Babel Island all sized commercial harvest trial of Longspined sea urchin

Lead Agency: Tasmanian Commercial Divers Association
Funding: $31,000
Start Date: 1 November 2020 End Date: 31 May 2021
Status: COMPLETED

Aims and Objectives:

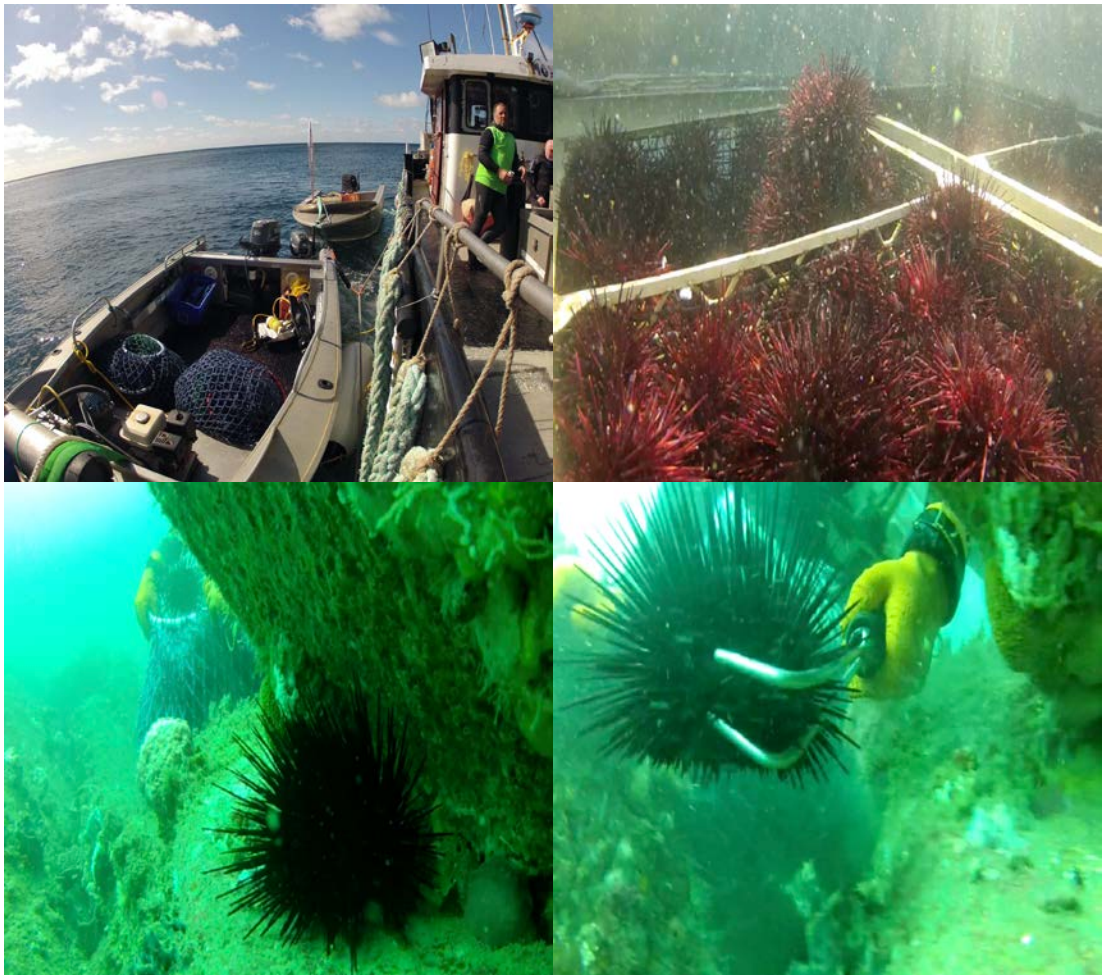
- Remove all sizes of Centro from Babel Island.
- Remove Centro within roe season for processing; or use sea urchin for waste processing machine.
- Trial the feasibility of mother boats/live tanking in the urchin industry.
- Provide urchin to IMAS for sampling

Final Report:

The Babel Island project removed 3,444kg of Centrostephanus from around 7,500m of coastline on Babel, Cat and Storehouse Islands. The project provided valuable information about the viability of mother boat use in relation to the storage, transport and processing quality of the urchin harvested as well as biological and ecological details.

Long range populations of Centrostephanus exist in Tasmania waters. Direction from the Babel project will assist in the development of these potentially valuable fisheries as well as balancing the ecology within.

Babel Island all sized commercial harvest trial of Longspined sea urchin *(Centrostephanus rodgersii).*



TASMANIAN COMMERCIAL DIVERS ASSOCIATION

AIRF

UNIVERSITY of TASMANIA | IMAS INSTITUTE FOR MARINE & ANTARCTIC STUDIES

TRUE SOUTH SEAFOOD

Sean Larby 2021

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Background

The Longspined sea urchin (*Centrostephanus rodgersii*) was first noted on the East coast of Tasmania and the Babel Island group in the 1970's by local abalone divers. In 2010 more significant numbers of *Centrostephanus* were noted when a reduction in the Legal Minimum Length of abalone and inclusion into the Bass Strait fishery saw an increased abalone harvest in the Babel Island group.

The Tasmanian Commercial Divers Association (TCDA) primary harvest species is now the Longspined sea urchin (*Centrostephanus rodgersii)*. The harvest industry for this species started on a small scale in 2008 and upsized in 2009/2010 to 63.7 tonnes after ready markets were discovered. In 2016 the Abalone Industry Re-Investment Fund (AIRF) introduced a harvest subsidy to encourage industry expansion. Commercial divers have harvested over 1250 tonnes in the last 3 roe seasons including the 2021 year to date. Roe processing season goes from December to the following June and peak roe production is from March to May when the species begins spawning. Tasmania has become one of the world leaders in sea urchin production and benefits from a peak roe production period without international competitors.

