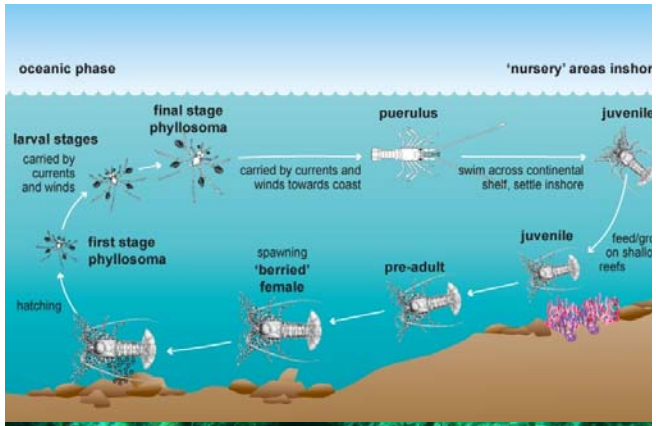

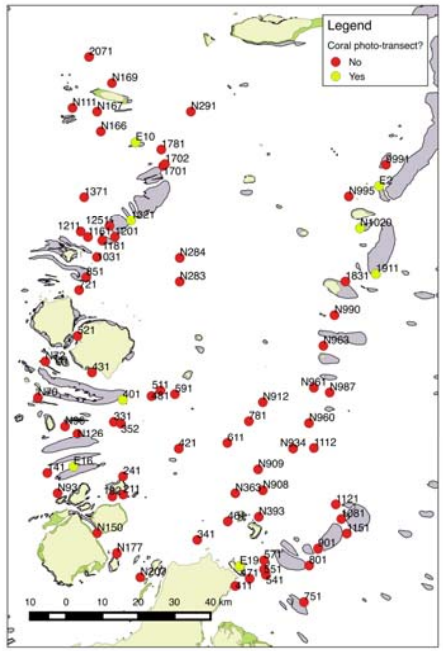

TRL RAG Meeting #19 December 2016

Agenda Item 5 Survey Results 2016

Eva Plaganyi, Darren Dennis, Robert Campbell, Roy Deng, Mick Haywood, Mark Tonks, Nicole Murphy, Kinam Salee

December 2016

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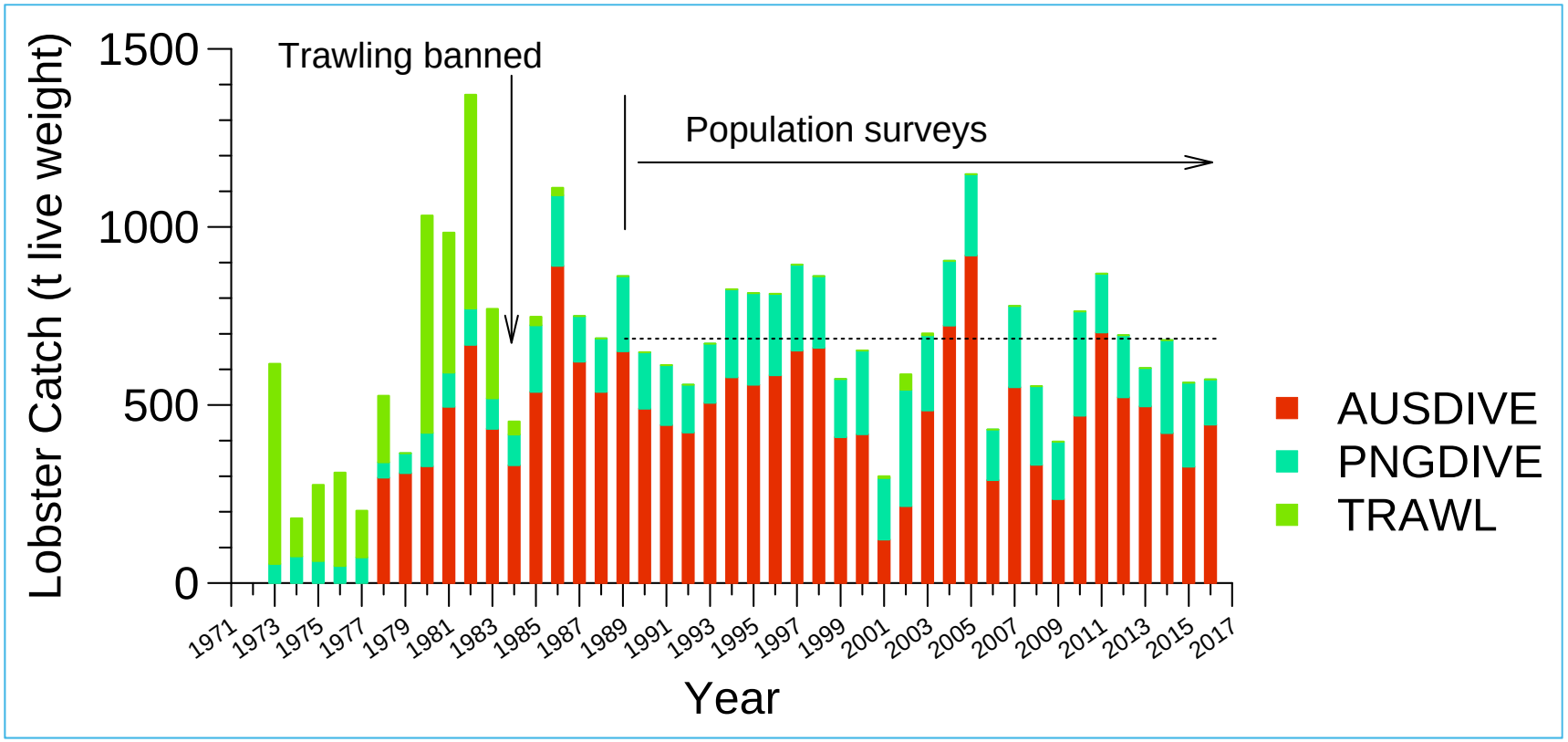
Item 5 2016 TRL Pre-season Survey Results

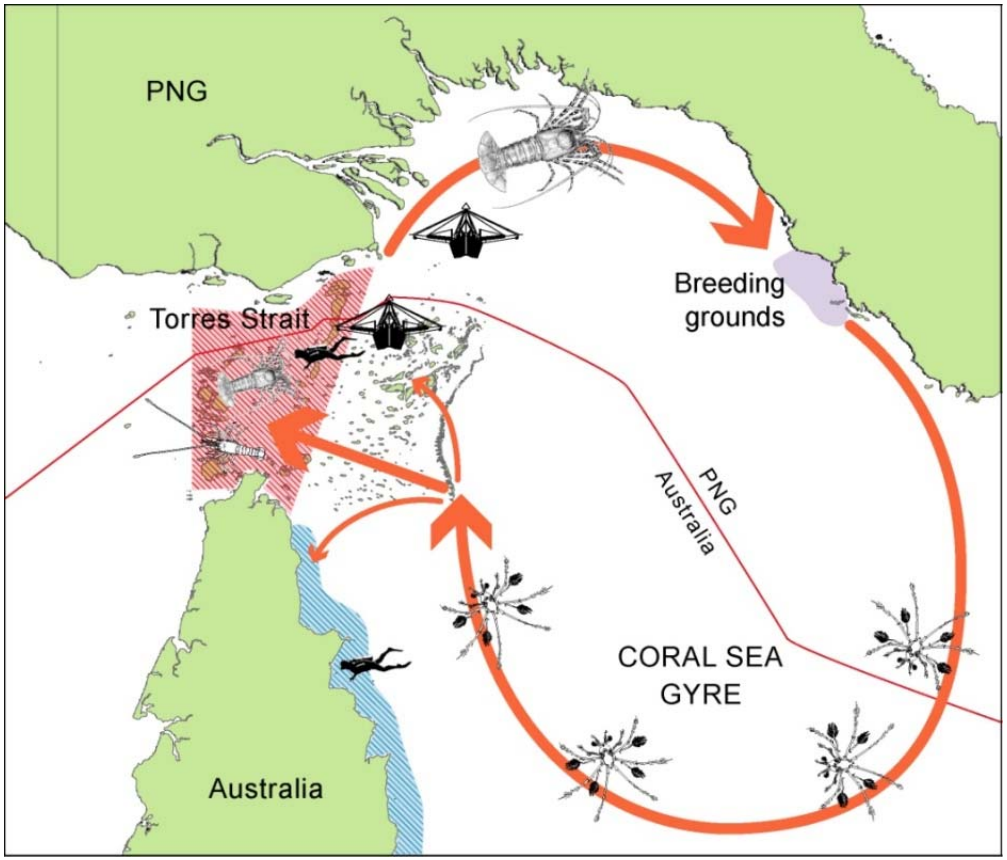
TRL Fishery Research: Historical Catch (1973-2016)

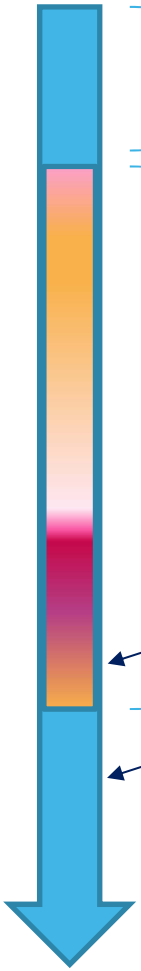


Fishery-independent population surveys were initiated in 1989 to monitor abundance of recruiting and fished lobsters

Average dive catch is ~690 t live (295_{2001} -1048_{2005} t) since 1989

TRL Fishery Research: Lobster Life Cycle & Long-term Population Monitoring Strategy





Larval phase 6 months (Oceanic & pelagic, numerous unknown influences)

