

Climate and Oceanographic Summary, Great Australian Bight 2015 - 2

Kirsten Rough – 17th November 2014

This is the second 2015-season update of Sea Surface Temperature (SST), ocean currents and chlorophyll distribution in the Great Australian Bight (GAB). If anyone has any questions or further suggestions please call or email (details appear at the end of this document).

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 through the SBT fishing areas are routinely monitored and information updates on local ocean temperature, chlorophyll and currents were distributed weekly through the 2012-13 and 2013-14 fishing seasons – these will continue for the 2015 season also.

Summary:

The Leeuwin Current is progressing in a similar manner to November last year and there are no indications from the major climate system forecasts to suggest it will be unusually strong through this next season.

GAB Sea Surface Temperatures are warming in a similar fashion to last season. Latest satellite images suggest they are currently suitable for early SBT along the shelf-break west of longitude 133°E and inshore to around longitude 134°E with some pockets of water around 135°E.

Forecasted Sea Temperature conditions are proving accurate in the short-term with small SBT caught by recreational fishers from inshore areas within forecasted areas of suitable temperatures.

Longer-term Forecasts of Sea Temperatures suggest the majority of fish will be in the historic fishing areas through December (but some may extend to western Kangaroo Island). Through January forecasts suggest that conditions will be highly suitable for SBT through most of the GAB and this extends to the areas fished last season.

The eastern area of the GAB, especially south and east of Kangaroo Island has maintained reasonably high levels of productivity throughout winter and spring, clearer water is now pushing in from the west.

Climate system forecasts are predicting that an El Niño is likely to develop through this next summer. Historically these are associated with improved upwelling in the eastern GAB, which in turn enhances productivity and food supply to the baitfish and everything else in the area. Information from the last fishing season under an El Niño influence can be found on the second to last page of this document.

PLEASE NOTE – none of the actual or forecasted conditions take into account any influence the seismic surveys may have on SBT distribution.

Leeuwin Current - South West WA Sea Surface Temperature (SST):

Sea Surface Temperatures and ocean currents around the Western Australian coastline for this point in time coming into the previous 3 fishing seasons can be seen in Figure 1. The situation for early November now can be seen in Figure 2. The situation now shows that the general speed of the Leeuwin Current is similar to the same point in time coming into last season; but that the warmer

water does extend slightly further southwards along the WA coastline. There are also some pockets of warmer water that are already located to the southwest of Cape Leeuwin. However there is nothing in the climate system forecasts to suggest that the behavior of the Leeuwin Current will be particularly unusual through this next fishing season