The Babel island group of islands has long been considered an important area for harvesting abalone in Tasmania with an average annual harvest of 18.6 Tonnes since 2010.

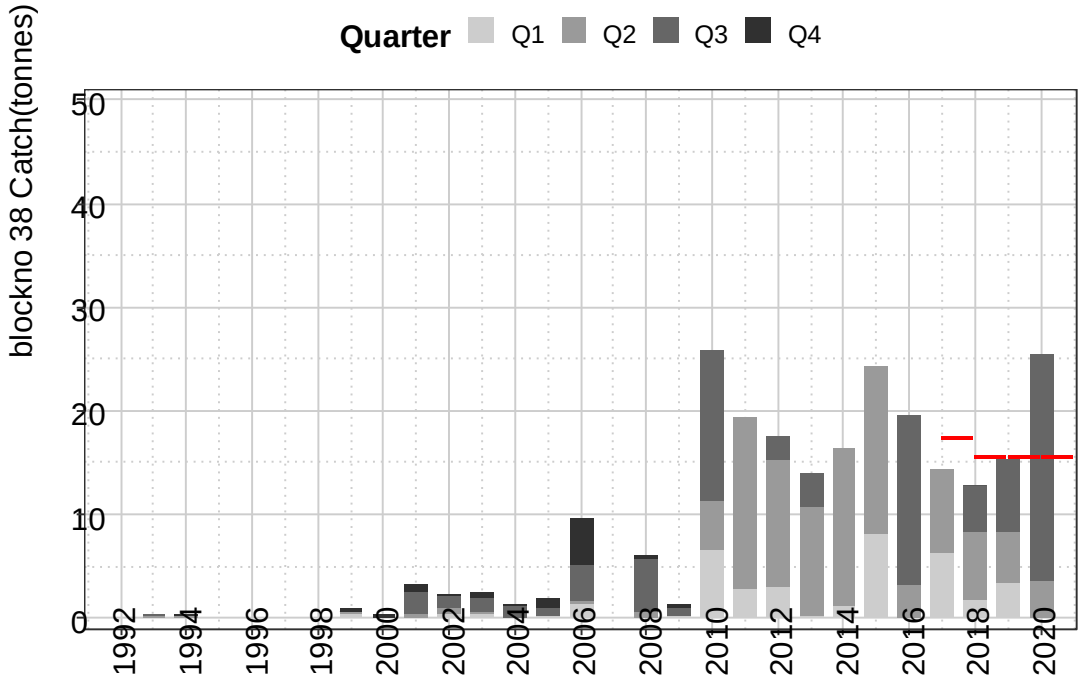

Figure 1. Blacklip abalone catch history from Block 38 between 1992 and 2020. In 2010, the Furneaux group was included in the Bass Strait Zone, with a reduction in the Legal Minimum Length from 127mm to 114mm in Block 38. More than 95% of the catch in Block 38 is from Babel, Cat and Storehouse Islands..

During this period, abalone divers have noted increasing numbers of *Centrostephanus* and are rightfully concerned about the damaging effect that this may have on the abalone harvest and habitat. Removal of *Centrostephanus* urchin from the Babel group has, therefore, been a pressing issue for the abalone industry and the AIRF committee for several years.

These concerns prompted a group of divers to initially propose a cull for the area to be funded by the AIRF. Due to a number of reasons but mainly the commodity status of the *Centrostephanus* roe, a compromise was reached and a take all size commercial harvest of the area using a dive team on board a motherboat resulted.

Introduction.

The Babel island all sized commercial harvest of the Longspined sea urchin was designed to achieve a number of objectives including removing of *Centrostephanus* from the Babel Island group, testing the feasibility of a mother boat fishery in regards to the storage and quality of urchin held on the vessel and importantly, utilising the urchin for commercial use. The Babel team was made up of 2 dinghy's with 4 divers and 2 deckhands on board the mother boat Motonui. The team targeted a weather window of 3 good days between February and May to carry out the experiment.

Abalone divers who regularly fish the Babel island group identified key areas where *Centrostephanus* had been sighted as well as areas where densities were likely to be higher. With this information the Babel team planned to cover the whole Eastern side of Babel and encompass Cat and Storehouse islands. This would:

a) cover the areas where *Centrostephanus* would most likely be found and had been seen,

b) allow time to be spent on urchin removal in high density areas; and

c) allow removal of *Centrostephanus* from key abalone harvest areas.

Harvest Summary

Two dive teams were formed. Boat 1 consisted of divers Mick Ingram and Sean Larby with deckhand Luke Swanson whilst boat 2 had Bryan Denny and Joss Mauger as divers with Ben Riley as deckhand.
The teams covered approximately 7,500 metres of coastline and removed 3,444 kg of *Centrostephanus* in over 36 hours of diving. Swim rates varied with urchin densities and dive times were roughly 2 hours in the morning and 2 hours in the afternoon.

Table 1. Catch summary of Babel Project. CPUE figures are a 2 diver combined total.

