

# Climate and Oceanographic Summary, Great Australian Bight 2018 - 1

Kirsten Rough – 31<sup>st</sup> October 2017

## Background:

This project was initiated after the unusual distribution of Southern Bluefin Tuna (SBT) through the 2011-12 fishing season. In response to this, the status of the major climate systems that influence ocean conditions and currents through the SBT fishing areas are routinely monitored. Information updates on local conditions (ocean temperature, chlorophyll and currents) was distributed weekly over the past 5 fishing seasons – and will continue for this next season. This very preliminary brief contains items of relevance for the 2018-fishing season.

## Summary:

The situation at the moment is looking like an-historically typical season, with nothing to indicate an early or late start nor fish leaving or moving through the area at an unusually rapid rate.

The broader climate system driver of the Pacific Ocean has settled into a “neutral phase” that is tending towards La Nina (a situation similar to 2013 and 2014). This system is unlikely to have any negative influence over GAB conditions through the upcoming fishing season.

The broader climate system driver of the Indian Ocean has had very little influence over the Leeuwin Current over the past 6-months, and this is forecast to remain neutral throughout the fishing period of the 2018 season.

Under these forecast conditions, upwelling should occur – which means it is unlikely that SBT will move rapidly or unusually through the GAB this season.

There is 1 seismic survey with approval to operate potentially through our fishing areas after the 20<sup>th</sup> March (this company has postponed the scheduled survey through the previous 2 fishing seasons).

There are two other companies that have recently lodged applications with NOPSEMA to undertake seismic surveys in the eastern GAB (south and southwest of lower Eyre Peninsula, Rocky Island) through the 2018 and 2019 fishing seasons. ASBTIA is actively submitting objections to both of these operating before the end of March in any season.

With Chevron announcing that it won't be progressing its drilling campaign in the GAB, there will not be any Dynamic Positioned Rigs in the area for 2018. Statoil is continuing to progress its intentions to drill through the 2019 fishing period.

The internal zoning and management plans for the Commonwealth Marine Parks in the South West Bioregion (includes GAB and Kangaroo Island area) were released for comment this year. There are no restrictions on purse-seine fishing in the tuna catch locations of recent seasons. I will send out the details, co-ordinates and maps in an email prior to fishing operations.

## Areas of Ocean Warming coming into the 2018 fishing season:

The Pacific Ocean climate system (ENSO) has returned to a neutral phase that is tending towards La Nina, a situation similar to both 2013 and 2014-fishing seasons. This system can influence weather

patterns and upwelling in the GAB – but at this stage there is nothing to indicate any adverse impacts.

The Indian Ocean climate system (IOD) has had very little influence on the Leeuwin Current over the past 6-months, and this is forecast to continue throughout the fishing period of the 2018 season.

The Southern Ocean had a very strong influence over weather patterns through autumn and well into the winter of 2017 – this is why it was such a long delay until the start of winter rainfall and winter weather patterns. The influence that the Southern Ocean climate system has on the position and nature of the high-pressure systems is also why there were such long calm periods through much of the farming season. This system is not specifically forecast, like the ENSO and IOD systems but its influence is taken into consideration when the Bureau of Meteorology issues its outlooks of seasonal conditions.

The distribution of warmer or cooler water masses in areas adjacent to Australia and through the GAB for October is shown below. Figure 1 is the situation coming into the 2016-fishing season; large areas of the GAB and Indian Ocean were unseasonably warm. Figure 2 coming into the 2017-fishing season; large areas of the GAB were unseasonably cool. Figure 3 shows the situation this month, and shows nothing particularly unusual. Essentially at this stage there is nothing to suggest a strong Leeuwin Current, suppressed upwelling or that fish will move rapidly through the GAB fishing area or leave early.

Please note however that these systems are very dynamic so updates will be provided progressively as the fishing season approaches and progresses.

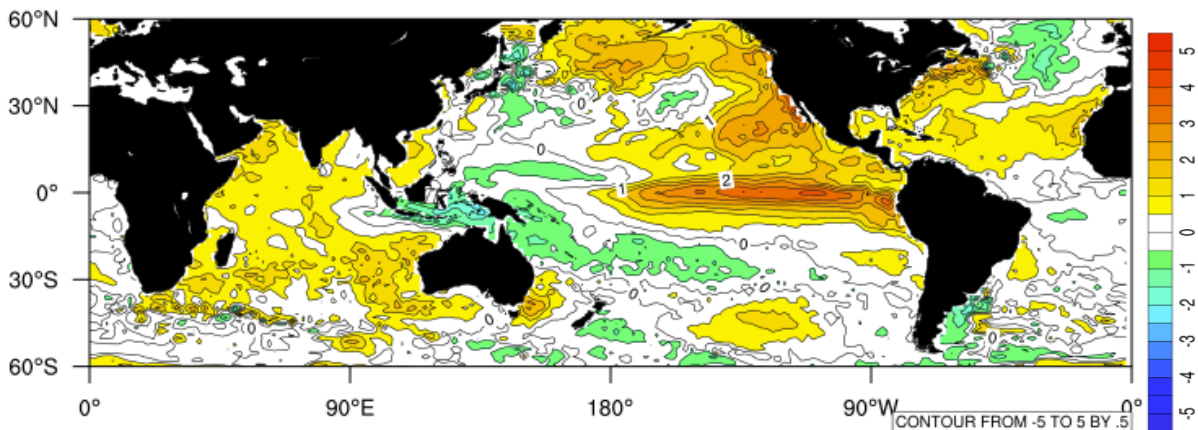


Figure 1: Global Sea Surface Temperature anomalies evident through October 2015, coming into the 2016-fishing season. The scale bar on the right of the image shows how many degrees above or below the long-term average (Bureau of Meteorology 2015).