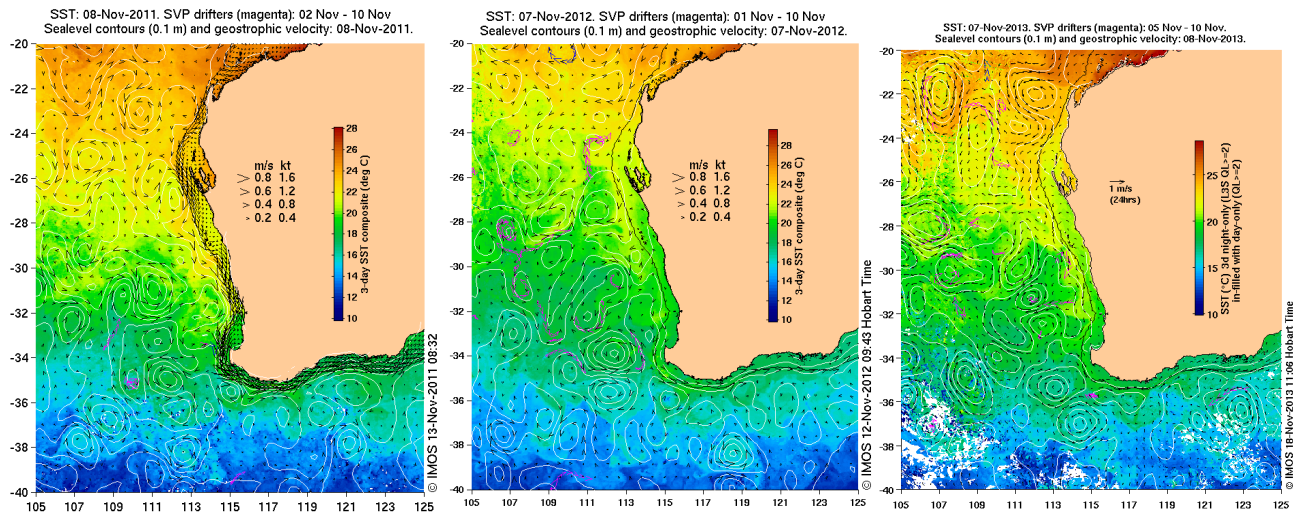


Figure 1: A comparison of the Leeuwin Current sea surface temperature and current speed and direction for early November for the previous 3 years; 2011 (left) 2012 (middle) 2013 (right) (IMOS 2014).

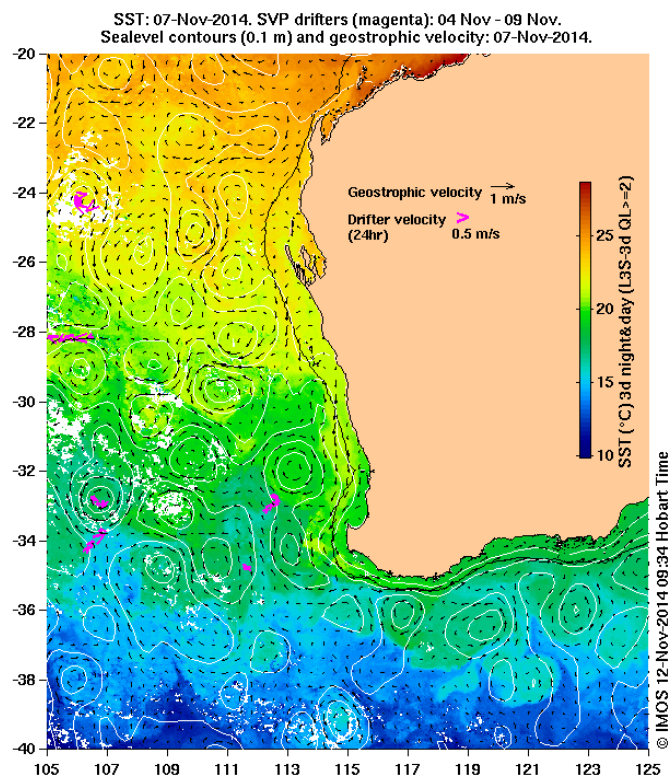


Figure 2: Actual Sea Surface Temperature and surface current speed and direction along the West Australian coastline now (IMOS 2014).

GAB Sea Surface Temperature (SST):

The most recent 3-day composite satellite image of water temperatures through the GAB and graph of actual temperatures along the shelf break is shown in Figure 3. From this, temperatures are suitable for SBT along the edge of the shelf to at least longitude 133° and inshore to around longitude 134° with some pockets of water around 135°E. Yesterday, the 17th November the 5pm satellite pass, showed a band of 20°C water extending from on the shelf at 133°E 33°16'S to 131°33'E 34°03'S. Figure 4 shows the situation for November over the previous 5 years, GAB SST

patterns now are similar to November last year. However, a look at where water is warmer or cooler than the longer-term average via the IMOS system suggests that the GAB may be a little warmer over a larger area when comparing similar time periods of November from 2013 to 2014 (Figure 5 and Figure 6). This may be related to the unseasonably warm weather through late winter, spring and into October. It is also worth noting that there are less of the large warmer (than average) water masses out from northwest and southwest WA, but what the GAB or Indian Ocean observations will mean for tuna distribution over the upcoming season is unclear at this stage. Will endeavor to monitor these and keep you updated through the season.