Date	am/ pm	Boat	Location	Dive Time	Weight	CPUE combined	Ave Depth	Max Depth
				Mins.	Kgs.	Kg/Hr	M	M
9-Apr	am	1	ESE Storehouse	111.00	556	300.54	12	17.4
		2	East Cat	121.00	240	119.01	11.2	19.3
	pm	1	ESE Storehouse	100.00	420	252.63	12	15
		2	NE Cat	104.00	158	91.15	12.1	17.5
10-Apr	am	1	SW Cat	92.00	589	384.78	7.4	9
		2	ESE Babel	115.00	304	158.61	9.4	14.5
	pm	1	Middle Babel	112.00	455	243.21	10.8	14.7
		2	Middle Babel	115.00	226	117.91	10.3	14.6
11-Apr	am	1	NW Cat / ENE Babel	115.00	274	142.96	7.1/9.2	9/13
		2	ENE Babel	116.00	222	114.83	9	15
				Total	3444 kg	195.2kg/hr		

Figure 2 . Babel Island group dive locations, colour coded by dive team and labelled by day of fishing. Boat 1orange, Boat 2 Yellow. Courtesy IMAS.

Information about *Centrostephanus* density.

Urchin density can be roughly categorised in to 5 main categories;

1. No Urchin.
2. Sparse Urchin (appear to have little or no effect on surrounding reef)
3. Incipient Barrens (barrens beginning to form, still some weed growth amongst urchin)
4. Barrens (no weed growth within barren) and
5. Extensive barrens (large barren areas devoid of most benthic life)

Category 3,4 and 5 barrens typically produce catch rates of 300-500kg per hour for **1** diver commercially harvesting. Category 1,2 and 3 urchin densities were noted during the project.

Centrostephanus density, effort and location.

Fishing for urchins covered the majority of the Eastern shore of Babel, Cat and Storehouse islands (Figure 2). Data were obtained from GPS data logger information placed in the dinghy whilst fishing took place. The image shows the track of the divers across the three days of fishing. While the fishing covered an extensive section of coast, only four 1 hectare cells showed a fishing duration of greater than 100 minutes (Figure 3, orange and red cells). Fishing effort in the majority of cells was less than 20 minutes.

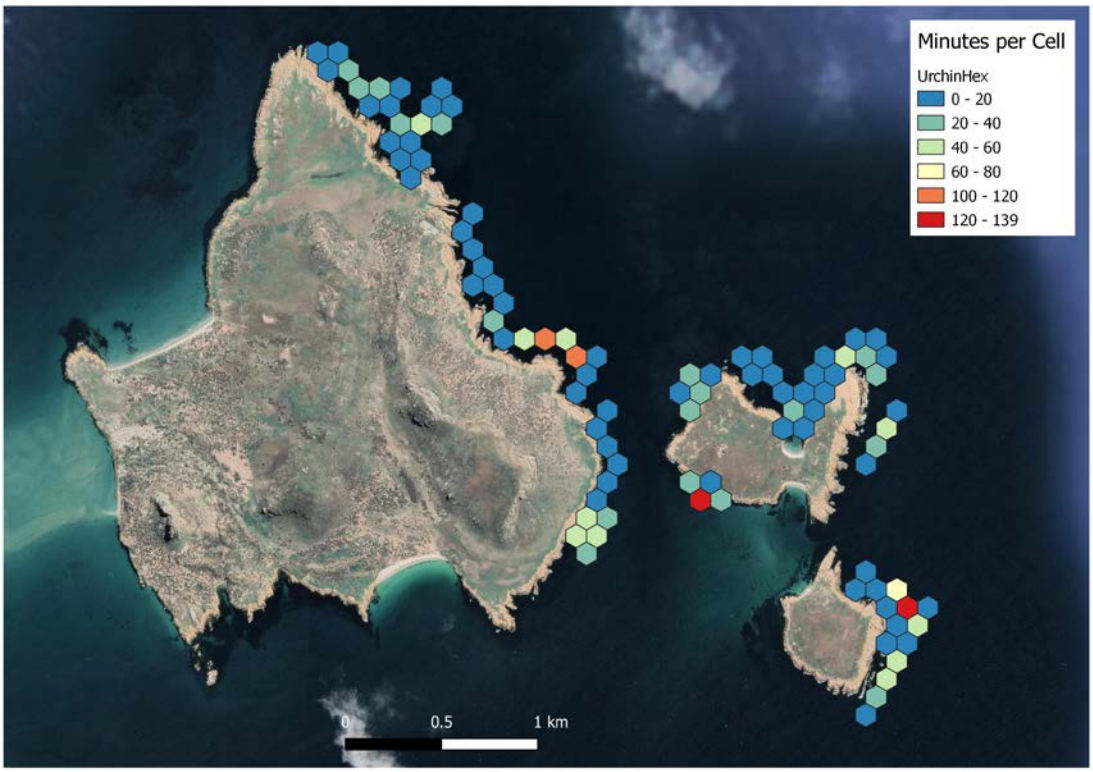

Figure 3. Hex grid of total minutes (all divers combined) during the Babel all size commercial harvest trial. Colour ramp shows total dive minutes in 20 minute groups.

Centrostephanus density by catch rate.

The following figures indicate urchin density using catch rate around the island group and are colour coded as follows; none, sparse (0-40kg/hr), low (40-100kg/hr), medium (100-300kg/hr) and high (300+kg/hr). The colour bands based on the diver observations are consistent with the hex cells identified in Figure 3 where the fishers spent the majority of their time.

All catch rate information is a two diver combined figure. Catch rates were affected by difficult weather conditions. On some dives, the weather conditions reduced the possible catch rates in medium and high density urchin areas.