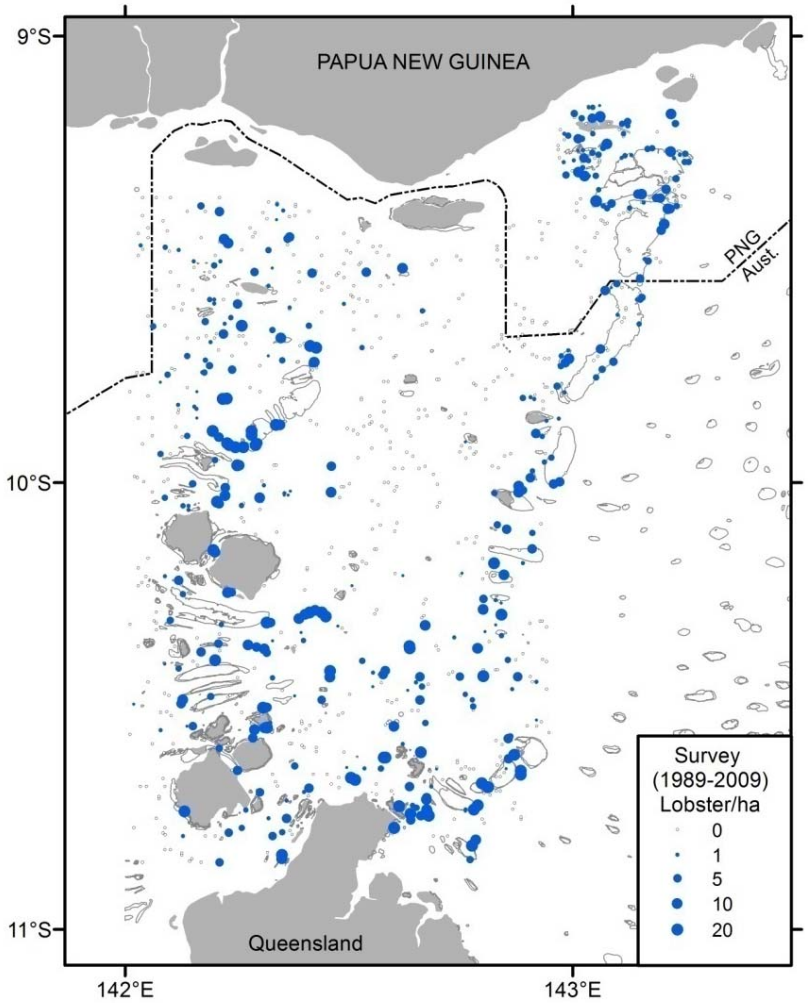
Torres Strait phase (2 years)

Mid-year surveys

Pre-season surveys

Breeding phase 6 months (Size & extent largely unknown)

TRL Fishery Research: Benchmark Population Surveys 1989 & 2002



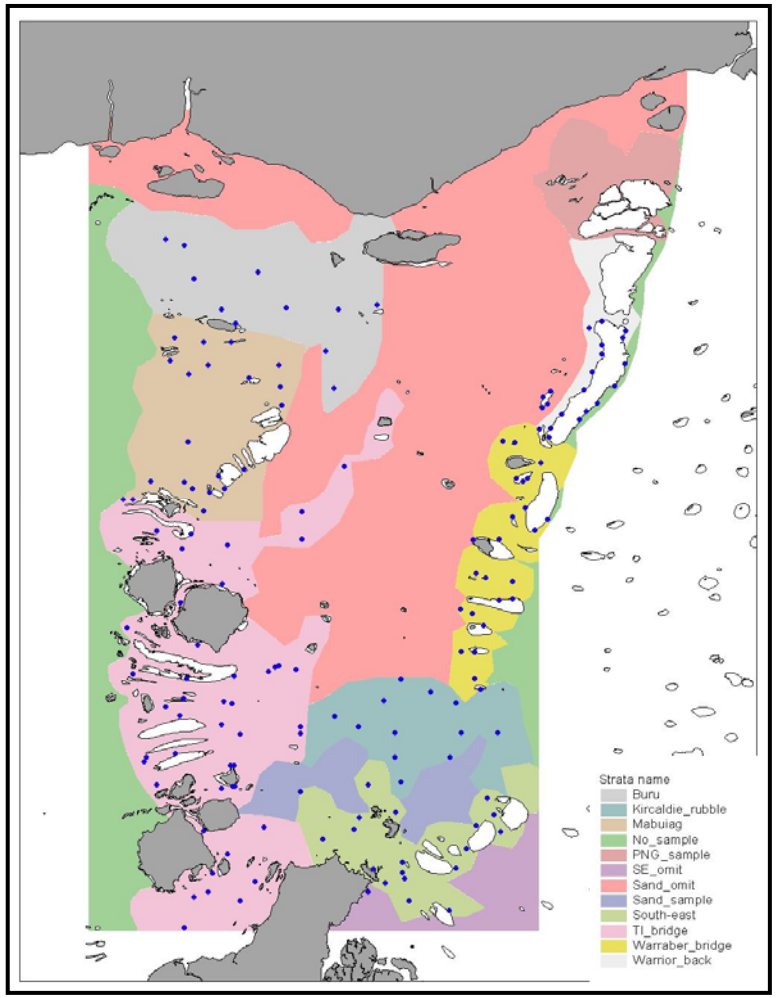
The first survey in 1989 involved 542 sites and the lobster population was estimated at 14 million ± 20% (stock biomass 4800 t)

The 1989 survey provided valuable habitat data to allow for more efficient future population surveys

The second survey in 2002 involved 375 sites and the lobster population was estimated at 9 million ± 20% (stock biomass 1100 t)

Benchmark surveys highlighted the variable abundance of TRL

TRL Fishery Research: Annual Population Monitoring using Sampling Stratums

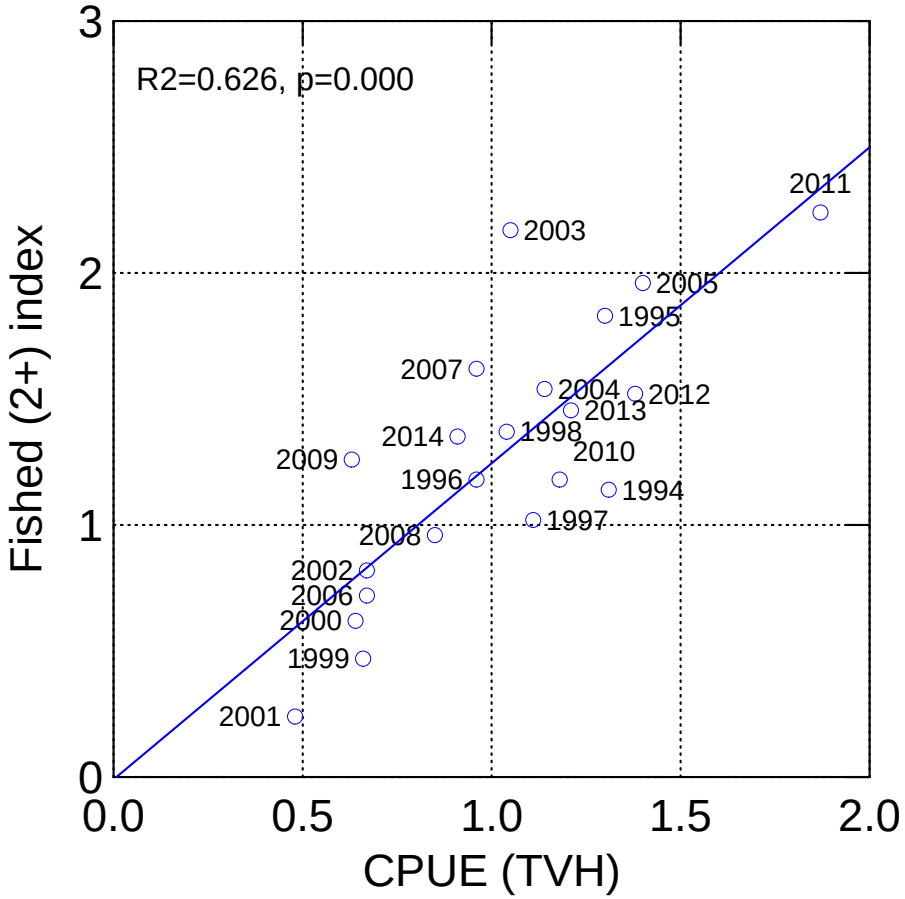


Annual population (1990 – date) monitoring was optimised by excluding unsuitable habitats and allocating sites to selected regions (stratums)

Unfortunately, deeper areas in eastern Torres Strait were also excluded

PNG stratum has not been surveyed since 2007

TRL Fishery Research: How reliable are survey indices – comparison with CPUE indices

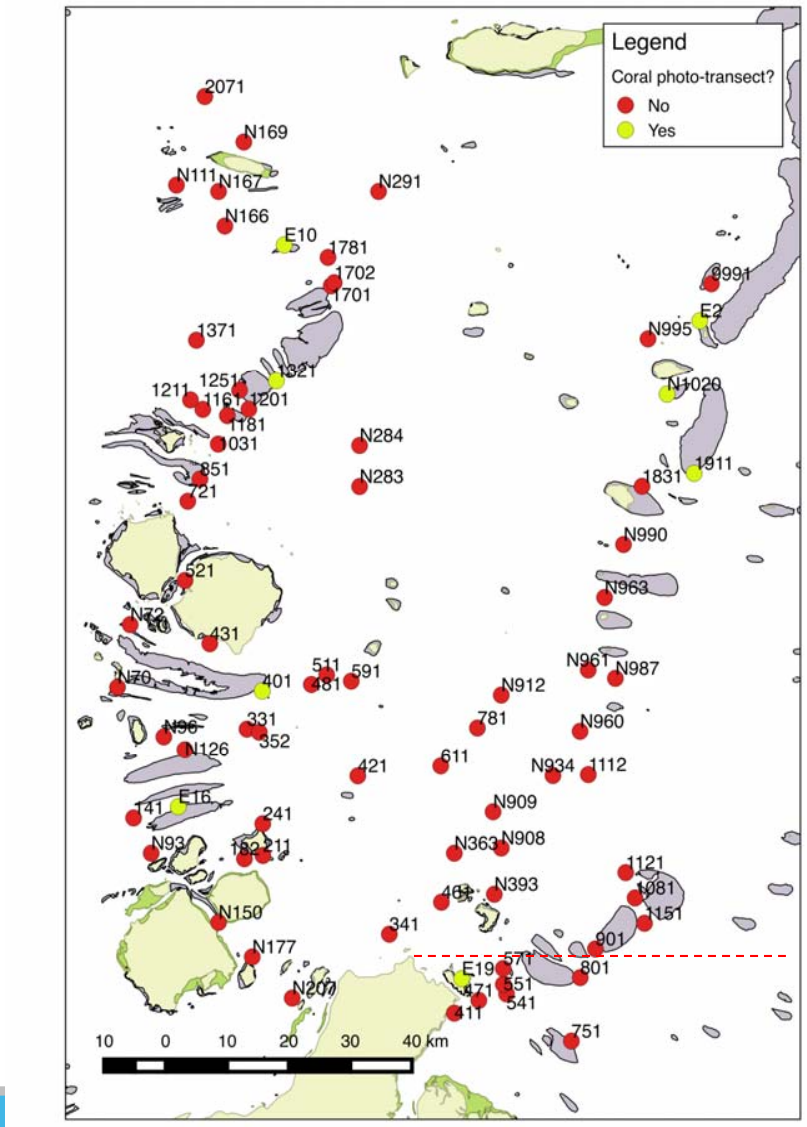


During 1994 to 2014 the survey indices were reasonably consistent with the CPUE indices