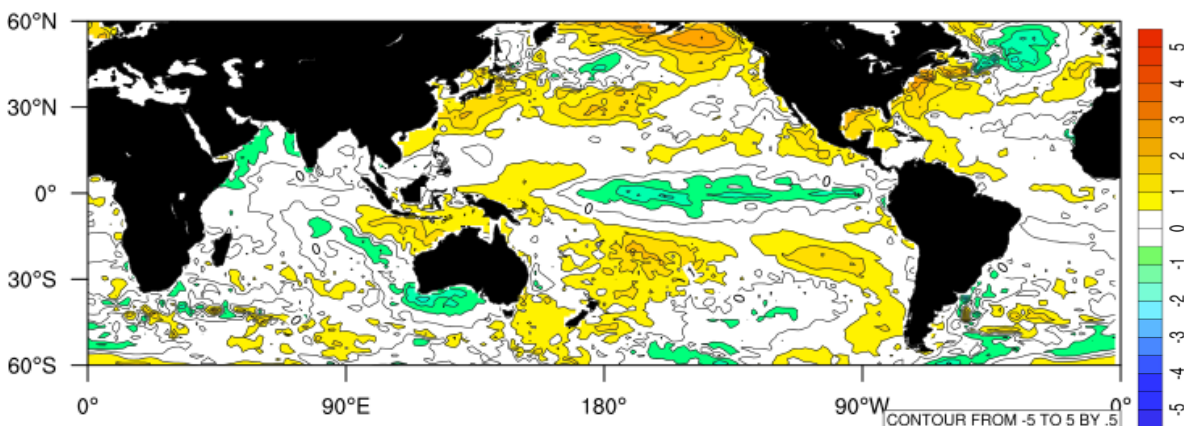


Figure 2: Global Sea Surface Temperature anomalies evident through October 2016, coming into the 2017-fishing season (Bureau of Meteorology 2016).

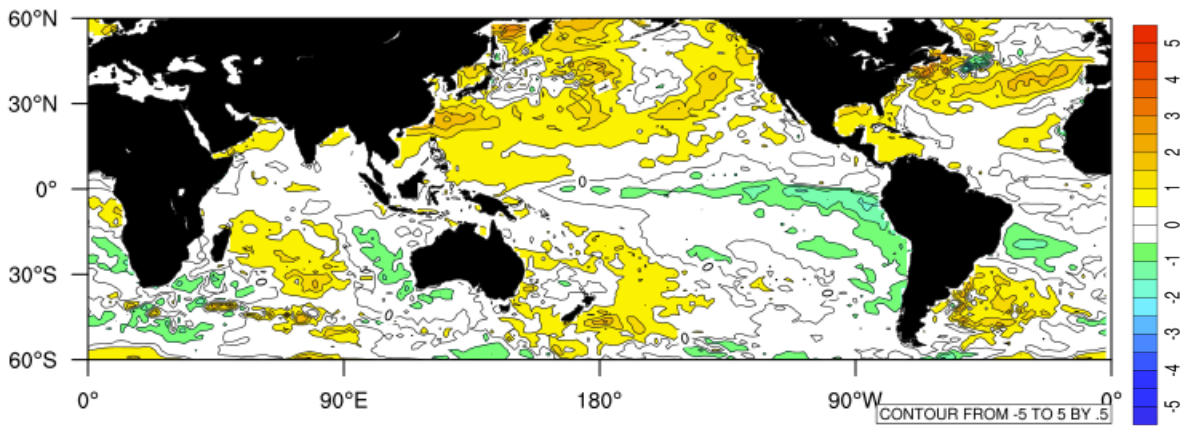


Figure 3: Global Sea Surface Temperature anomalies evident through October 2017, coming into the 2018-fishing season (Bureau of Meteorology 2017).

**GAB Sea Surface Temperature (SST):**

The situation across the GAB for the month of September 2017 and for the same period of time over the previous 5 years can be seen in Figure 4. Particularly noticeable from these images is the limited influence of the Leeuwin Current through September this year.

The situation across the GAB over the past week is shown in Figure 5. At this stage it is still quite cool throughout the area with warming starting in the shallower inshore areas; this is suggesting a more ‘historically normal’ start to the fishing season.

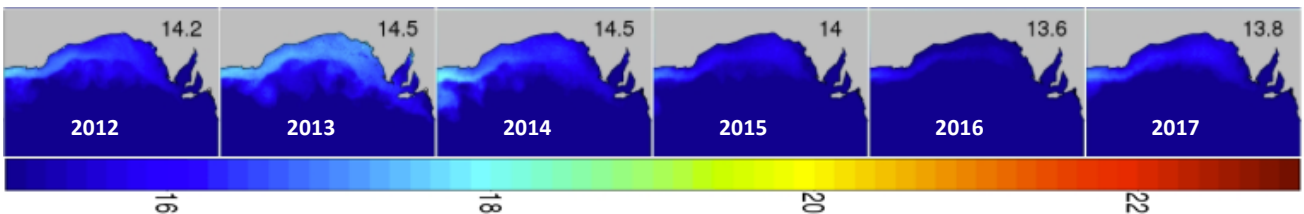


Figure 4: GAB sea surface temperatures for the area from longitude 120 to 140°E, through the month of September for 2017 and the previous 5 years; in these images aqua can contain early entry SBT (CSIRO 2017).