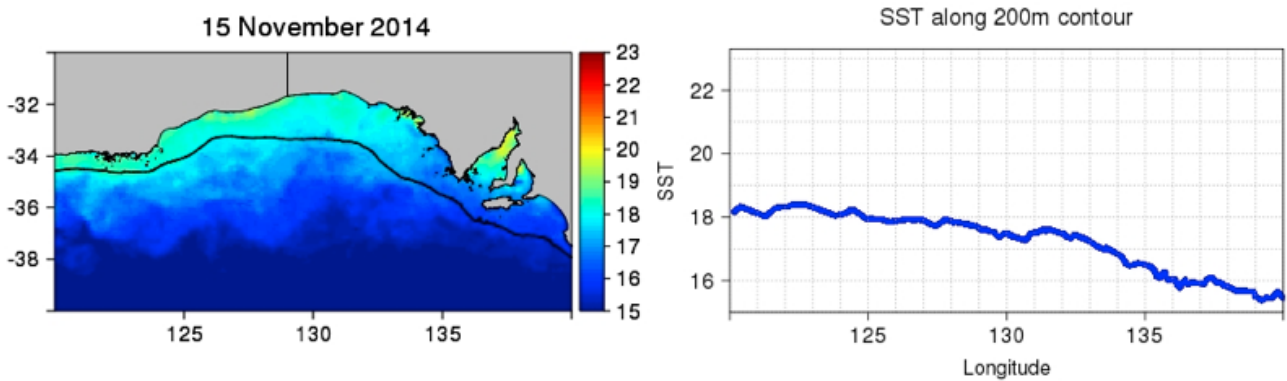


Figure 3: Actual SST along the shelf break of the GAB fishing area for the week ending 15th November 2014 (CSIRO 2014).

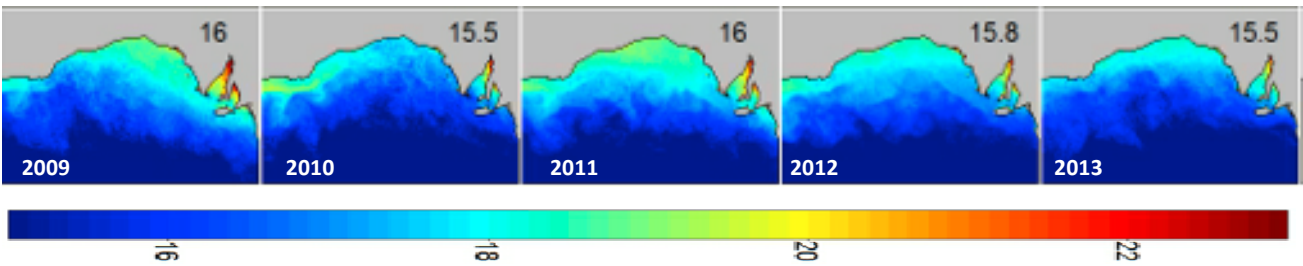


Figure 4: GAB Sea Surface Temperatures through November for previous 5 years (2009 to 2013) (CSIRO 2014)