This suggested that the survey indices were a true reflection of lobster abundance

No comparison available for 1+ indices

TRL Fishery Research: 2016 TRL Population Survey



Diver surveys were done at 77 repeat sites as per 2015

Seabed habitat monitoring was conducted concurrently

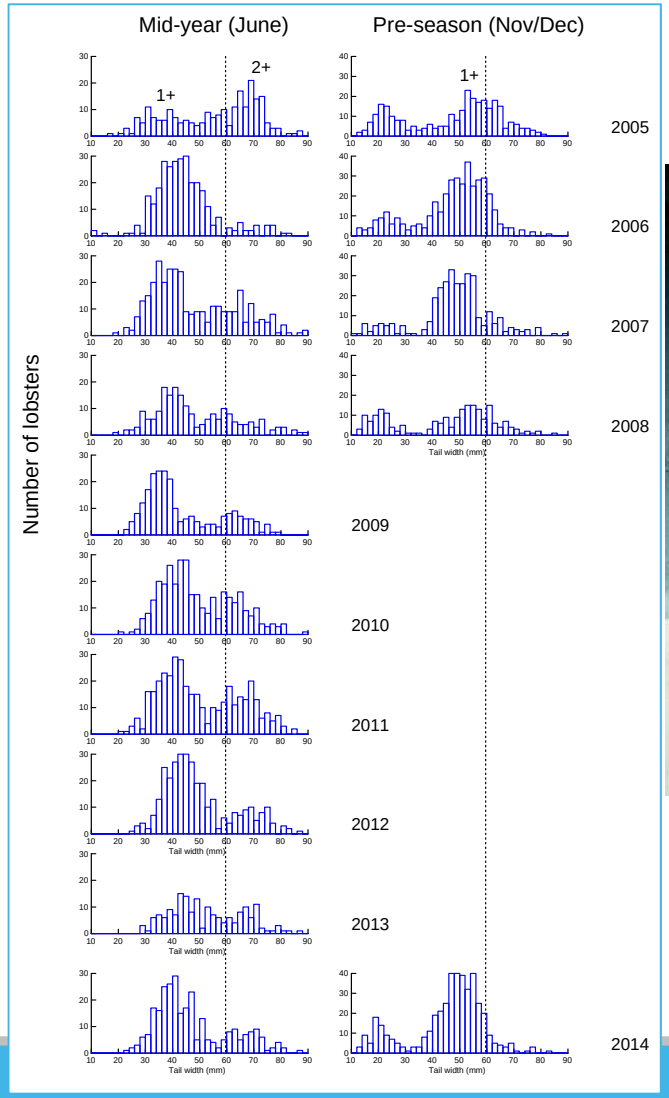
Representative samples of lobsters at each site were measured and sexed

Additional 50 m photo transects were conducted at eight reef edge sites (as per 2015) to monitor the coral bleaching impact

TRL Fishery Research: 2016 Population survey itinerary

Dive surveys were done during 3-14 November 2016 using the vessel Flying Fish V and CSIRO tender

TRL Fishery Research: Pre-season lobster age classes sampled



Pre-season surveys provide indices of recently-settled (0+) and recruiting (1+) lobster abundance

0+ lobsters average ~30 g
1+ lobsters average 350 g

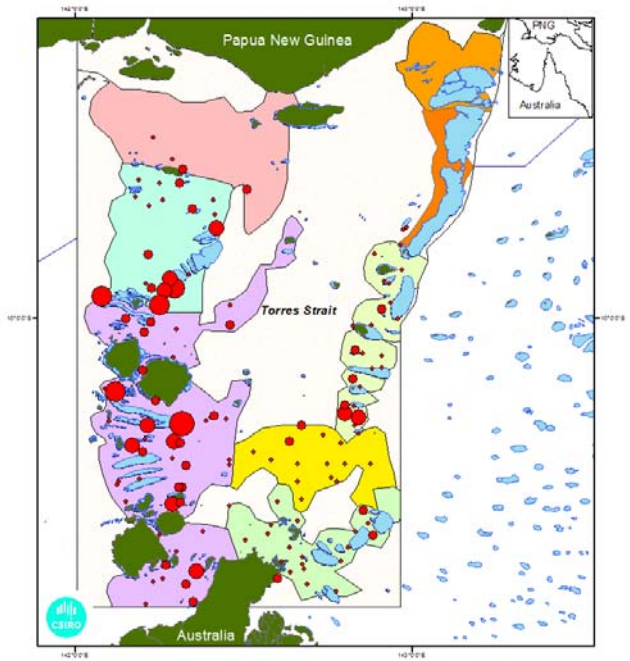
Most 2+ lobsters have migrated

TRL Fishery Research: 0+ lobster distribution 2014-16

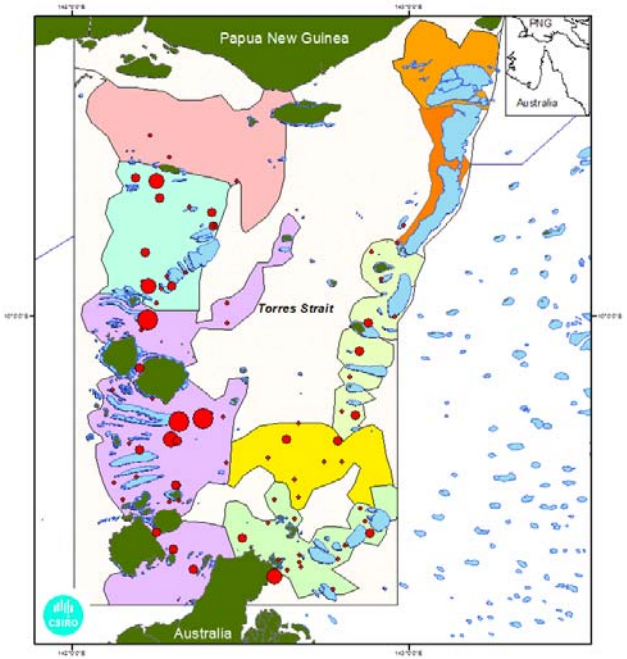
The 2016 distribution of 0+ lobsters was similar to previous years – generally restricted to the western margin of the fishery