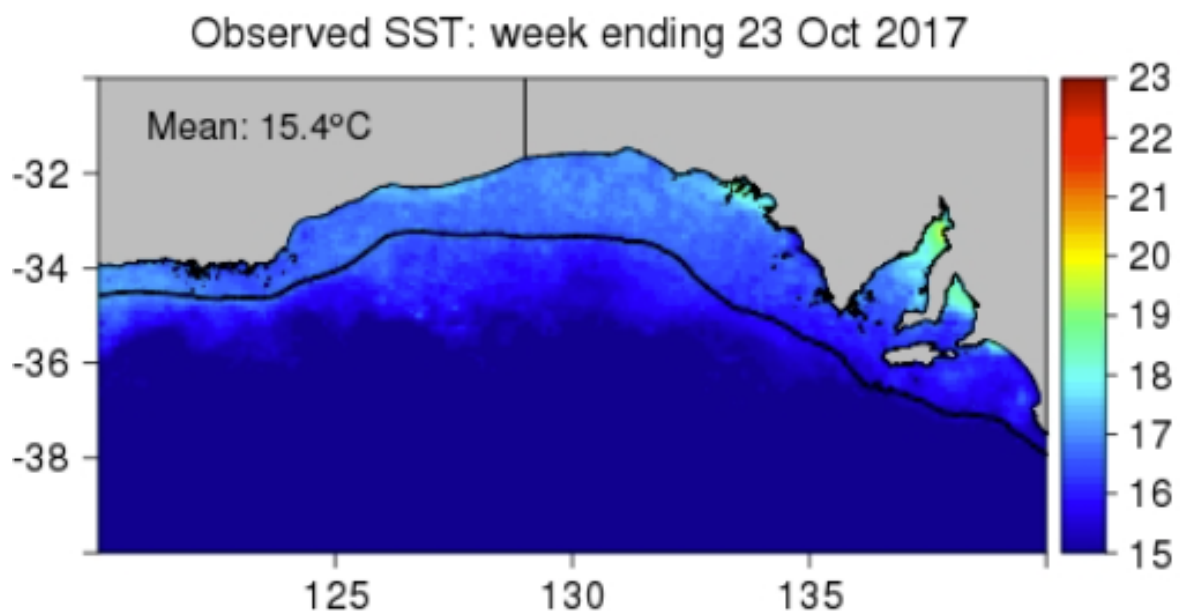
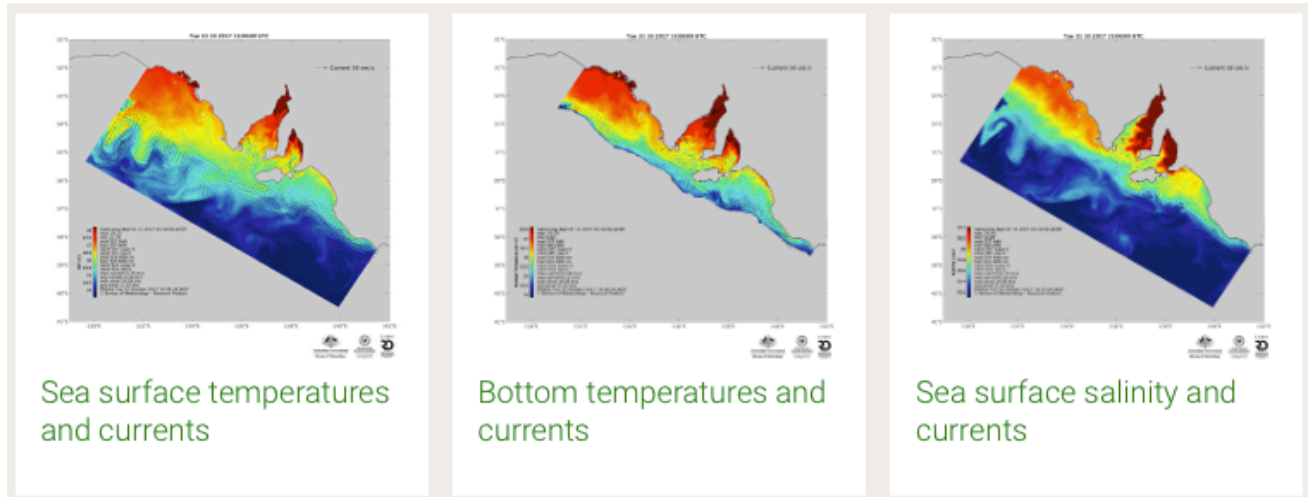


Figure 5: GAB sea surface temperatures for the area from longitude 120 to 140°E, over the past week; in these images aqua can contain early entry SBT (CSIRO 2017)

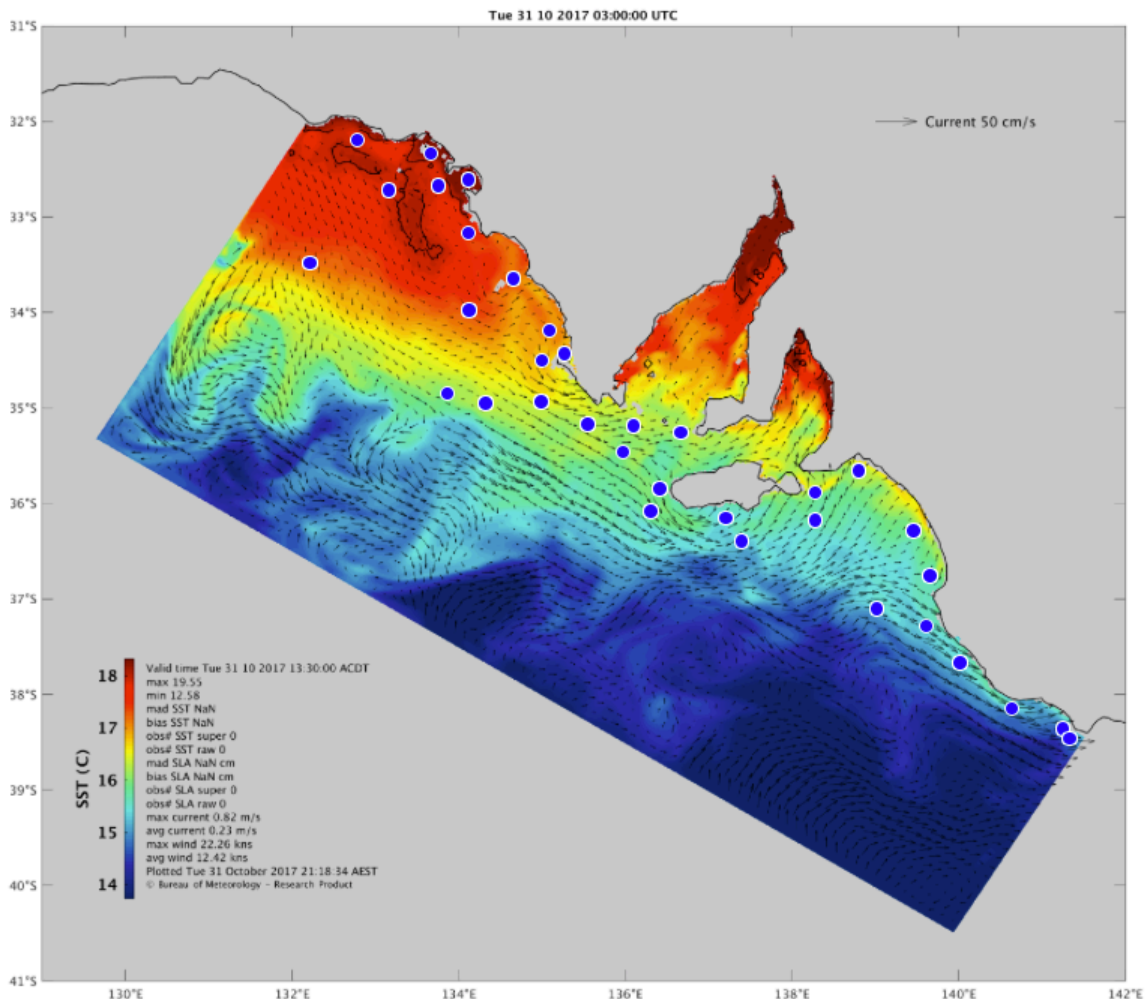
The SARDI, Bureau of Meteorology, ASBTIA (eSA-Marine) project developing short-term fine scale forecasts of sea surface temperature, sea floor temperature, ocean currents, water temperature and salinity profiles down through the water column, wind speed and direction is now completed and available on this link:

[http://pir.sa.gov.au/research/esa\\_marine](http://pir.sa.gov.au/research/esa_marine)

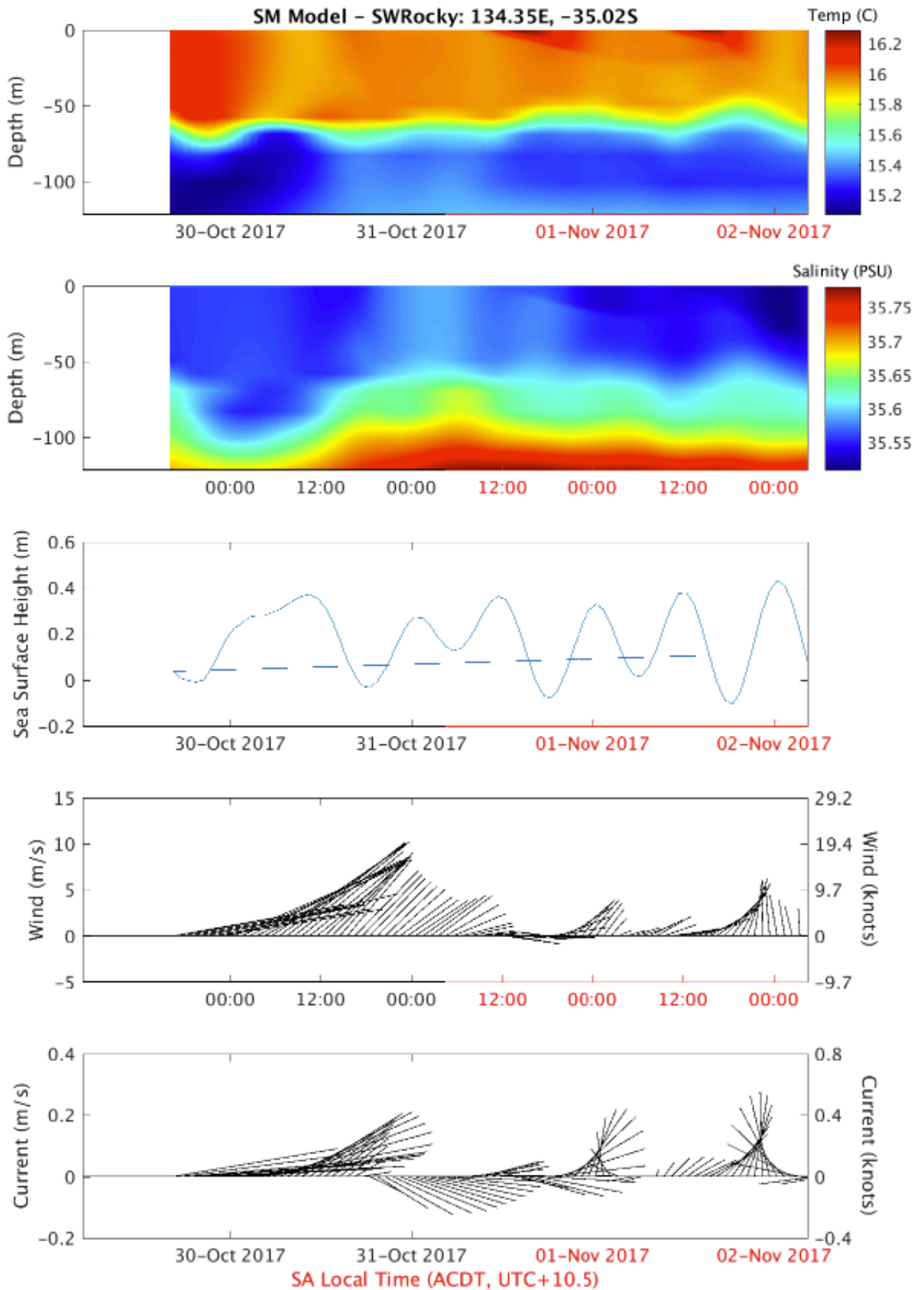
This first page has option to choose broad area across the Southern Shelf (ideal for tuna) or smaller area focused on the Gulfs (ideal for sardines). The Southern Shelf option gives this view:



Click to choose an option. The Sea Surface Temperatures and Currents will give a map view with several blue dots:



Choose a dot and click to get the following profiles for that location. For example, the SW Rocky option:



The top plot shows water temperature from the sea surface (0) to the sea floor (approx. -120m). On the 30<sup>th</sup> October (left side) a warmer mass of water, 16-16.2°C extended from the sea surface to a depth of about 60m, below this depth the water rapidly cooled by about 1°C. The difference between surface temperatures and bottom temperatures get much greater through summer and autumn and the depth of this “thermocline” can be a key driver of productivity in an area.