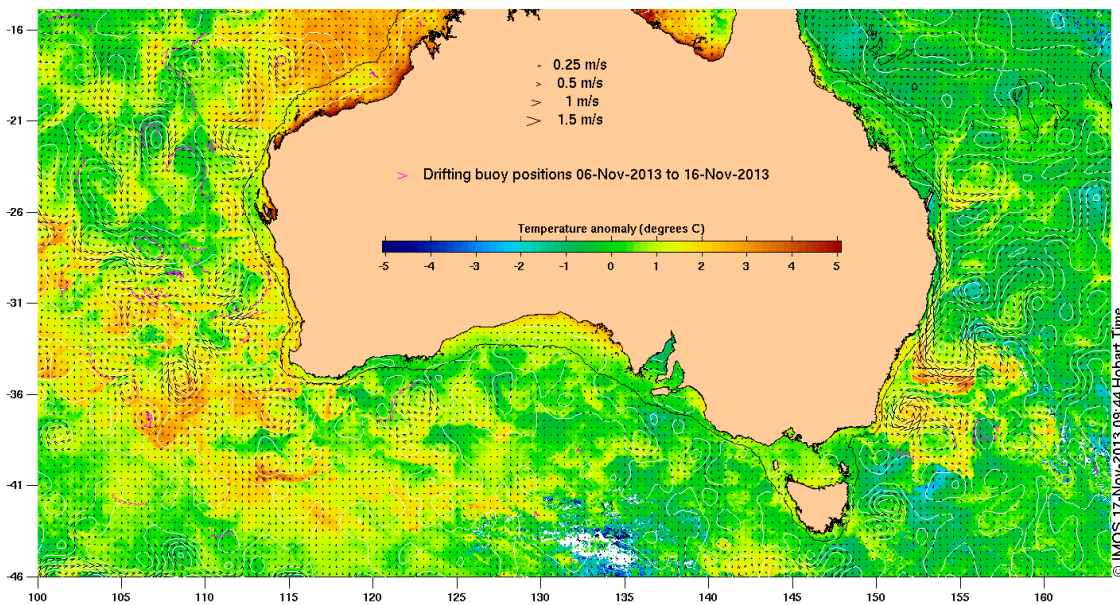


Figure 5: Sea Temperature anomalies between 9th to 14th November 2013. Note the shelf break is shown as the thin black line and surface water current direction indicated by arrows (IMOS 2014).

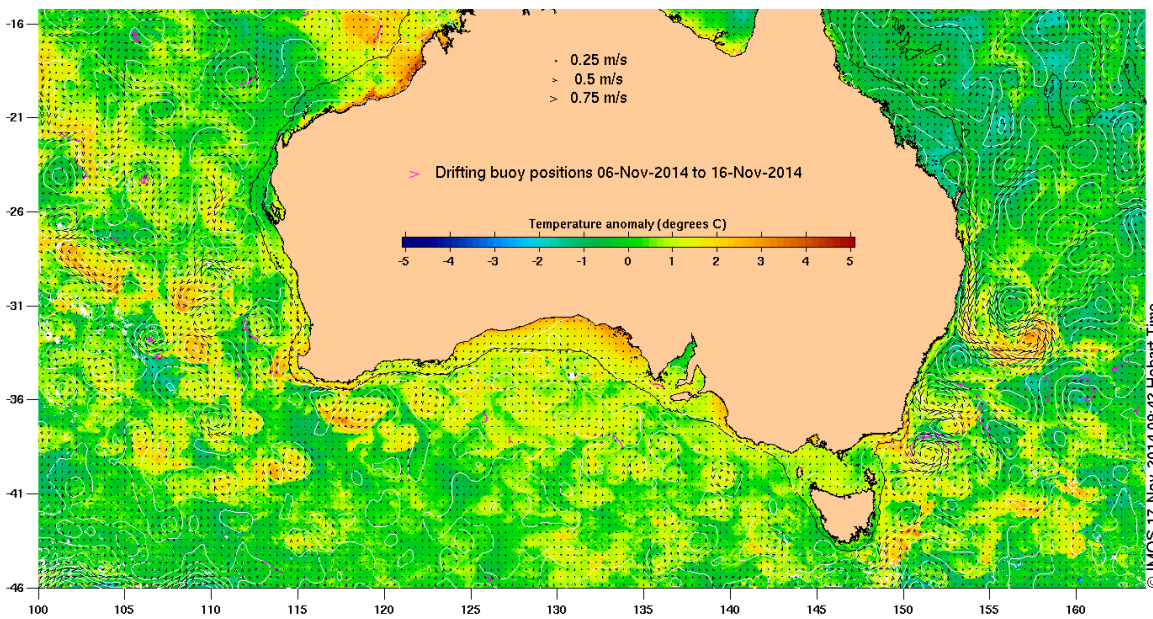


Figure 6: Sea Temperature anomalies between 7th to 12th November 2014. Note the shelf break is shown as the thin black line and surface water current direction indicated by arrows (IMOS 2014).

Sea Temperature and Habitat Forecasts:

Please note that the following comments relate only to environmental conditions and do not take into account any influence the seismic surveys may have on SBT distribution.