Future industry surveys could increase reliability and precision of the index

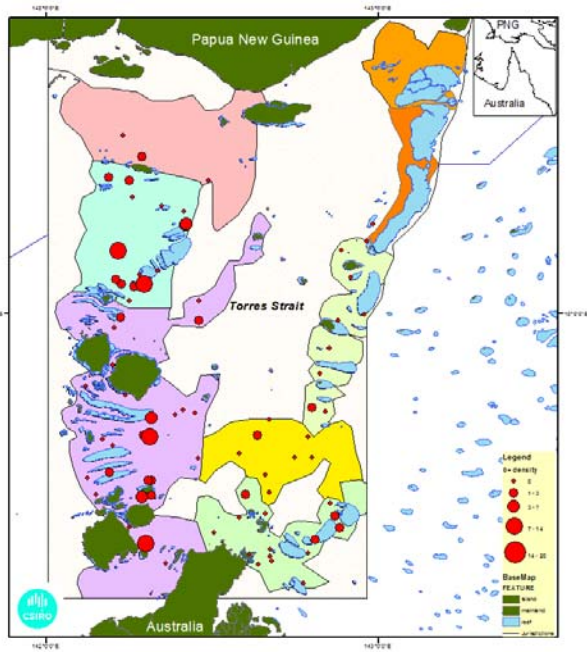
2014



2015

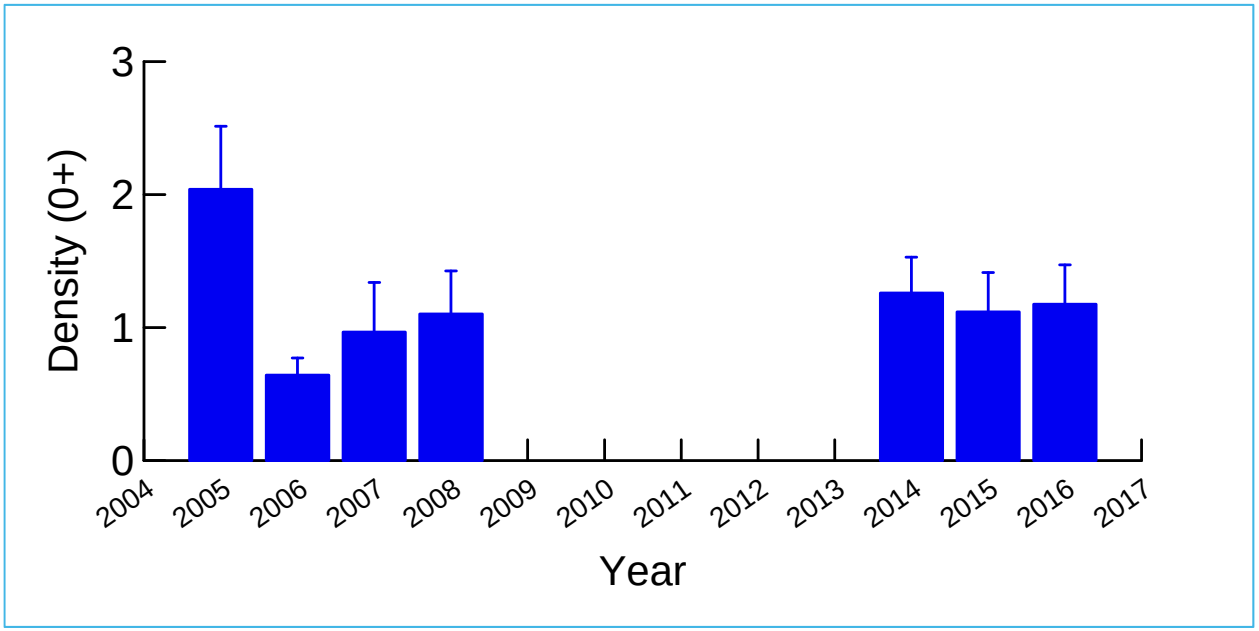


2016

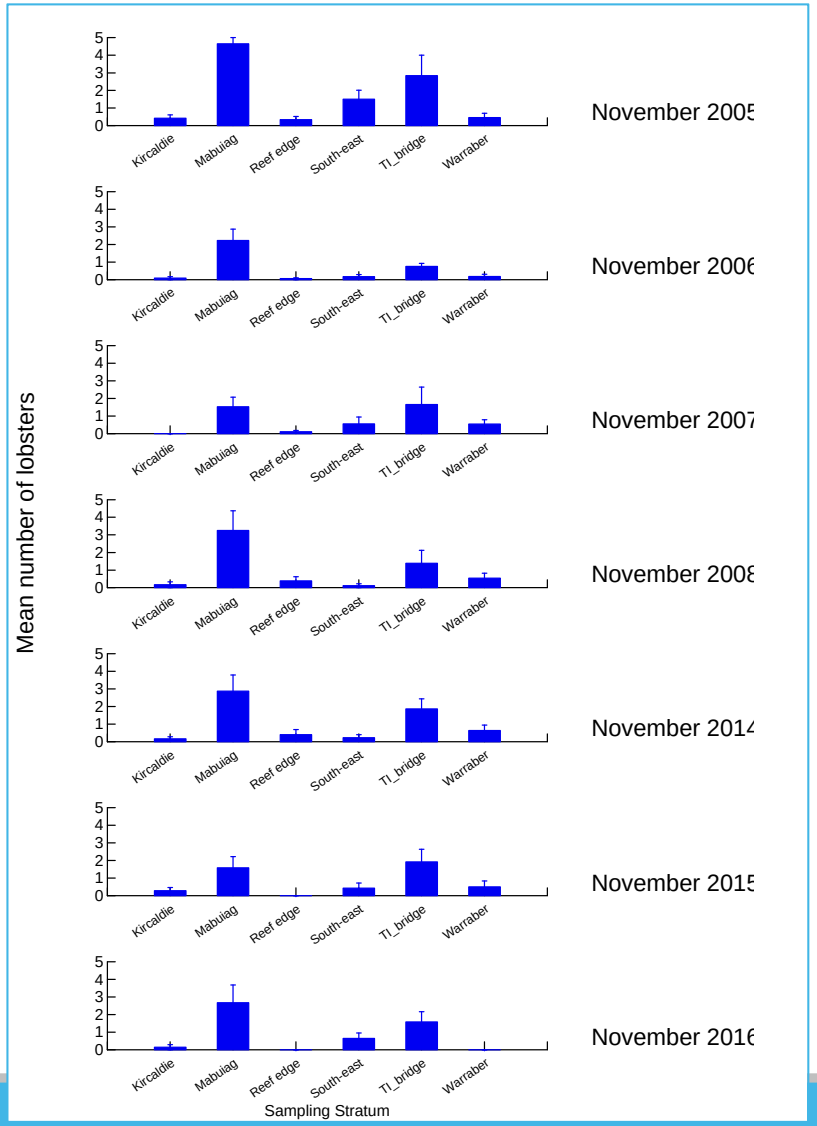


TRL Fishery Research: 0+ lobster density 2014-16

The density of 0+ lobsters in 2016 was similar to that recorded in 2014 and 2015.



TRL Fishery Research: 0+ lobster stratum densities

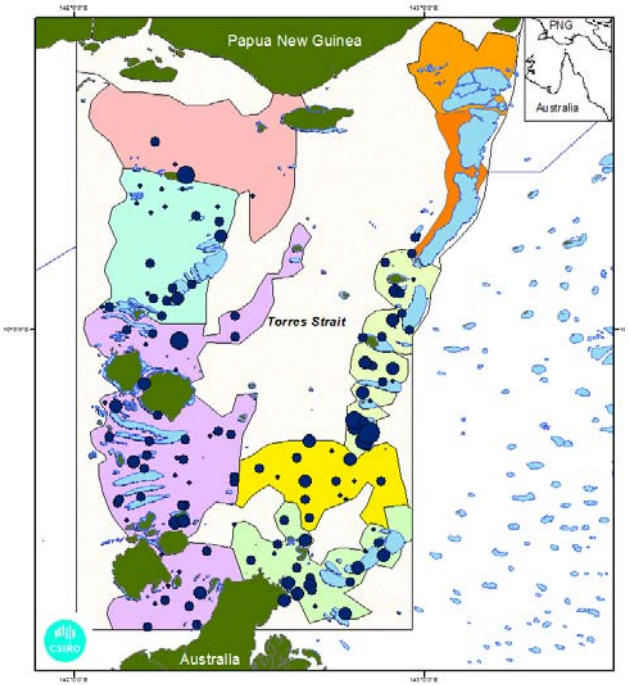


The densities of 0+ lobsters in the sampling stratums highlights the restricted distribution of recently-settled lobsters

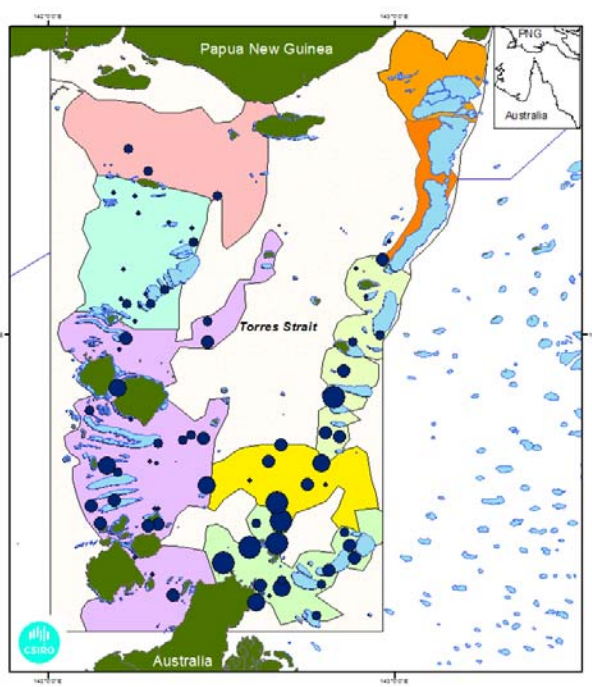
TRL Fishery Research: 1+ lobster distribution 2014-16

The 2016 distribution of 1+ lobsters contrasted with the distributions recorded in 20155 and 2015 with low densities across the study area.