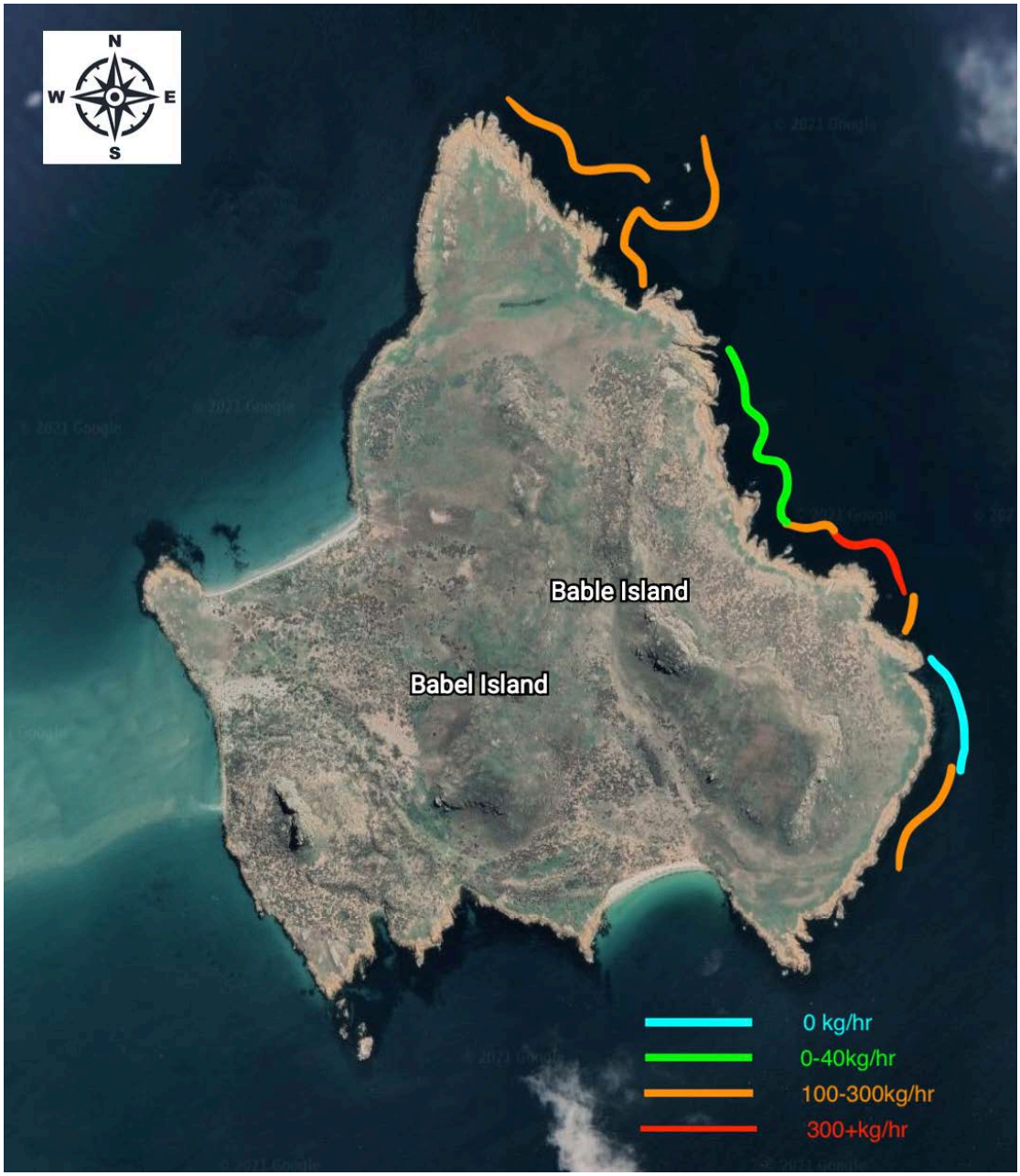

Figure 4. Babel Island Density by CPUE (kg/hr). Combined diver catch rate.

Figure 5. Cat Island Density by CPUE (kg/hr). Combined diver catch rate.