Short term forecast, issued at the beginning of November predicting temperatures for the latter half of November (Figure 7) when applying an 18°C threshold suggest conditions would be suitable for SBT around inshore areas of Lower Eyre Peninsula. This was indeed the case with small SBT being caught by recreational fishers out from Point Sir Isaacs last week. From this forecast, conditions for larger surface aggregations offshore/shelf break are generally west of 132-133°E.

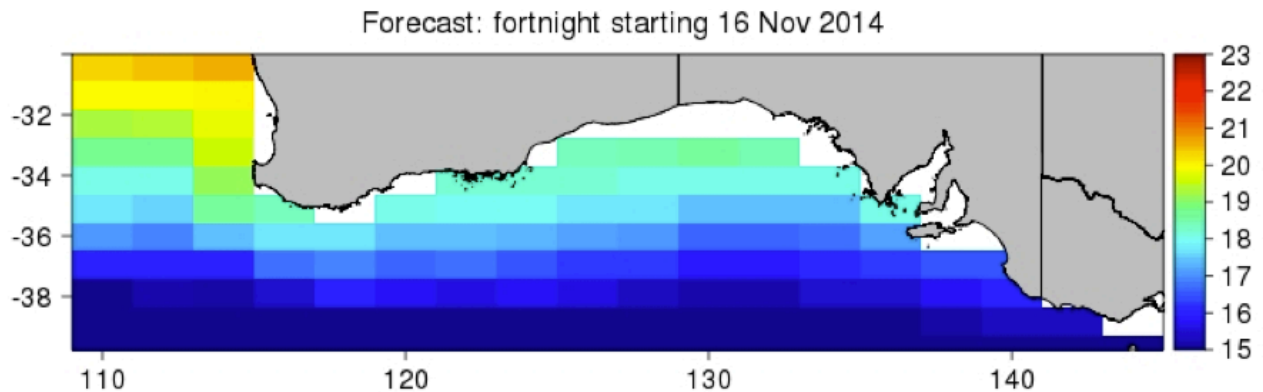


Figure 7: Sea Temperature Forecast issued at the beginning of November for latter half of November (CSIRO 2014).

Longer-term forecasts, issued 16th November for the month of December (Figure 8) suggest suitable conditions will extend to western Kangaroo Island both on and along shelf-break, but areas to the west of 133°E are likely to remain where the majority of the fish will be (and inshore this will possibly extend to 134°E).

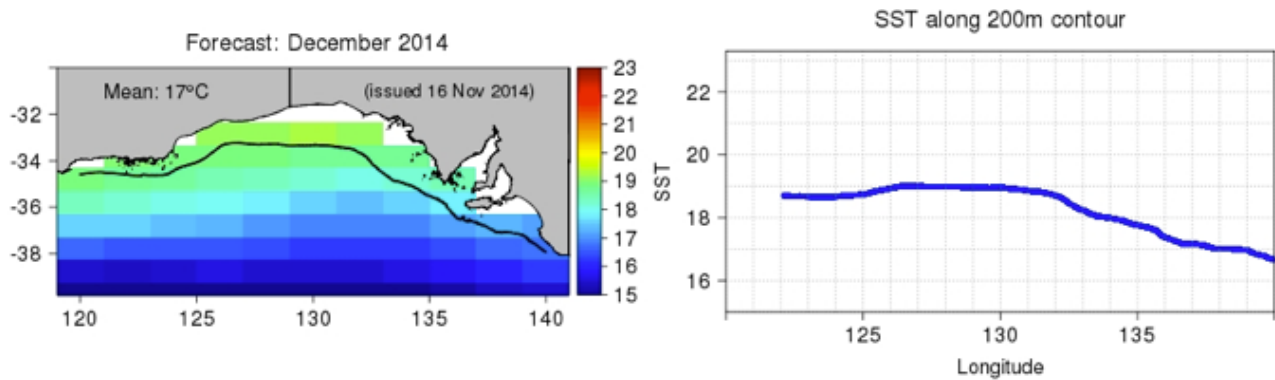


Figure 8: Sea Temperature Forecast issued mid-November for the month of December (CSIRO 2014).

Longer-term forecasts, issued 16th November for the month of January (Figure 9) suggest conditions through January will be highly suitable through most of the GAB and this extends to all the areas fished last season.