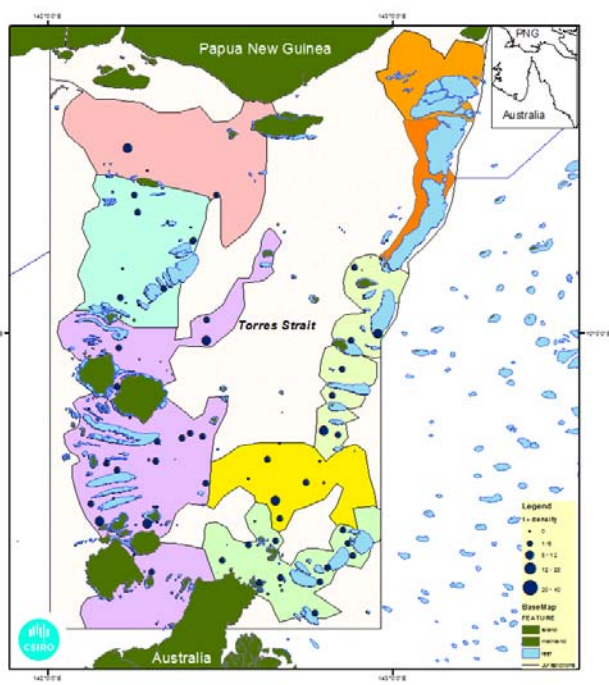
2014



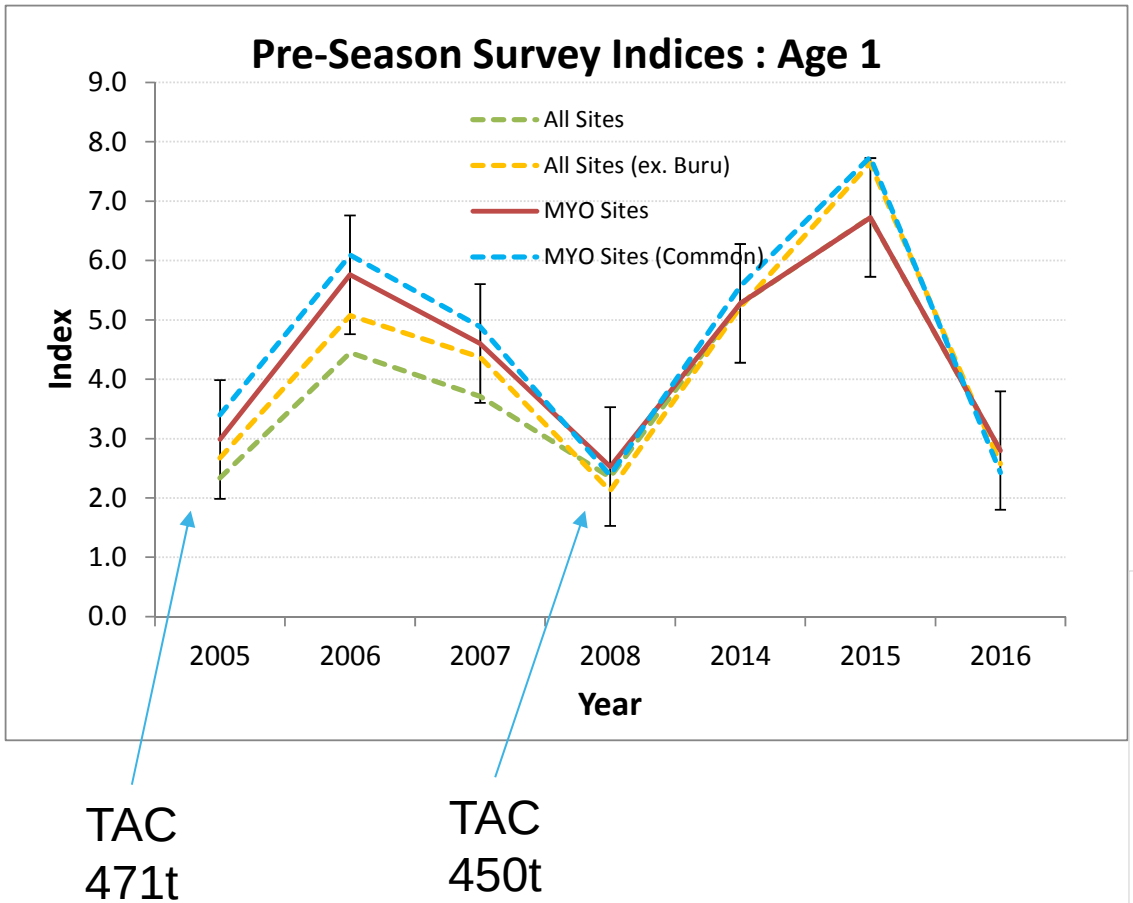
2015



2016



TRL Fishery Research: 1+ lobster densities 2014-16

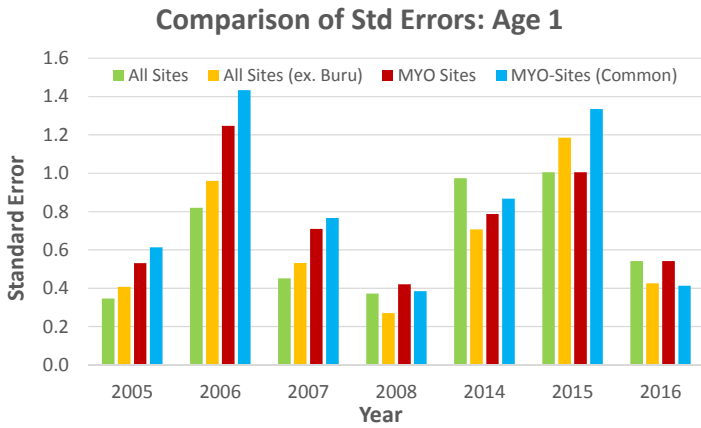


TAC 471t

TAC 450t

The 2016 1+ index was significantly lower than 2014 and 2015 and similar to the low 2005 and 2008 indices

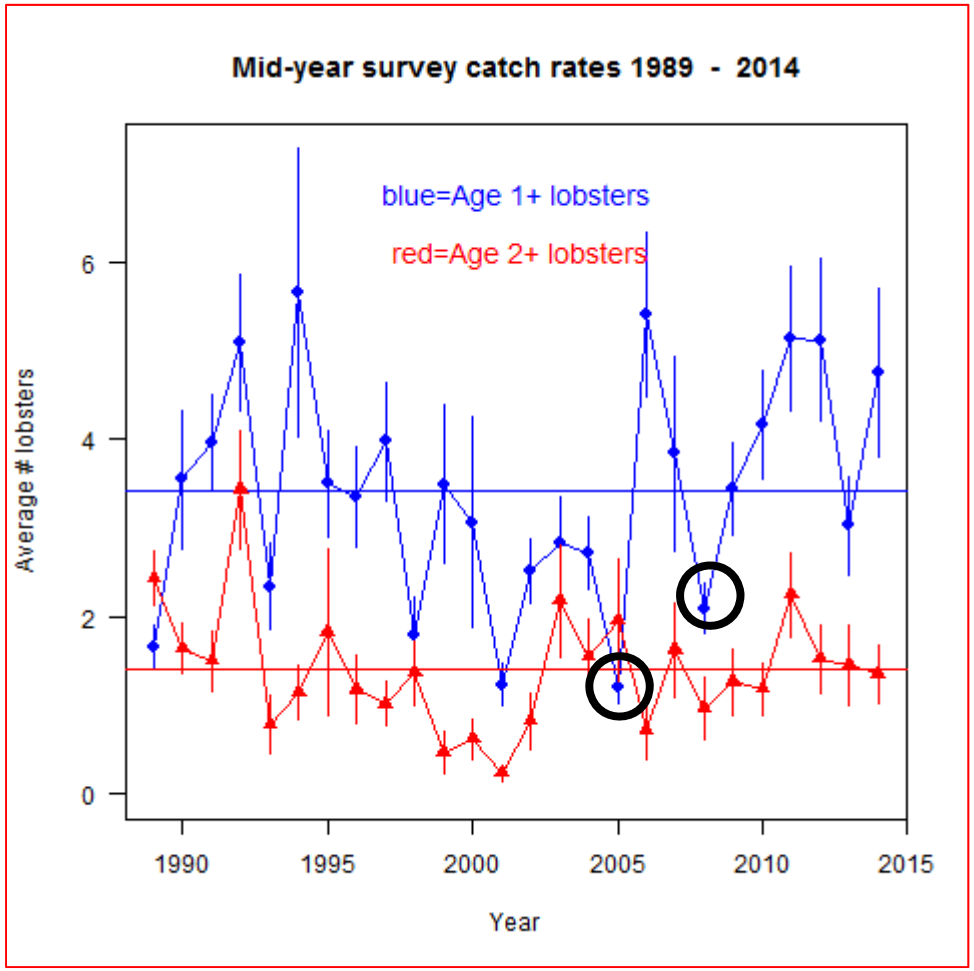
These recruiting year classes led to low TACs



TRL Fishery Research: Long-term trends in 1+ lobster densities 1989-14 – mid-year indices

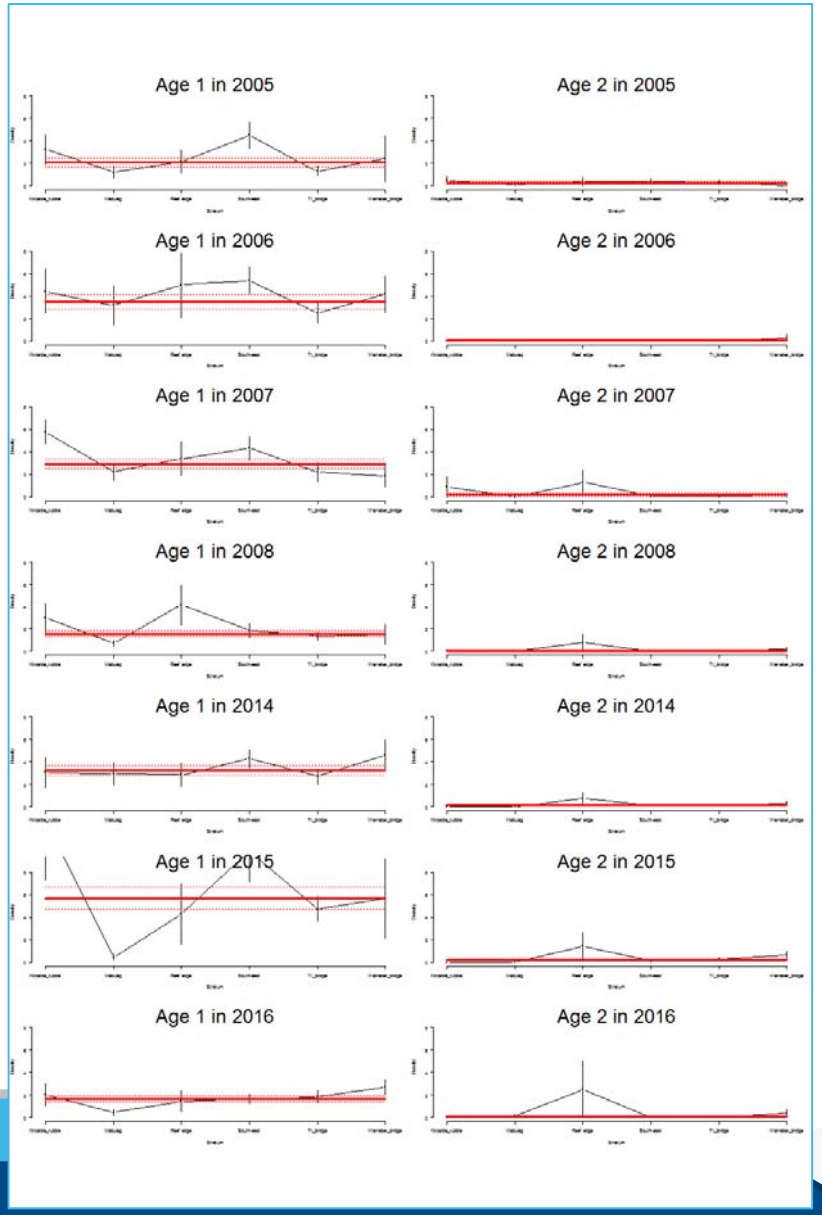
Both 2005 and 2008 recruiting year classes led to below average stocks

However, both low year classes were followed by above average levels



TRL Fishery Research: 1+ lobster stratum densities

Densities of 1+ lobsters were uniformly low across all sampling stratums, in contrast to the patchy distribution recorded in 2015