The second plot shows the salinity profile, the saltier water is at the sea floor and it is less saline on the surface. It is anticipated that in an upwelling event the higher salinity (and more nutrient rich) waters from the deeper ocean basin will push up higher in the water column – this can lead to hotspots of productivity at depths that may not be visible from the sea surface or from aircraft.

The third plot shows sea surface height – an indication of tide.

Fourth plot is the wind speed and direction 10m above sea level. In these the stick length indicates speed, and the position indicates direction. Straight up/vertical is directed to the North; leaning to the right is directed to the East.

Bottom plot is the water current averaged across all depths at that location, and like wind the length indicates strength or speed and stick position indicates direction.

**John Middleton will be at the Tuna Industry Workshop on 30<sup>th</sup> November 2017 at the Lincoln Marine Science Centre to demonstrate how to use the website and answer any questions on what the various links and plots show (or about oceanography generally).**

## Oil & Gas Exploration Update:

A map showing the locations of all Petroleum Permits currently issued in the Commonwealth waters adjacent to South Australia is shown in Figure 6. The status, operators and scheduled work plan obligations for the permits areas adjacent to SA are summarized in Table 1. Note there is another large area west of Permit EPP43, adjacent to Western Australia that is scheduled to have both seismic surveys and exploratory wells drilled, these details are not shown in the map and table presented here.

As an overview:

BP withdrew its environmental application to drill 2 exploratory wells from the NOPSEMA assessment process through October 2016. At that time BP had joint ownership (70%) with Statoil (30%) of 4 petroleum permit areas, EPP37, EPP38, EPP39, EPP40. After withdrawing the drilling application the permits were split so that BP was the sole operator of EPP37 & EPP38; and Statoil became the single operator of permit areas EPP39 & EPP40. Statoil began informal consultation with Stakeholders in the GAB in June 2017, and re-affirmed their commitment to commence drilling in the GAB either late 2018 or early 2019 earlier this month. Consultation regarding Statoil's seismic survey obligation is currently being undertaken with the likely 3<sup>rd</sup> party contractor (see section below – 'seismic surveys through 2018').

On the 12<sup>th</sup> October 2017, Chevron announced they would not proceed with their campaign to undertake exploration drilling in the GAB. However, in the press release it was noted, "Chevron would work with interested stakeholders to help realize the GAB's potential."

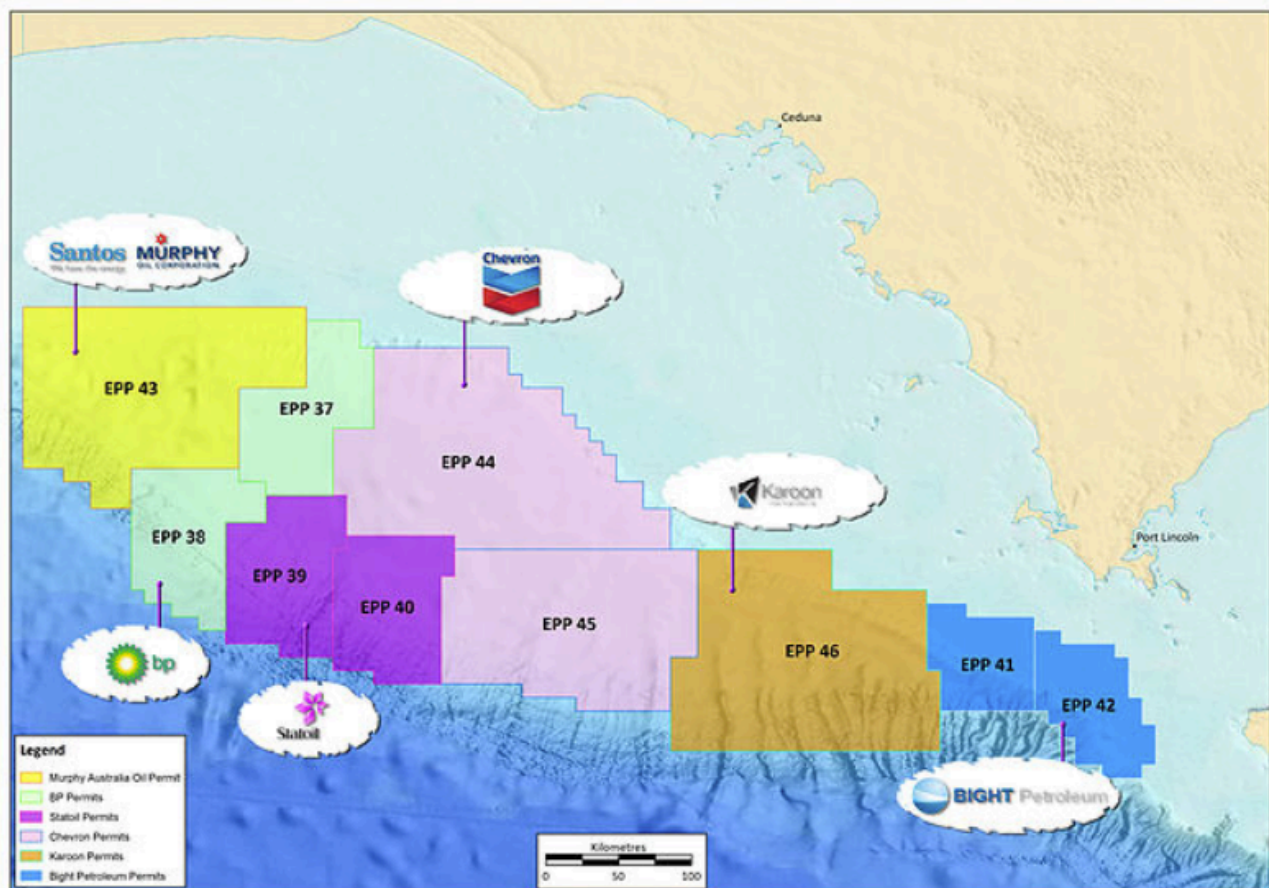


Figure 6: Identification and location of Petroleum Permits in the Great Australian Bight (GAB Exploration 2017)