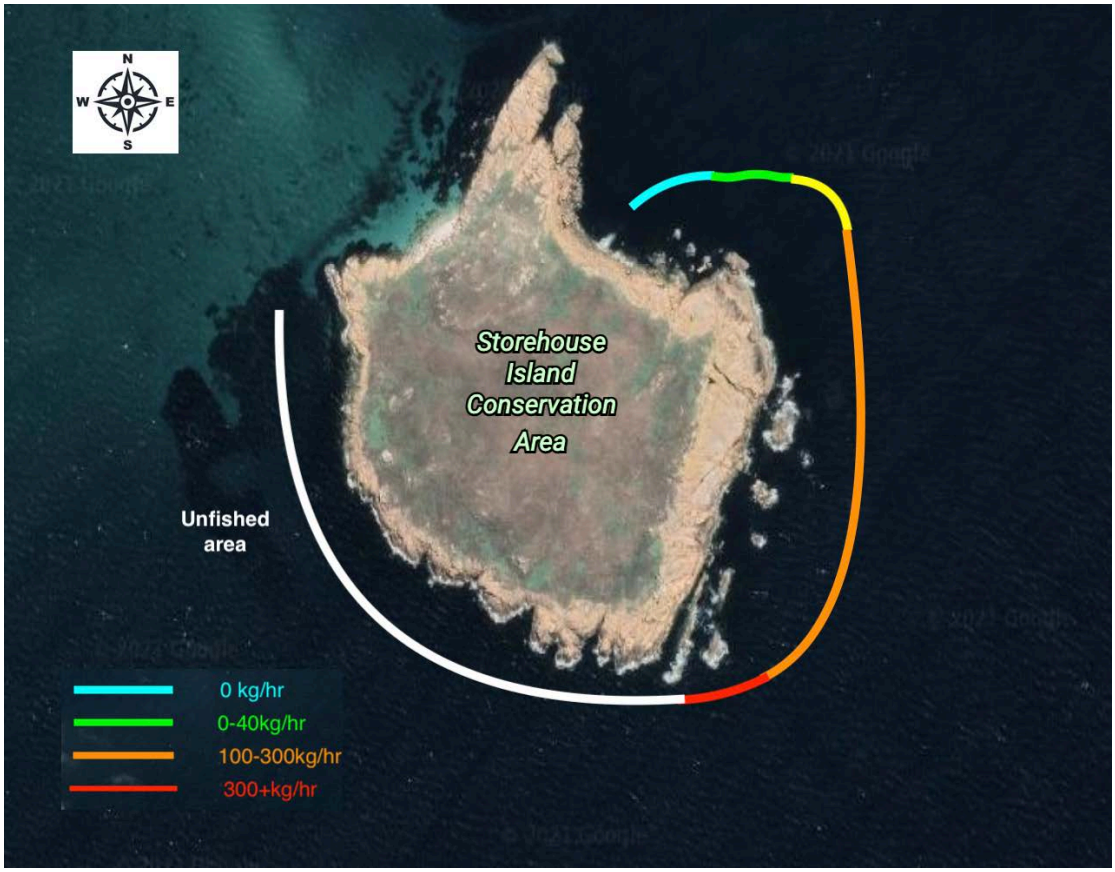

Figure 6. Storehouse Island. Density by CPUE (kg/hr). Combined diver catch rate.

Storehouse island unfished area.

The area marked in white on Storehouse island was identified as a key harvest area for the project as abalone divers had noted high urchin densities here. Strong to gale force winds for the duration of the project prevented access to this area for safety reasons. On day 1, the boat 1 team briefly overlapped the marked area on Southwest Storehouse Island and during that period had a catch rate of approximately 350kg/hr.

The marked SW Storehouse area that is likely to hold *Centrostephanus* in high density is approximately 400m long with another 150m that may also hold urchin. At Southwest Cat Island, another high density urchin area for the trip, a 90 minute dive covering approximately 100m of coastline landed 556kg of urchin. From this information and the anecdotal information from abalone divers, the project team estimate that the Southwest Storehouse Island area would hold between 1,500kg and 5000 kg of urchin.

On top of this, there are likely to be urchins in medium to high density West of the high density area on Cat island marked in red in Figure 5. The unfished area is approximately 200 m long that is likely to have a medium to high catch rate. Poor weather conditions prevented the team from returning to this area.

Depth.

The majority of fishing was within the 6m – 10m and 10m to 15m depth bands on all three days of fishing. Only on the first day did fishing occur deeper than 15m. *Centrostephanus* were located between 3 - 17m depth with the 9-12m depth band being the most common depth for medium to low urchin densities. Very few *Centrostephanus* were noted in less than 7 metres with one main exception at Southwest Cat island where the highest urchin density for the project was found in 7.4m.

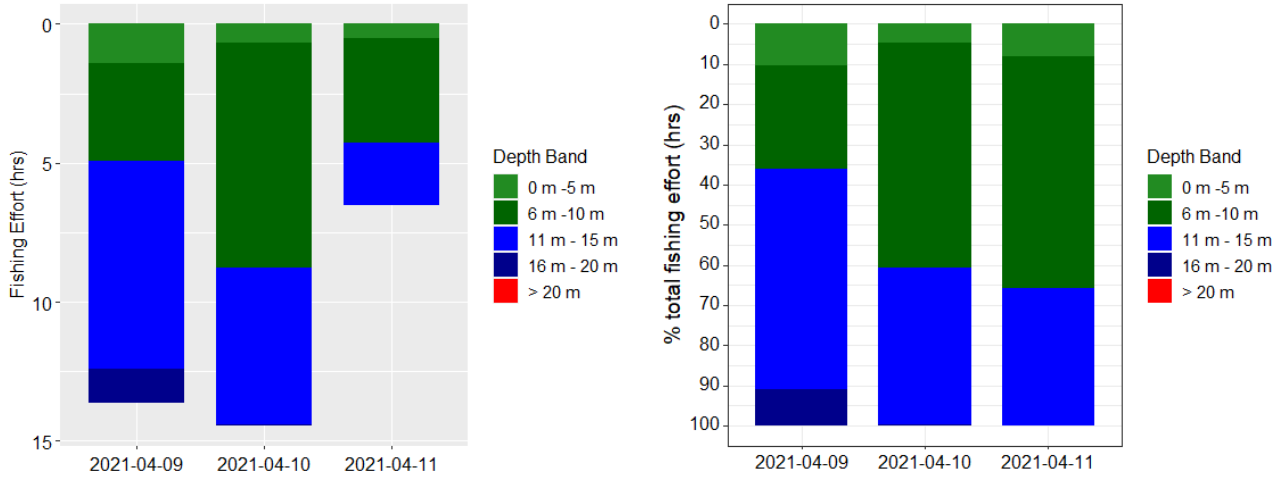

Figure 7. Total dive minutes in 5m depth bands during the Babel all harvest urchin experiment. Left panel shows total minutes in each band. Right panel shows the proportion of effort in each band by day.

The following figure shows a diving depth profile that is typical of the depth range search pattern employed during the project.