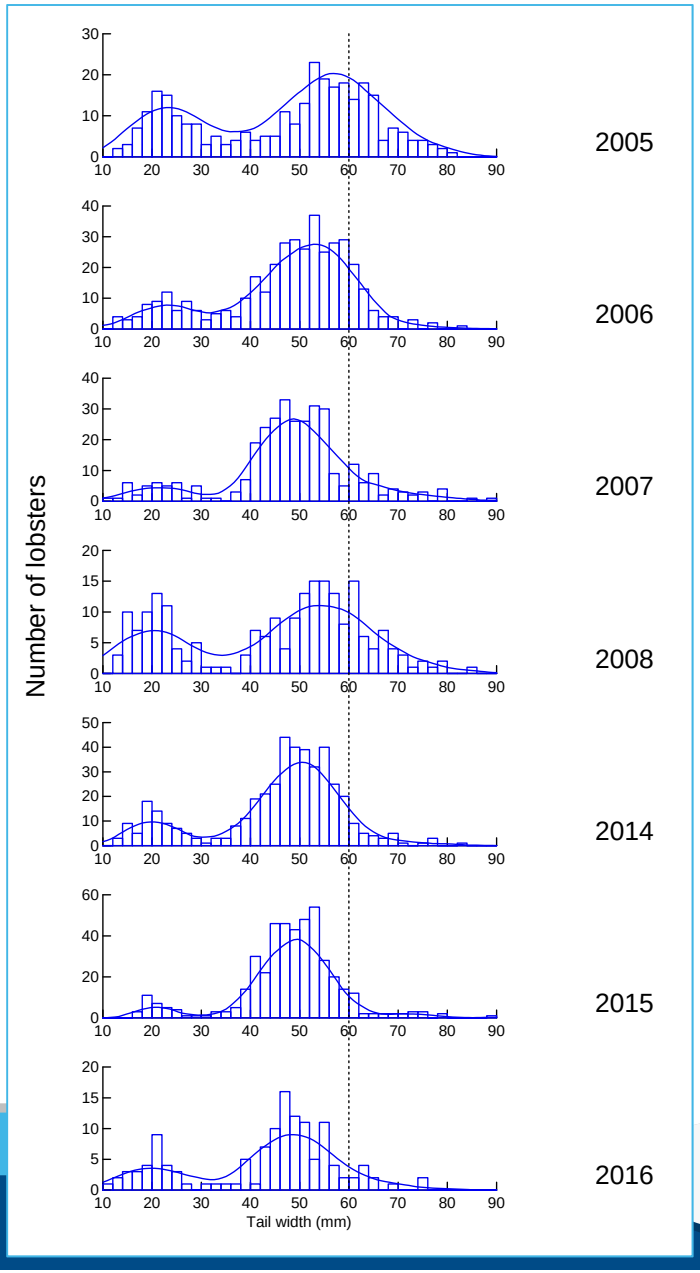


TRL Fishery Research: 2016 Population survey – size/age monitoring

The size & age composition of the TRL population is sampled during the pre-season surveys

The size distributions have been generally consistent over time, indicating external influences have also been consistent

However, the 2014-2016 recruits were smaller than in previous years, and very few legal lobsters were measured



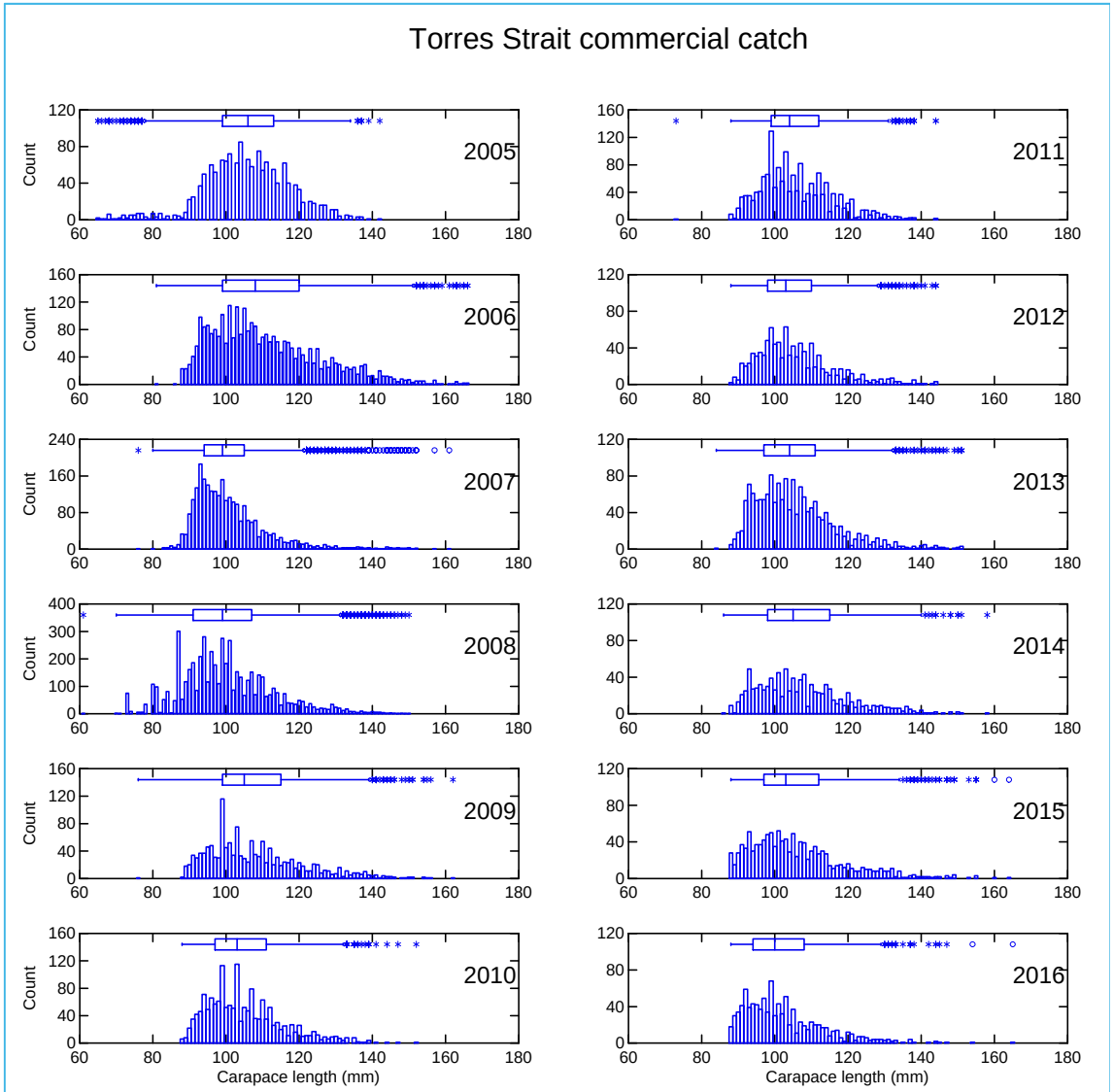
TRL Fishery Research: Commercial catch size/age monitoring - ongoing

As expected the size distributions of commercial catches have also been generally consistent

However, the average size of lobsters caught in 2016 was lower 100 mm CL than in most preceding years – density effect?

Climate change?

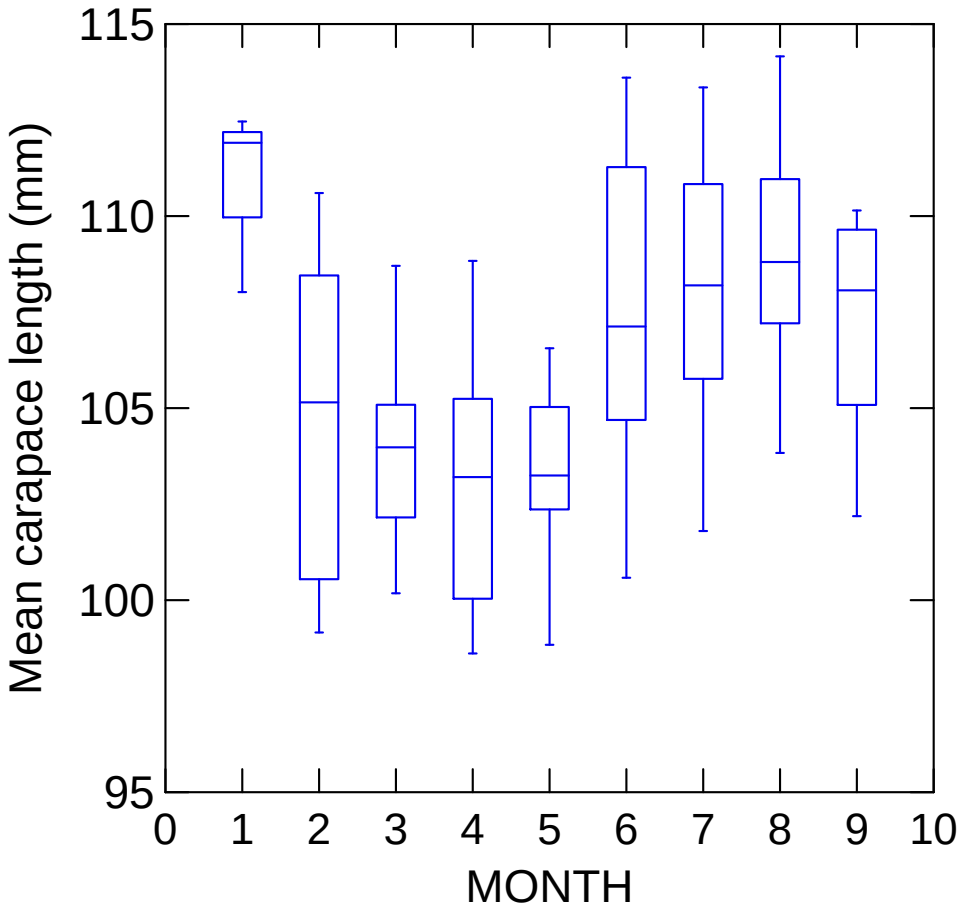
Thanks to MG Kailis for providing monthly size data