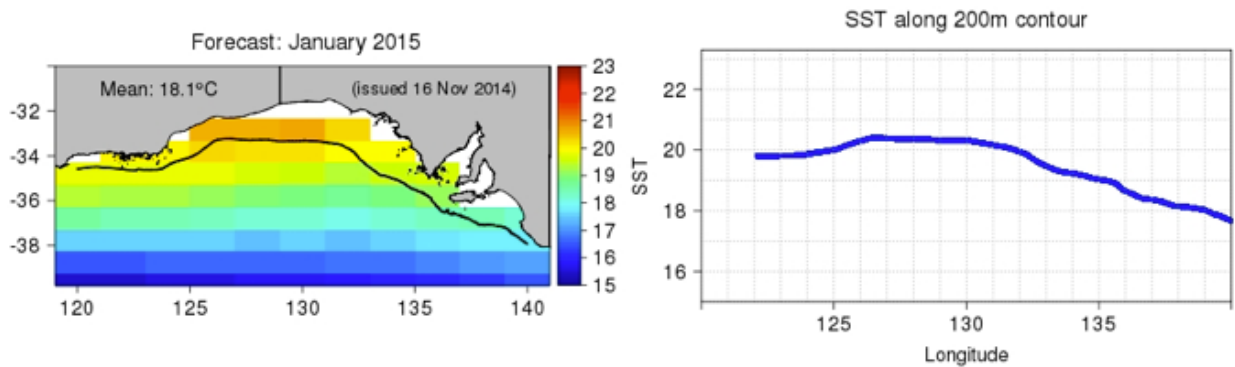
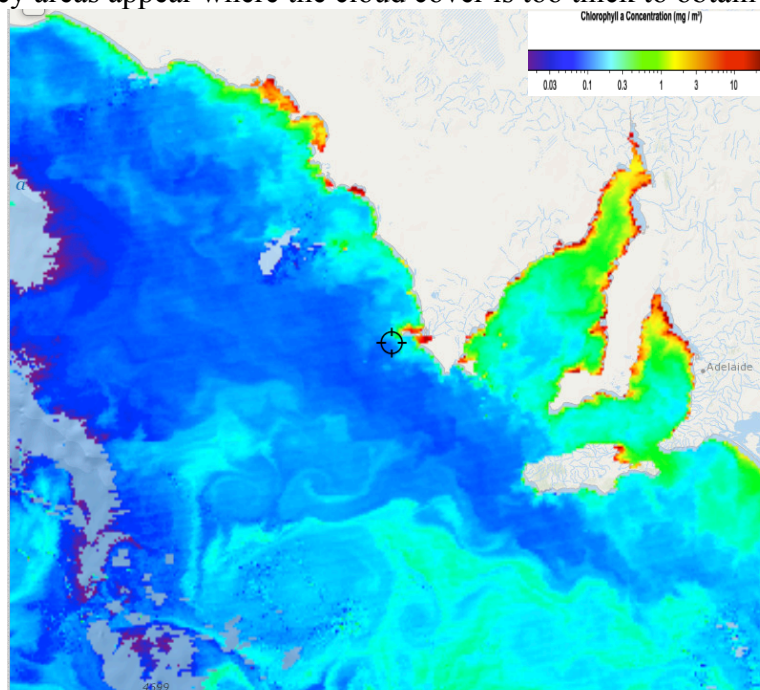


Figure 9: Sea Temperature Forecast issued mid-November for the month of January (CSIRO 2014).

The status of the upwelling system is likely to be a key-determining factor in actual SBT distribution and this will be monitored through the season and provided in the weekly updates.

Chlorophyll / Productivity:

The latest clear satellite image (FishTrack 2014) showing where productivity is concentrated is shown below, the grey areas appear where the cloud cover is too thick to obtain an image.



Climate / Ocean Trends:

There are at least 3 major Climate Systems that have an influence over the ocean and weather conditions experienced in the GAB. They do this by having varying degrees of influence over at least 6 water masses and currents in the vicinity of Australia. The relative influence of any one of these can be exaggerated or modified by the prevailing phase of the other(s).

