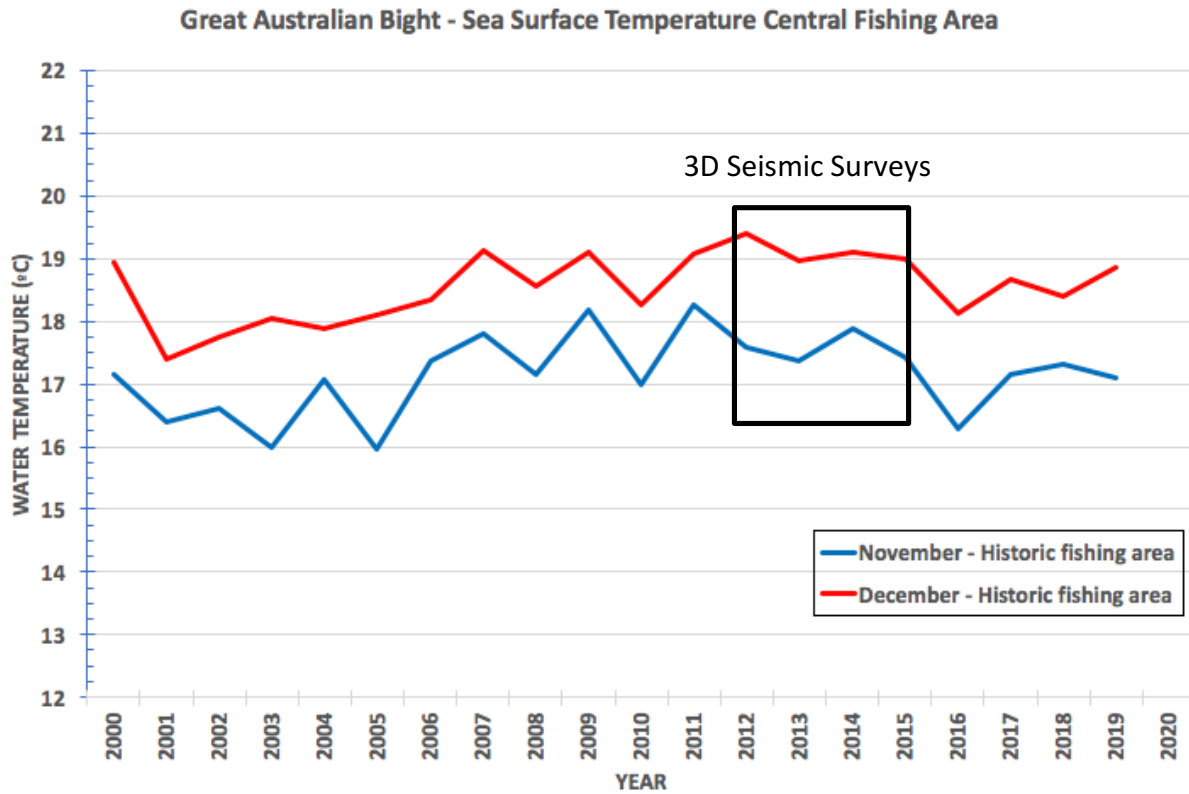
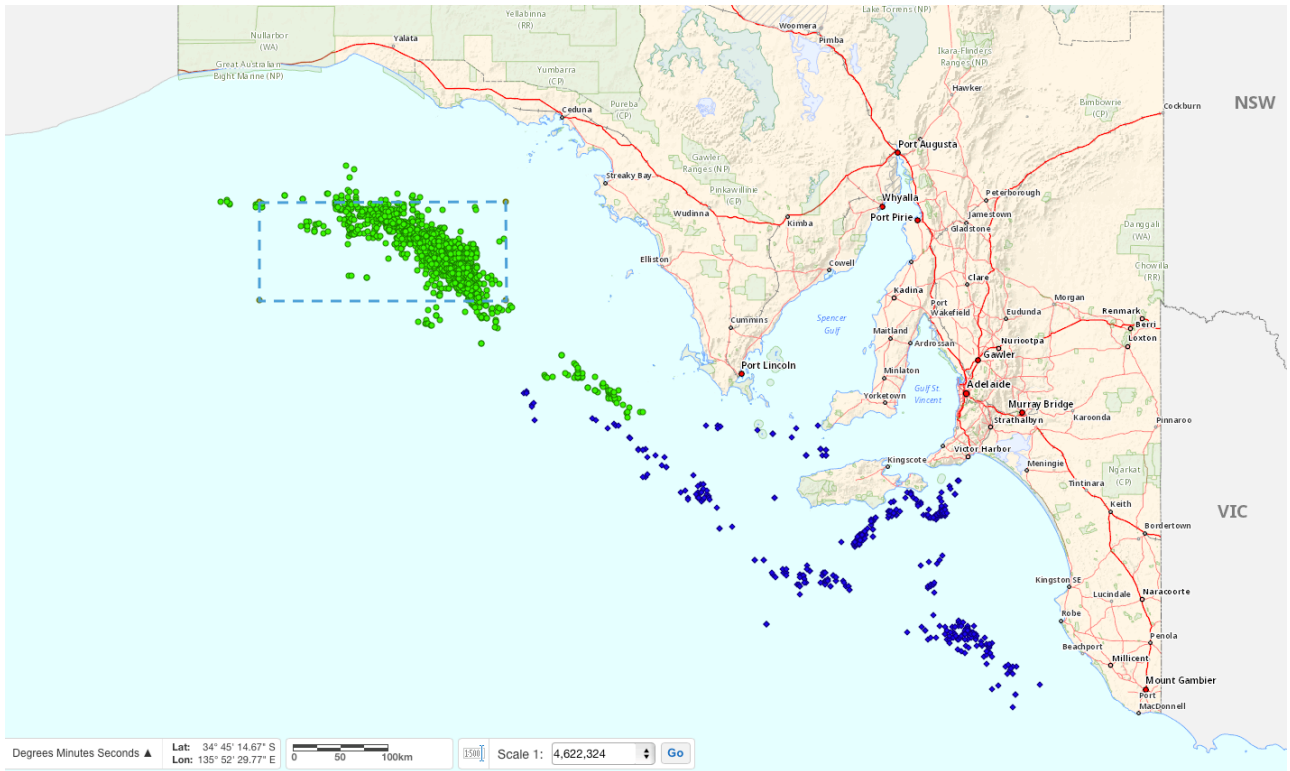


Figure 3: Sea surface temperature of the area in the central GAB through the migratory period of Southern Bluefin Tuna, the area that reliably and predictably supported SBT fishing operations for decades. That area is bounded by the corner points in the northwest 130°E x 33°S to 133°E x 34°S in the southeast (the location of this area and how it relates to tuna capture locations before 3D seismic surveys is shown in Figure 4). The period when the 3D seismic surveys operated in the Bight is highlighted by the black square (SST data provided by CSIRO extracted from NOAA satellites).



**Figure 4: Fishing locations for the Southern Bluefin Tuna in the Great Australian Bight. The green circles are net sets between 1<sup>st</sup> December and 31<sup>st</sup> March for the seasons before 3D seismic surveys (fishing seasons 1999 to 2011). Blue diamond's show the catch locations after multiple large scale long duration 3D seismic surveys were undertaken in the deep waters along the continental slope of the Bight (fishing seasons 2016 to 2020). Sea surface temperatures displayed in Figure 3 are measured from the area defined by the dashed rectangle, bounded by coordinates 130°E 33°S (NW) and 133°E 34°S (SE) (fishing location data sourced from AFMA logbooks 1999 to 2020).**