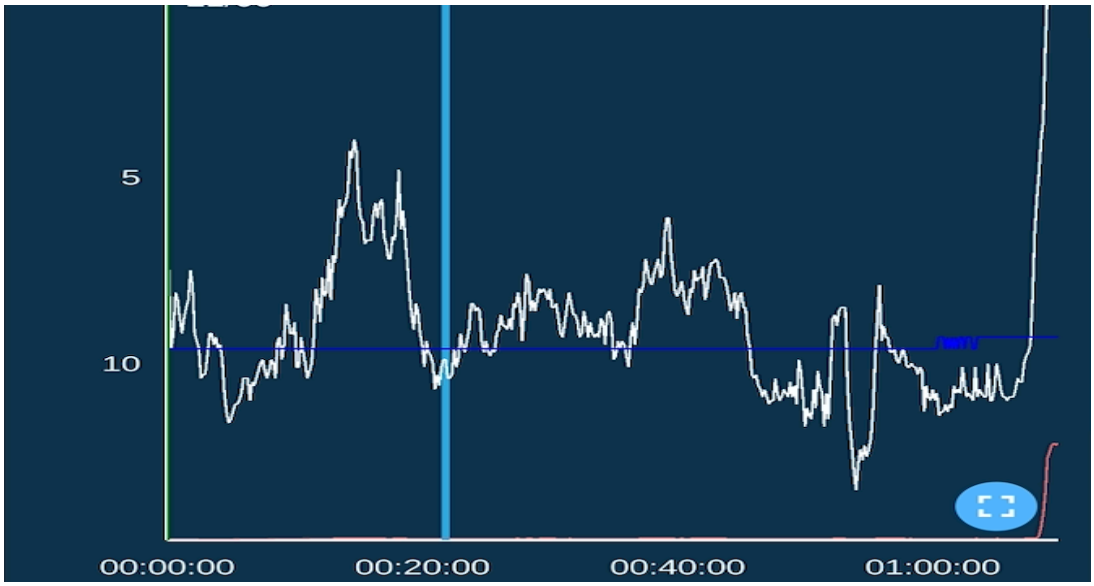

Figure 8. Depth Profile of ENE Babel dive. Max Depth 13.4m, Ave Depth 9.2m, Duration 68 min. Low to medium density catch rate. Image courtesy M. Ingram

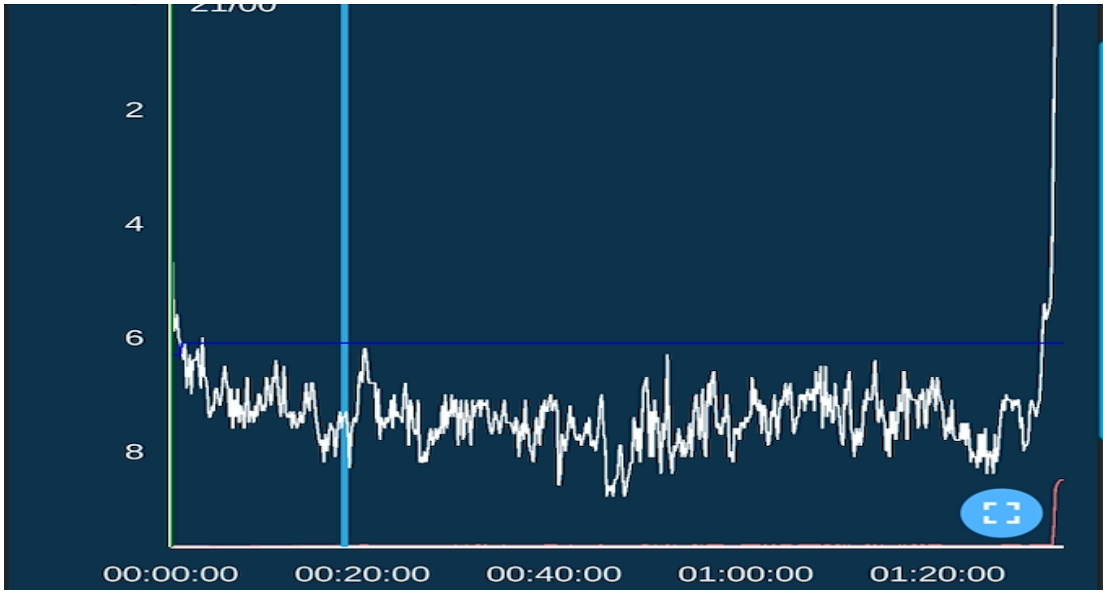

Figure 9. Depth profile of Southwest Cat Island dive. High catch rate. Image courtesy M.Ingram.

Centrostephanus Size

The Babel project was designed as a take all size harvest. Mesh sizes in harvest nets were small to allow holding of small <25mm urchin. Dive team members all remarked on the large size of the urchin and the distinct lack of small urchin (<85mm test diameter) throughout the Babel project.

The following Length / Frequency graph was created by the IMAS *Centrostephanus* research program. The graph is a combination of samples from all areas of the Babel group. The graph clearly shows what the dive teams noted anecdotally. Less than 4% of the entire harvest was below 85 mm test diameter.