**Table 1: Petroleum Permit operators, status, seismic survey and exploratory drilling work plan obligations and progress to date (NOPTA 2017)**

Permit ID.	Operator	Status & Period	Seismic Survey Obligations	Expl. Drilling Obligations	Progress
EPP37	BP Developments Australia Pty Ltd	Active Issued: 14/01/2011 Expires: 30/06/2020	4,920km <sup>2</sup> 3D	2 wells	~13,000km <sup>2</sup> seismic completed between 12/11/2011 and 31/05/2012 Drilling EP withdrawn
EPP38	BP Developments Australia Pty Ltd	Active Issued: 14/01/2011 Expires: 30/06/2020	4,400 km <sup>2</sup> 3D	4 wells	
EPP39	Statoil Australia, Theta BV	Active Issued: 14/01/2011 Expires: 30/10/2022	3,800 km <sup>2</sup> 3D (BP) 1,000 km <sup>2</sup> 3D (StO)	1 well (BP) 2 wells (StO)	BP Seismic completed; Statoil Seismic still required
EPP40	Statoil Australia, Theta BV	Active Issued: 14/01/2011 Expires: 30/10/2021	2,200 km <sup>2</sup> 3D (BP) 0 km <sup>2</sup> (StO)	0 well (BP) 1 well (StO)	BP drilling EP withdrawn Statoil wells now in consultation phase
EPP41	Bight Petroleum Pty Ltd	Active Issued: 7/07/2011 Expires: 6/07/2021	2,819 km <sup>2</sup> 3D	3 wells	Nothing done to date Currently in consultation phase for seismic work through two 3 <sup>rd</sup> party contractors
EPP42	Bight Petroleum Pty Ltd	Active Issued: 7/07/2011 Expires: 6/07/2021	181 km <sup>2</sup> 3D 405 km <sup>2</sup> 2D	3 wells	
EPP43	Murphy Australia Pty Ltd; Santos Offshore Pty Ltd	Active Issued: 22/10/2013 Expires: 21/10/2020	7,367 km <sup>2</sup> 3D	1 well	~12,000 km <sup>2</sup> 3D seismic completed between 18/11/2014 and 4/04/2015
EPP44	Chevron Australia Pty Ltd	Active Issued: 22/10/2013 Expires: 21/10/2021	10,000 km <sup>2</sup> 3D	2 wells	~9,000km <sup>2</sup> seismic completed between 20/01/2014 and 1/06/2014 Drilling EP withdrawn
EPP45	Chevron Australia Pty Ltd	Active Issued: 22/10/2013 Expires: 21/10/2021	13,000km <sup>2</sup> 3D	2 wells	~16,000km <sup>2</sup> seismic completed between 20/12/2014 and 21/05/2015 Drilling EP withdrawn
EPP46	Karoon Gas Browse Basin Pty Ltd	Active Issued: 6/10/2016 Expires: 5/10/2022	5,000 km <sup>2</sup> 2D 2,500 km <sup>2</sup> 3D	1 well	Nothing done to date Currently in consultation phase for seismic work through two 3 <sup>rd</sup> party contractors

### SEISMIC SURVEYS THROUGH 2018 FISHING SEASON

There is a very large 2D seismic survey (covering >600,000km<sup>2</sup>) that has approval to operate from July 2015 until May 2018; this area extends from Tasmania westwards, including permit areas EPP41, EPP42 & EPP46. This survey has postponed operations through the past 2-fishing seasons; we are still awaiting confirmation of this company's intention through the 2018-fishing season.

There are 2 seismic survey operators undergoing the NOPSEMA Environmental Plan assessment process at the moment. There is considerable overlap between these two applications where they are competing for work over the same permit site (EPP46).

ASBTIA is actively submitting objections to any operations in this region starting before the 31<sup>st</sup> March in any year.



## 1. 'Dunroon MC2D, MC3D' by PGS – shown in Figure 7:

Proposing to split operations over 2 seasons.

Season 1 has two operational surveys starting from 1<sup>st</sup> March 2018. A broad-scale 2D survey with approximately 5000km of widely spaced transect lines (grey grid lines in Fig. 7); and an intense 3D survey within the box outlined in orange.

Season 2 will have another intense 3D survey approximately in the box outlined in yellow; the starting time of this second survey has not been detailed in correspondence from PGS.