The forecasted situation for the two major systems (those of the Pacific Ocean and the Indian Ocean) are not likely to increase water current speeds through the GAB or interfere with upwelling. The other system (of the Southern Ocean) has an influence over the position and nature of the High Pressure systems and is very difficult to forecast even beyond 7-days, so updates on this are not included here, but will appear through the fishing season.

The Pacific Ocean system is likely to develop into an El Niño phase through this summer period. El Niño's historically have been associated with improved upwelling in the GAB (research by John Middleton, SARDI-oceanography). Note that it is the upwelling along the eastern section of the GAB that enhances the productivity and food supply to the bait fish (and everything else) in the area.

The most recent tuna fishing season under an El Niño influence is 2010. A snapshot of the average monthly sea temperatures and the chlorophyll (productivity) for the period December 2009 to March 2010 is shown in Figure 10. In this season upwelling began at the start of January and persisted through the entire fishing and aerial survey season. Persistent and strong southeasterly winds limited fishing days through this season, but when the weather was conducive there was an abundance of fish present at the surface. The spatial distribution of tuna sightings from the CSIRO Aerial Survey by month can be seen in Table 1. In that year the entire catch of the 2010 fishing season was obtained from within the boundaries of the Aerial Survey area.

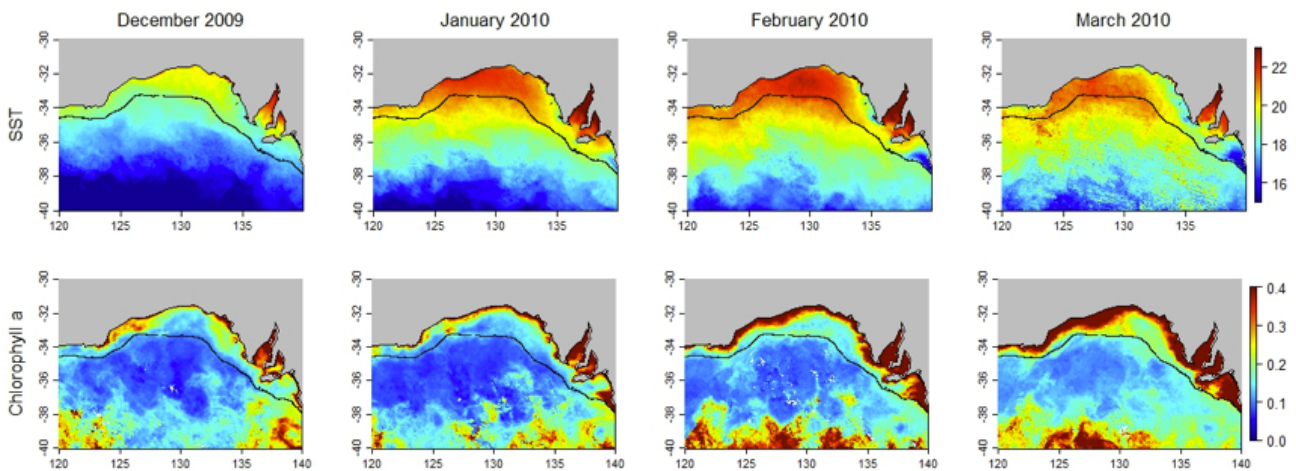


Figure 10: Broad scale patterns of Sea Surface Temperature (top) and Chlorophyll a (bottom) across the Great Australian Bight through the summer and early autumn period of 2010 (CSIRO 2014).

Table 1: CSIRO Aerial Survey daily sightings summarized by month and longitude for 2010; note this includes all size classes of tuna

2010	128°	129°	130°	131°	132°	133°	134°	Total
Jan	0	85	218	270	2464	1384	918	5339
Feb	0	0	0	342	4609	674	41	5666
Mar	40	70	75	1398	1754	3919	102.5	7359

Useful Websites:

<http://www.bom.gov.au>

<http://www.csiro.au>

<http://www.fishtrack.com>

<http://www.oceancurrent.imos.org.au>

<http://www.cmar.csiro.au/gab-forecasts/index.html>

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