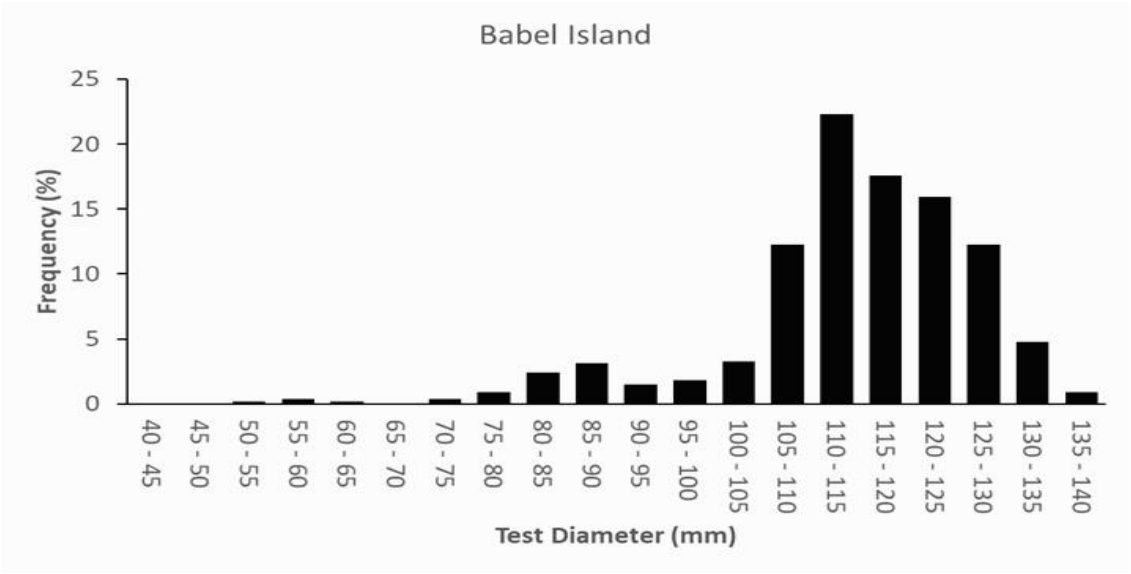

Figure 10. Length Frequency graph of Babel island harvest. Courtesy J.Keane IMAS

This information indicates very low recruitment in the area which may indicate that it has taken many years for the population to reach where it was. 96% of the harvest total was over 85mm which is the minimum useful size for roe production processing.

Storage, Quality and Commercial Viability

Extensive populations of *Centrostephanus* are known to exist beyond the regular day fishing range of runabouts used in the commercial fishery. An important part of the Babel project was to gain knowledge and information on the viability of using motherboats in the fishery.

Prior to the Babel project going ahead, RTS PauCo was asked and agreed to take the urchin from the harvest and to provide some information on the quality and value of the product.

The project was designed to hold urchin in the live tanks on the motherboat over 3 fishing days as well as storing urchin on the deck of the boat in bulk bins on the last day. The crates and bins were dated and boat number labelled so the information could be related back to dive location, storage method and storage time.

The following tables show the quality and utilisation breakdown of the product over the 3 diving days.

Diving Day 1.

Table 2. Roe quality poor, not suitable for consumption. Random fish found in live condition. Courtesy RTS Paua Co.

Boat No. am/pm	A Grade	B Grade	C Grade	D Grade	Recovery	Sellable A +B	Sellable C
1 am	0.00%	23.16%	61.44%	15.40%	6.76%	1.57%	4.15%
1 pm	0.00%	8.93%	88.35%	2.72%	8.57%	0.77%	7.57%
2 am	0.00%	14.57%	81.96%	3.47%	6.60%	0.96%	5.41%
2 pm	0.00%	5.58%	82.90%	11.52%	7.46%	0.42%	6.18%

Image 1. Diving day 1. Centrostephanus whole. Photo courtesy RTS PauaCo

Diving Day 2.

Table 3. Didn't send fish to market, Processed and kept separately as D grade frozen blocks. Courtesy RTS Paua Co.

Boat No. am/pm	A Grade	B Grade	C Grade	D Grade	Recovery	Sellable A +B	Sellable C
1 am	0.00%	18.33%	75.81%	5.86%	9.85%	1.81%	7.47%
1 pm	0.00%	22.34%	73.43%	4.23%	7.41%	1.66%	5.44%
2 am	0.00%	18.53%	64.36%	17.10%	9.54%	1.77%	6.14%
2 pm	0.00%	20.32%	61.67%	8.02%	10.23%	2.08%	6.31%

Image 3. Diving Day 2. Whole Centrosephanus. Photo courtesy RTS PauaCo.

Image 4. Diving Day 2. Centrostephanus roe, Photo courtesy RTS PauaCo.

Diving Day 3.

Table 4. Good colours, good texture, High AB%, High live fish %. Courtesy RTS Paua Co.

Boat No. am/pm	A Grade	B Grade	C Grade	D Grade	Recovery	Sellable A +B	Sellable C
1 am	2.75%	58.69%	34.76%	3.80%	9.85%	6.05%	3.42%
1 pm	3.86%	59.77%	24.79%	11.58%	8.70%	5.54%	2.16%
2 am	3.71%	50.59%	23.96%	21.47%	11.68%	6.34%	2.80%
2 pm	7.18%	57.02%	30.15%	5.65%	9.63%	6.18%	2.90%

Image 5. Diving Day 3. Whole Centrosephanus. Photo courtesy RTS PauaCo.

Image 6. Diving Day 3. Centrostephanus roe, Photo courtesy RTS PauaCo.

The results were varied and probably affected by high sea temperatures, however, the only high value urchin were those caught on Day 3 and either tanked or stored on deck in bulk bins.

Fishing began on the 9th of April and was completed on the afternoon of the 11th April and the urchin were unloaded on the morning of the 12th of April. The Diving day 1, AM urchin were in the live tank for close to 70 hours or just under 3 days. Subsequent catches were stored for shorter periods and the processing results reflected the storage time.

The project team put considerable thought and effort into the storage and live tanking conditions and used varying stocking densities. *Centrostephanus* settle to around 66% of initial volume during any sort of transport. This is also the case for live transport which was taken into consideration during the project.

The diving day 3 urchin were unloaded in a live and vigorous condition and table 4 reports that the processed end product had good colours, good texture and a high AB grade percentage.

The quality results for the diving day 1 and 2 are shown on pages 14 and 15. Factors that may have affected the end results were strong winds, water temperatures of up to 17 degrees and the rough transit from Babel to St Helens where the unload took place.