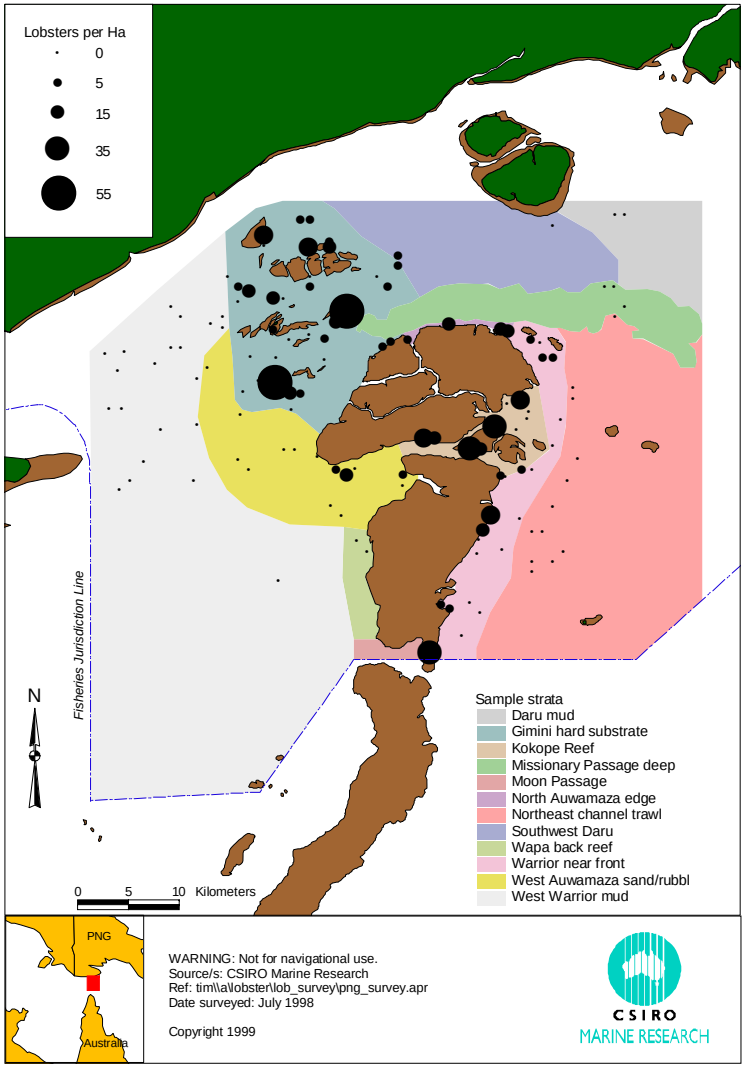
TRL Fishery Research: Commercial catch size/age monitoring – seasonal trend

There are 3 apparent “size phases” seasonally

(1) January – large lobsters – predominantly non-emigratory males
(2) Feb-May – medium size lobsters
(3) June-September – larger lobsters – likely pre-emigratory



TRL Fishery Research: Future PNG Population Surveys



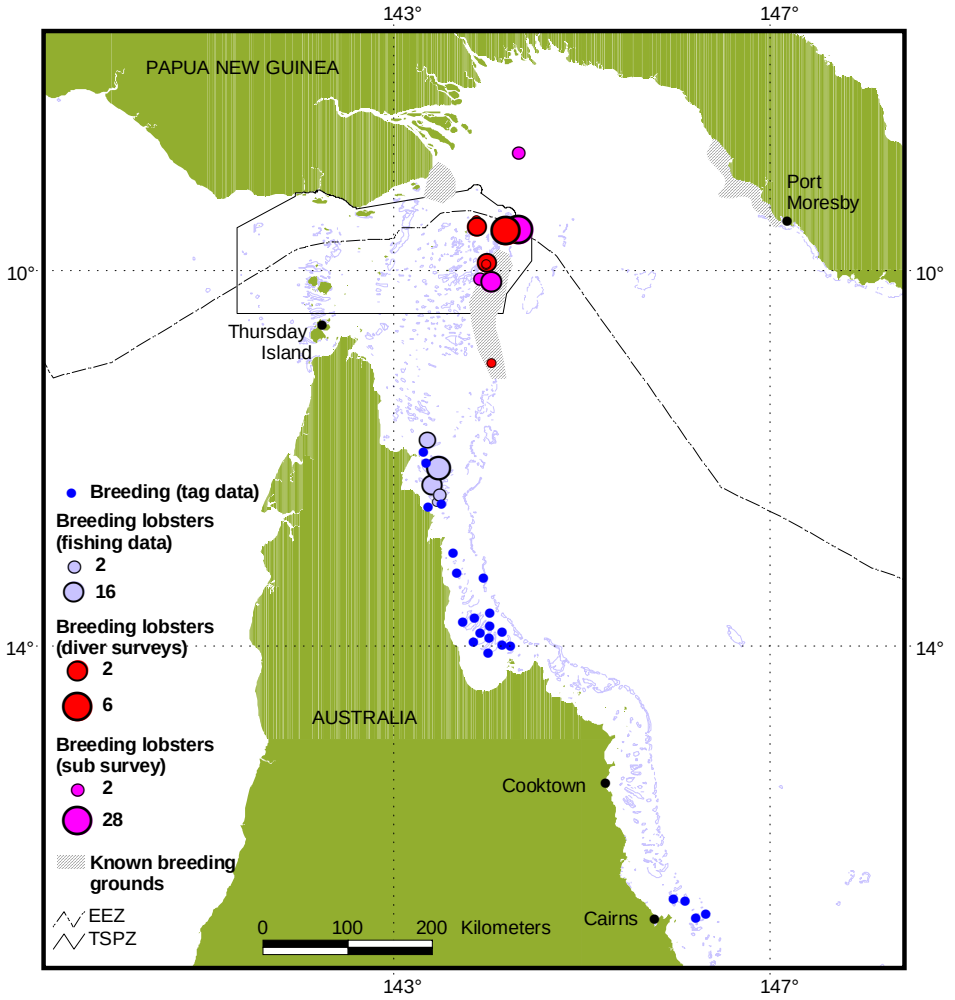
Mid-year surveys conducted in 1989, 1998, 2002, 2003, 2004 and 2007 included PNG survey sites and collaboration with PNG NFA staff

Pre-season surveys conducted in 2006 and 2007 included PNG survey sites

Future surveys should include established sites so that long-term trends are reliable

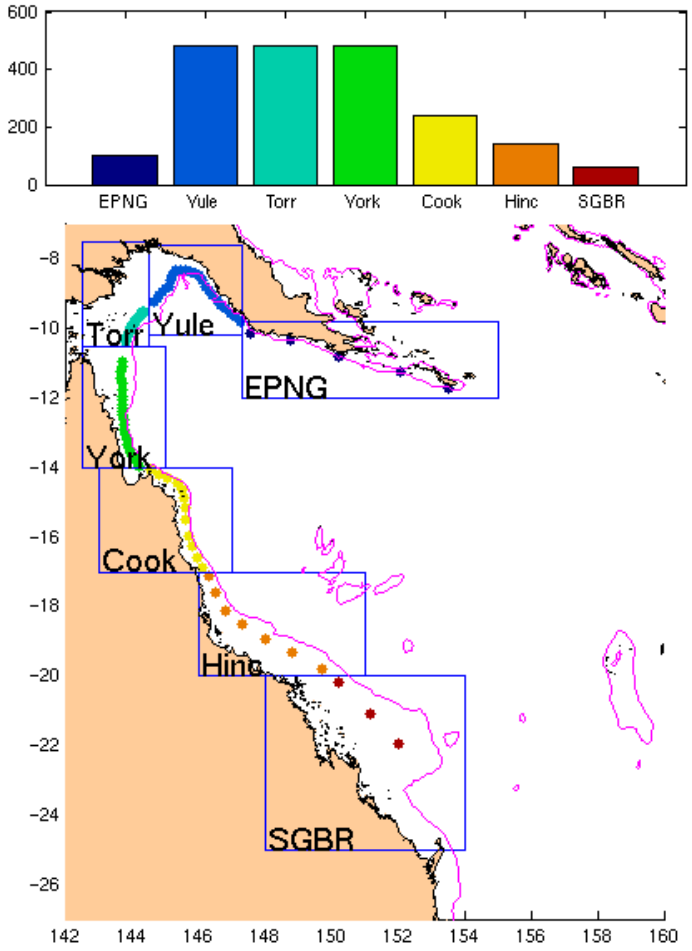
TRL Fishery Research: Item 6 TRL Larval Movement

Previous research addressed the fate of TRL larvae released from known breeding grounds qrounds around the NW Coral Sea



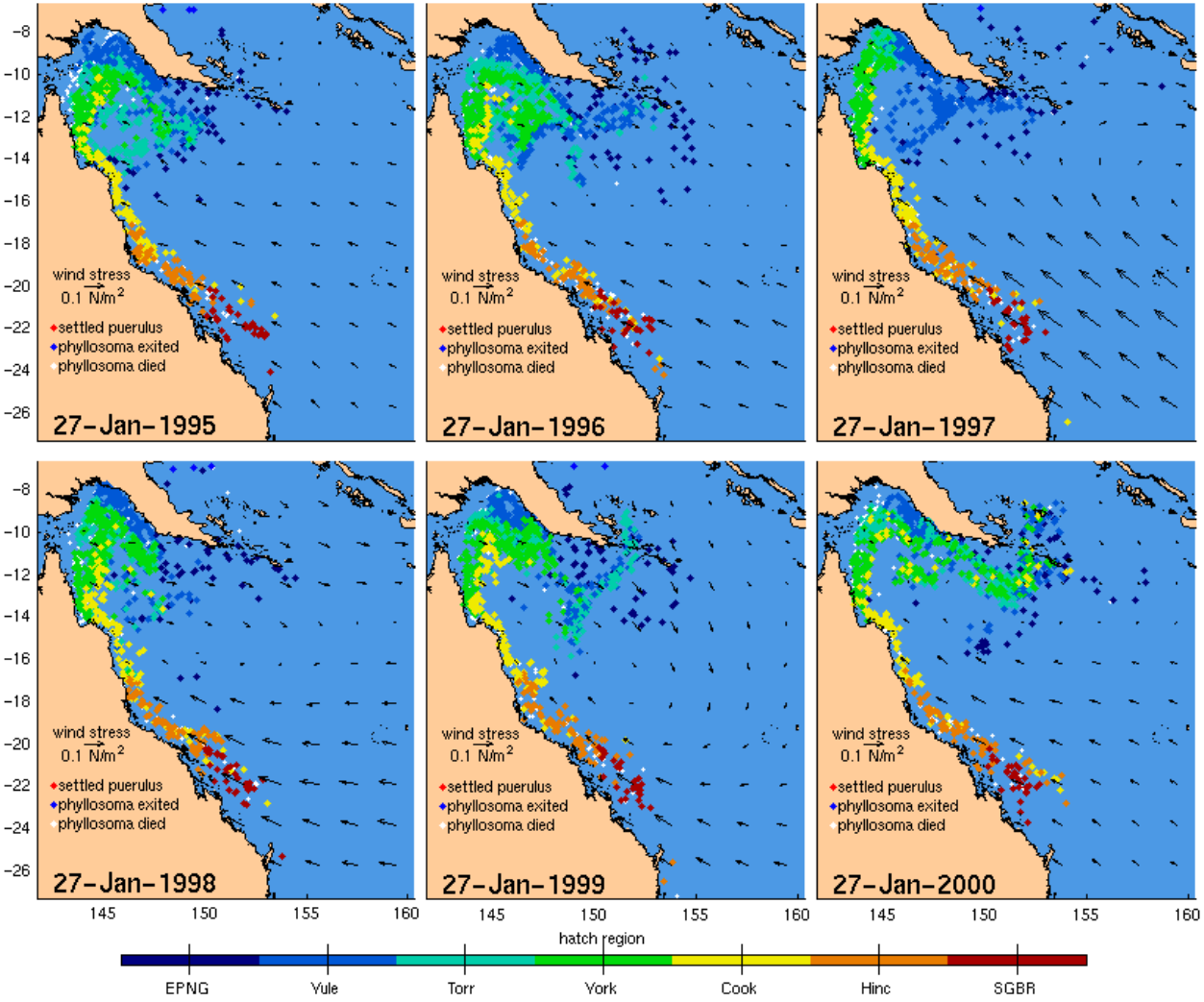
TRL Fishery Research: Item 6 TRL Larval Movement