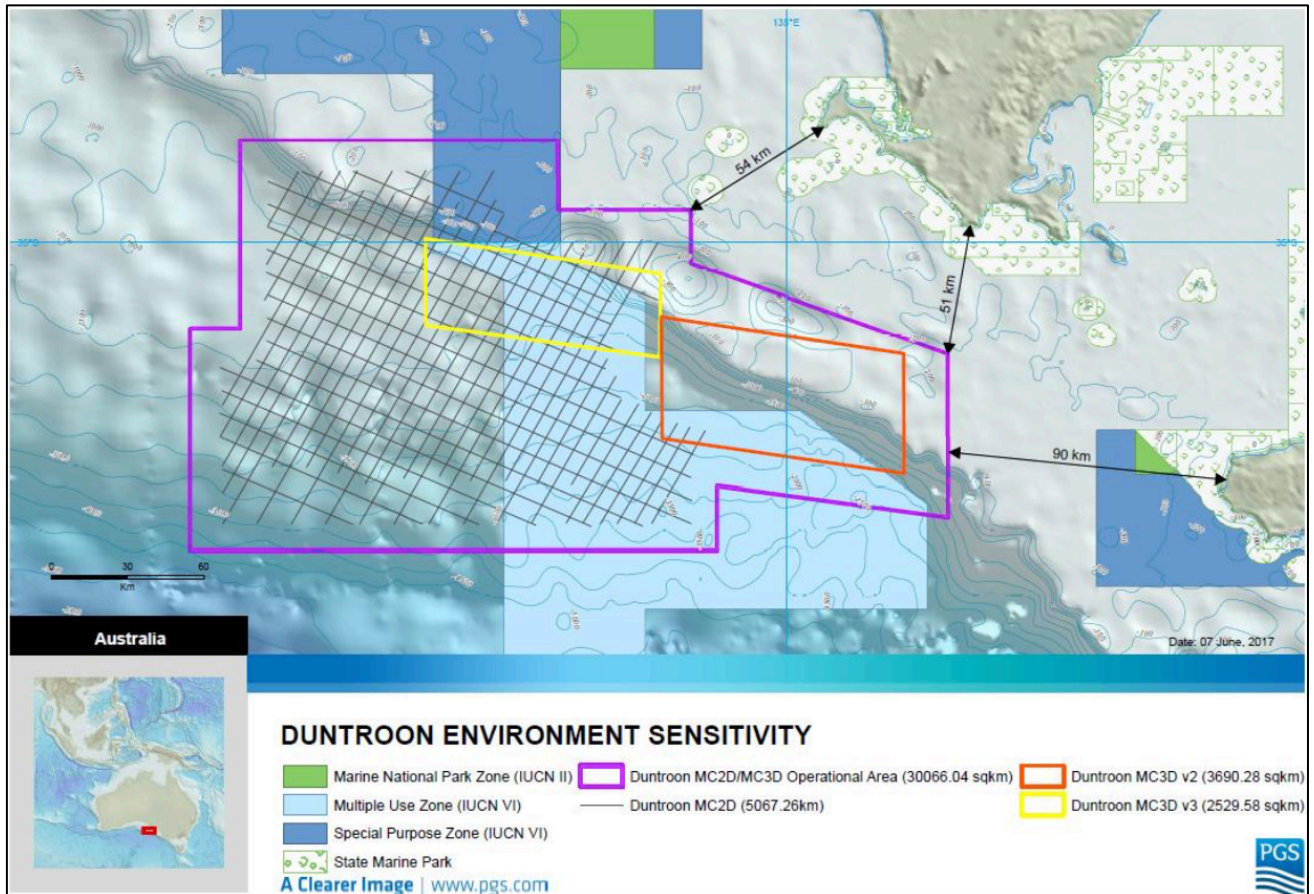


Figure 7: Dunroon Seismic Survey; total operational area outlined in Pink, proposed for 2018-fishing season are the 2D transect lines in Grey and a more intense 3D survey within the area outlined in Orange. For the area outlined in Yellow it is proposed to have a 3D survey the following season (PGS 2017)

## 2. 'Nerites Phase 3 - MC2D, MC3D' by TGS – shown in Figure 8:

Proposing to split operations over 2 seasons.

Season 1 is a broad-scale 2D survey in the eastern section outlined in green in Figure 8. TGS is proposing to split this large area into 4 sub-areas as shown in Figure 9 with different starting times for each. Area A (shaded green) would have no time restrictions over when the seismic survey vessel undertook survey work; Area B (shaded yellow) would have the seismic vessel operating from 1<sup>st</sup> February; Area C (shaded orange) would have the seismic vessel operating from 1<sup>st</sup> March and Area D (red) would only have half strength or ramping up seismic signals.

Season 2 would have a more intense 3D survey within the eastern section (outlined in green) the size and exact location would be determined after analyzing the results from season 1. And a 3D survey over Statoil permit sites, the exact location has not been detailed to date.