There is currently an IMAS based PhD project in place which is in part focussed on *Centrostephanus* roe quality in relation to catch, storage and transportation conditions. The PhD project utilised information obtained from the Babel Island project which will help with future protocols and strategies for the storage and transport of harvested *Centrostephanus*.

Conclusion.

The Babel Island project removed 3,444kg of *Centrostephanus* from around 7,500m of coast line on Babel, Cat and Storehouse Islands. The project provided valuable information about the viability of mother boat use in relation to the storage, transport and processing quality of the urchin harvested as well as biological and ecological details.

Long range populations of *Centrostephanus* exist in Tasmania waters. Direction from the Babel project will assist in the development of these potentially valuable fisheries as well as balancing the ecology within.

Acknowledgements.

Tasmanian Commercial Dive Association
Executive committee, committee members, members and TSIC for operational support.

The following project team members;

Divers
Bryan Denny (Skipper)
Mick Ingram
Joss Mauger
Sean Larby

Deckhands
Ben Riley
Luke Swanson

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Special thanks to Dr's John Keane and Craig Mundy for providing data analysis and presentation.

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For funding the project and seeing the value of this project in comparison to culling and funding.

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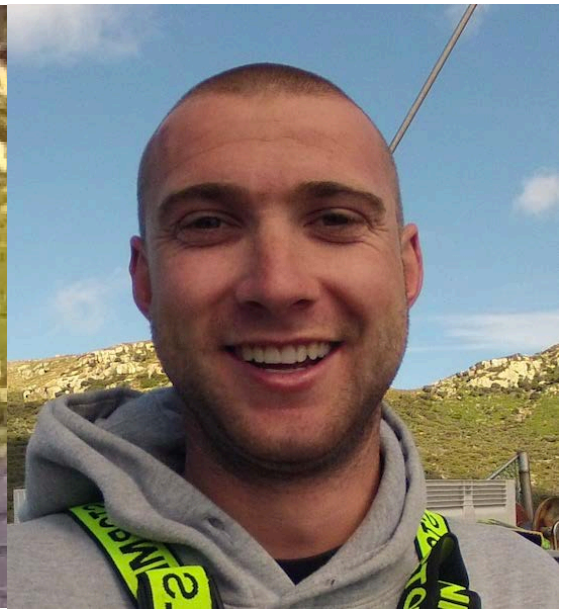
The Project Team.

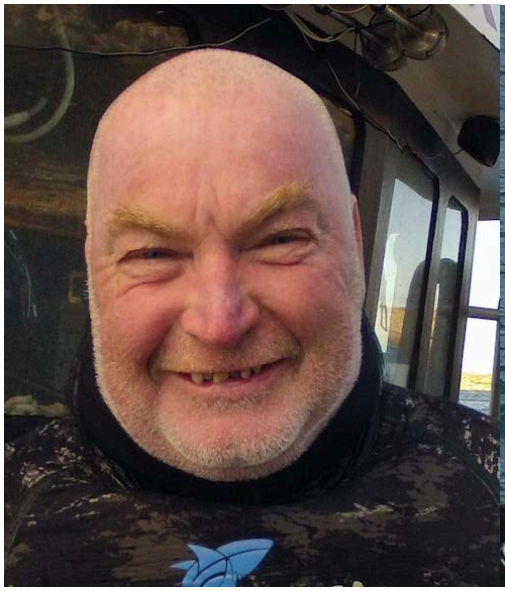
Sean Larby

Joss Mauger

Luke Swanson



Ben Riley



Mick Ingram

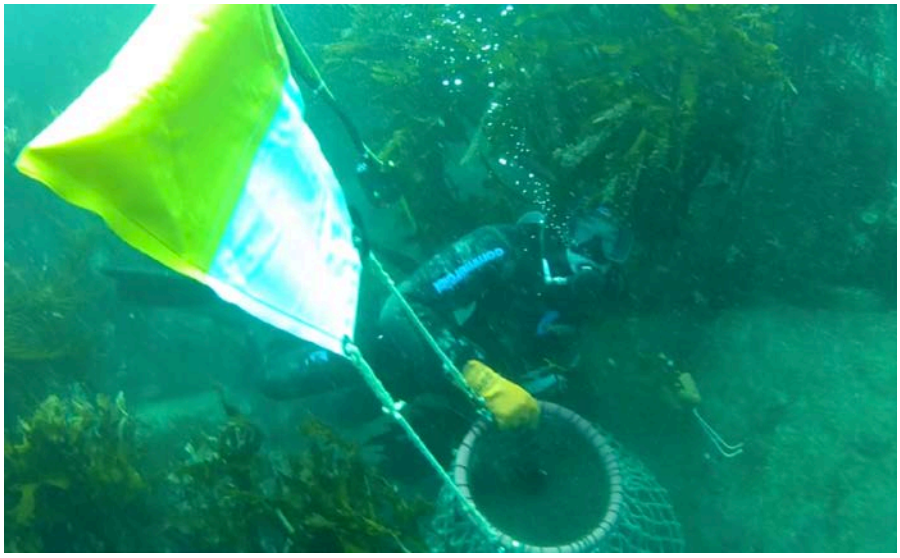
Bryan Denny

Photo Gallery

FV Motonui at anchor NE Babel Island.

Preparing to unload dinghies NE Babel.


Juvenile abalone East Storehouse Island.



Diver Mick Ingram West Cat Island

Centrostephanus on there way up! Storehouse Island.

Skipper Bryan Denny weighing anchor. NE Babel Island.

Team meeting, L to R M.Ingram, B.Denny, J. Mauger. Photographer S. Larby