Ocean current modelling was used to determine which breeding grounds might be most important to the Torres Strait fishery



TRL Fishery Research: Item 6 TRL Larval Movement

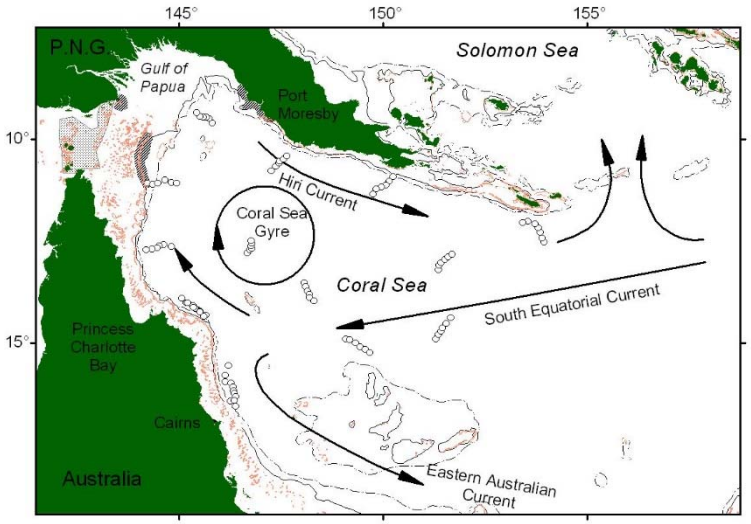
The modelling was run over the years 1995-2000 to look for inter-annual differences

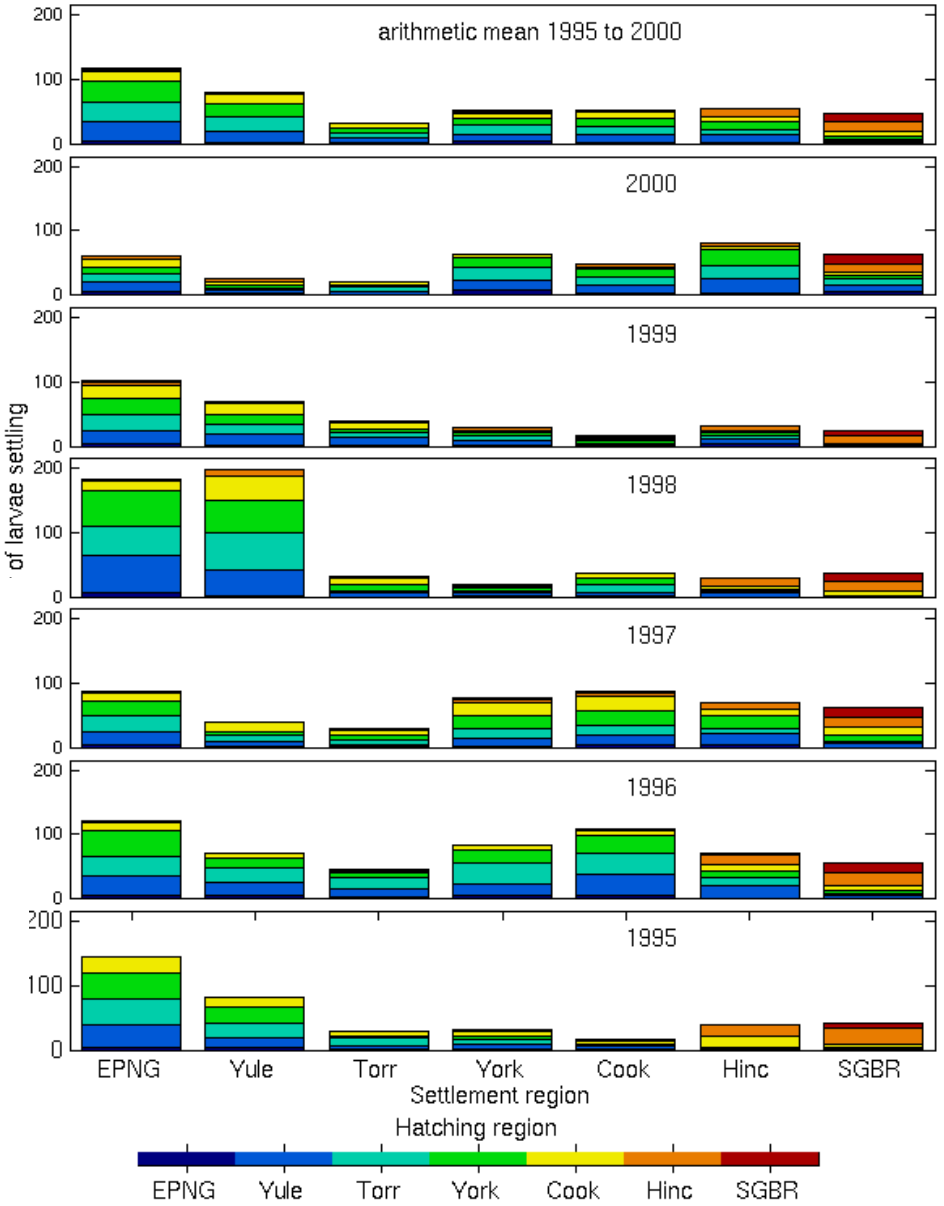


TRL Fishery Research: Item 6 TRL Larval Movement

The model showed that larval TRL settling in Torres Strait came from Yule, east Torres and northern GBR regions

This was due to the permanent Coral Sea gyre



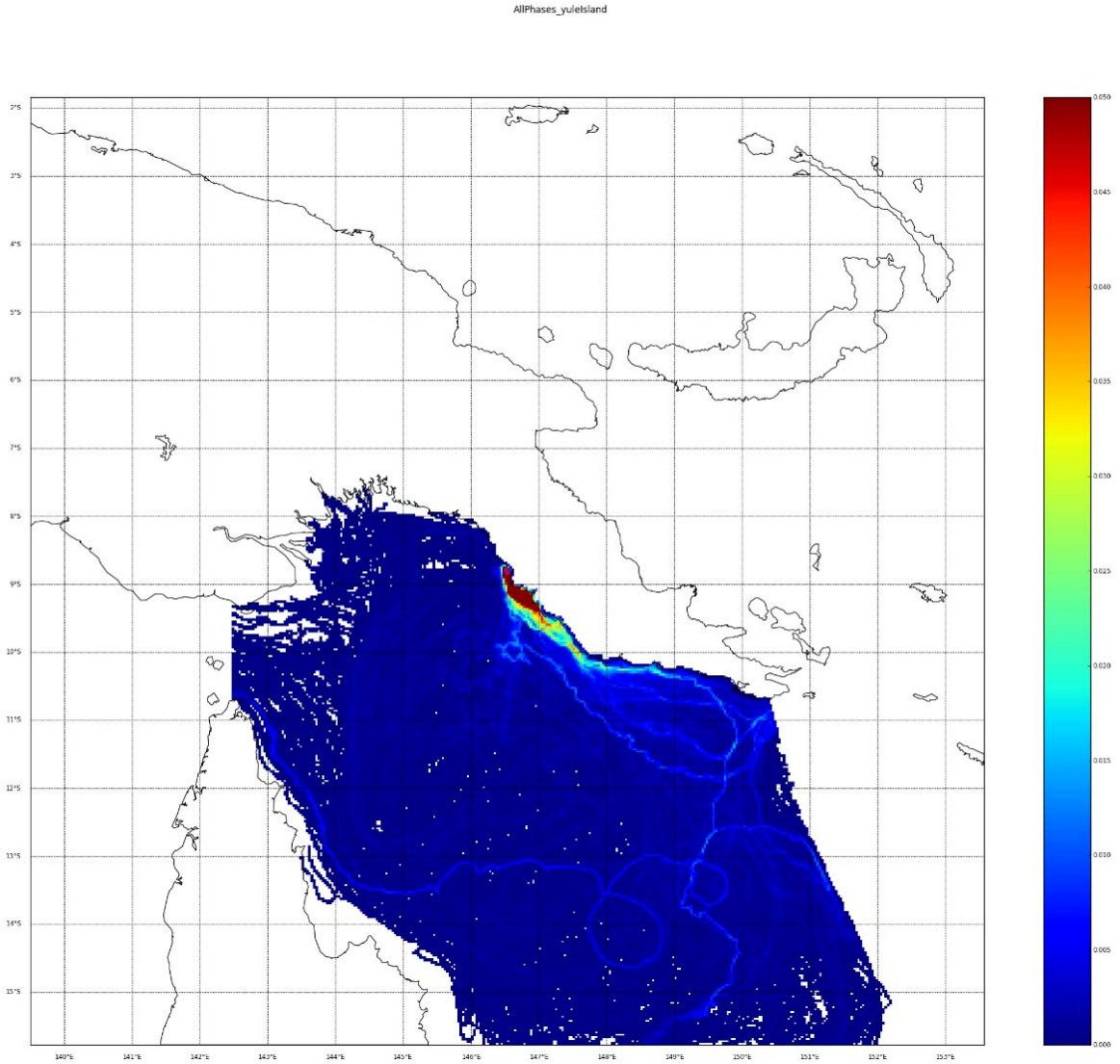


TRL Fishery Research: Item 6 TRL larval movement

New ocean current models (Connie 3) have been developed and are much more precise

Preliminary runs showed the paths of larvae released at Yule Island and the individual tracks of larvae transported to Torres Strait

Future modelling could also help determine reasons for poor recruitment eg. El Nino



Thank you

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