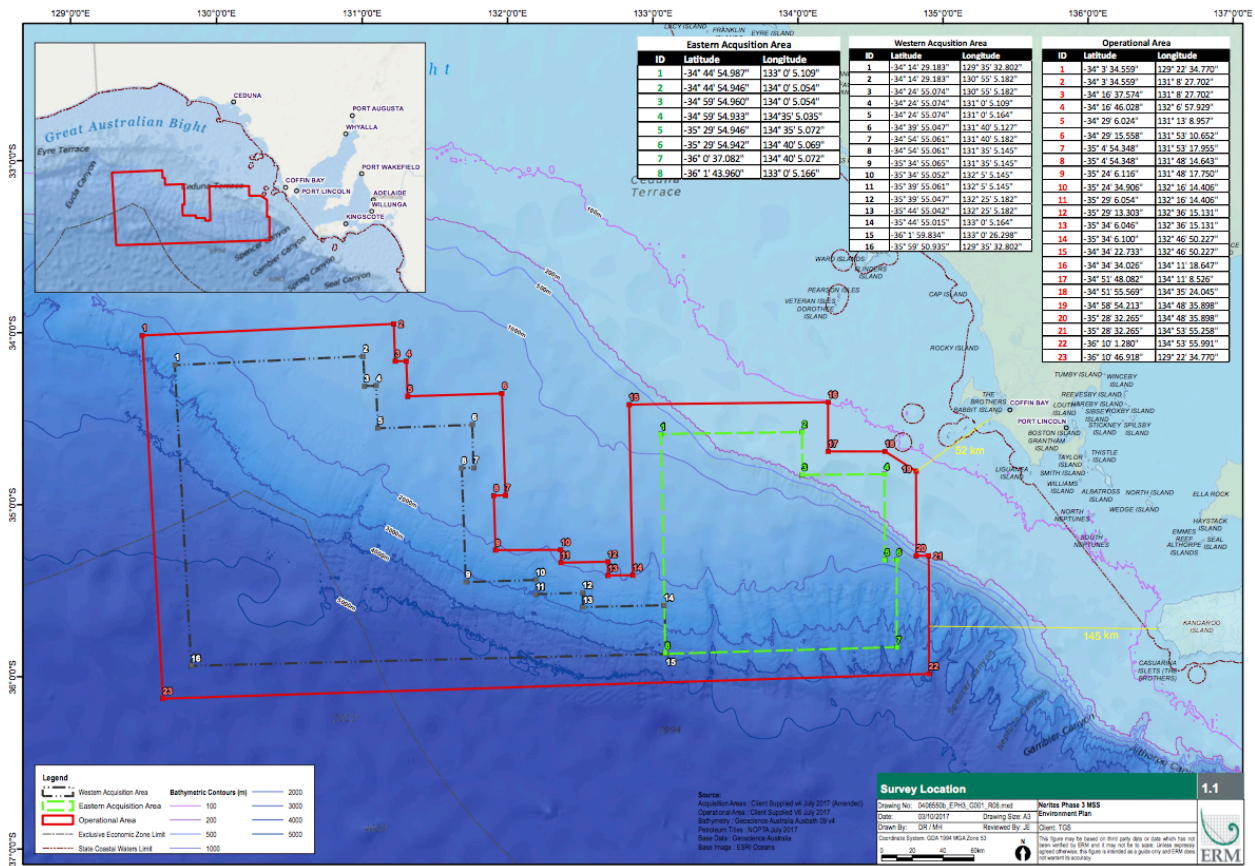


Figure 8: Nerites Phases 3 Seismic Survey; total operation area is outlined in red with the survey area being split into western (outlined black) and eastern sections (outlined green). The eastern area is further zoned into 4 sub-areas figure 9 below (TGS 2017)

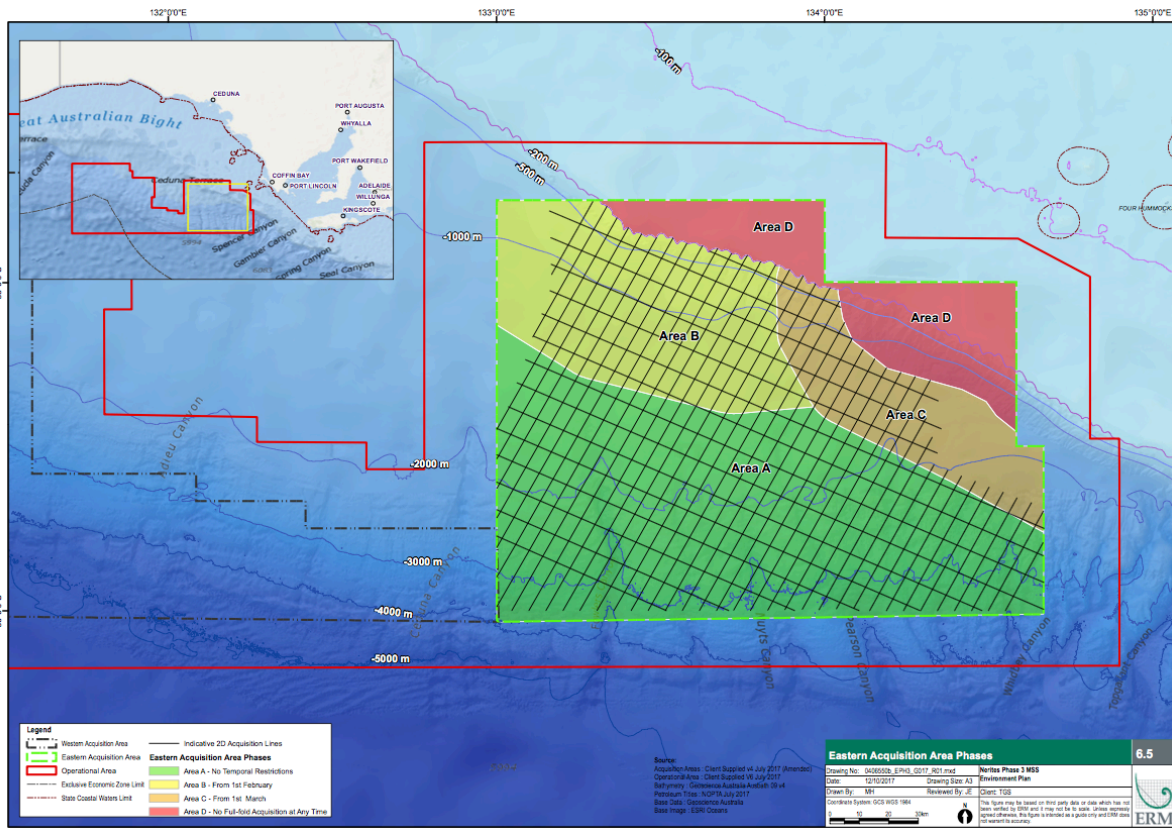


Figure 9: Eastern section of Nerites Phase 3 seismic survey showing the seismic transect lines and sub-areas. Area A (green) has no time restrictions on when operations occur; Area B (yellow/pale green) will have seismic operations after 1<sup>st</sup> February; Area C (brown/orange) will have seismic survey after 1<sup>st</sup> March and Area D (red) air guns will be operating at less than full strength (TGS 2017).

Any questions on any items in this update – please don't hesitate to call or email; contact details and links to the various websites used for this update are listed here:

GAB SBT Habitat Forecasts: <http://www.cmar.csiro.au/gab-forecasts/env-observed.html>

eSA Marine: [http://pir.sa.gov.au/research/esa\\_marine/sarom](http://pir.sa.gov.au/research/esa_marine/sarom)

IMOS ocean monitoring: <http://oceancurrent.imos.org.au/index.php>

Bureau of Meteorology: <http://www.bom.gov.au>

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