2014 SMALL BIVALVE FISHERY ASSESSMENT
Venerupis largillierti - Northern Zone, Georges Bay

David Tarbath and Caleb Gardner

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The Institute for Marine and Antarctic Studies (IMAS), established in 2010, comprises the University of Tasmania's internationally recognised expertise across the full spectrum of temperate marine, Southern Ocean, and Antarctic research and education.

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DEPARTMENT *of* PRIMARY INDUSTRIES, WATER *and* ENVIRONMENT

1. Georges Bay Northern Zone Venerupis Fishery Survey April 2014

Summary
A survey was conducted in the Georges Bay Northern Zone in April 2014. Estimated biomass of Venerupis clams derived from data from this survey was 466.7 t, with 95% confidence limits at 365.4 t and 568.1 t. Based on 10% of the biomass, the fishery TAC is 46.8 t. The estimated size of the biomass was approximately 60 t smaller than when last surveyed (2012), due to a reduction in both fished area and the size of clams. The apparent strength of sub-legal size classes provides confidence for a robust fishery in coming years.

Introduction
The venus clam *Venerupis (= Ruditapes) largillierti* (commonly known as Venerupis, or alternatively, the New Zealand venus) lives inter-tidally and sub-tidally on sand or muddy bottom on parts of Tasmania's east and south-east coasts (Grove, 2011). It forms dense beds in Georges Bay, where it is commercially harvested for food. It grows to a maximum length of ~70 mm. It is believed to have been accidentally introduced from New Zealand in the 1930's with shipments of the New Zealand dredge oyster *Ostrea lutaria* (Furlani, 1996).

Biomass estimates
Prior surveys of the Georges Bay Northern Zone produced biomass estimates of 284.7 t (2009) and 537.4 t (2012) i.e. the biomass estimate almost doubled over a three-year period. The reasons for this increase were poorly understood by some industry participants, and caused concern for the future of the fishery. The increase was due to a greater mean density of clams across the survey area, i.e. in 2012 there were greater numbers of clams per sample, and they were of larger size. The 2014 biomass estimate also differs from the 2012 estimate. There are several causes of variation in biomass estimates, and these are discussed here.

1. Changes to the survey area

The 2009 and 2012 fishery assessments assumed a fished area of 121,111.08 m^2 based on the location of four clam beds shown to D. Tarbath by G. Forsyth and D. Allen in 2008. The position of the beds can be seen in the attached image (Figure 1). The areas of the beds in square metres, was estimated:

Bed label	Fished area (m^2)
Bed 1 (yellow outline):	6,066
Bed 2 (green outline):	16,930
Bed 3 (red outline):	52,242
Bed 4 (magenta outline):	45,872
The sum of the areas:	121,111

In 2012, fishers advised IMAS that Bed 1 was no longer fished, but that an equivalent area north of Bed 2 was fished. Likewise, part of Bed 3 was not fished, but the fished area extended west of Bed 4 by a similar amount. The assessment proceeded with no change to the sum of areas (121,111 m^2).

In 2014, the fished area was estimated to be 96,393 m^2, which is approximately 80% of the area surveyed in 2012 and 2009. This estimate was based on advice given to IMAS officers in April 2014 by industry participants. The following changes are detailed here:

- The northern bed (Bed 1), shown outlined in yellow, is no longer used, although is known to hold Venerupis. The productive area of this bed was reduced to 0.

- A small bed of estimated size 50 m by 6 m was identified off the end of the point accessed from land off Simeon Place. Three samples (quadrat numbers 1-3) were taken here. The productive area was estimated to be 300 m^2.

- Bed 2 was much narrower than shown on the image, and further inshore, estimated to be about 15 m wide. It was sampled over a length of 250 m, thus its area was estimated at 3,750 m^2.

- Approximately 1/3 of the southern part of Bed 3 was not sampled, because it comprised seagrass and other unsuitable habitat. Its area was reduced by this amount to 35,003 m^2.

- In both 2012 and 2014, a number of large samples were taken from an unmapped area west of Bed 4. This area was estimated to be approximately ¼ of the original size of Bed 4, and its area was increased accordingly to 57,340 m^2. This bed now accounts for almost 60% of the fishery by area.

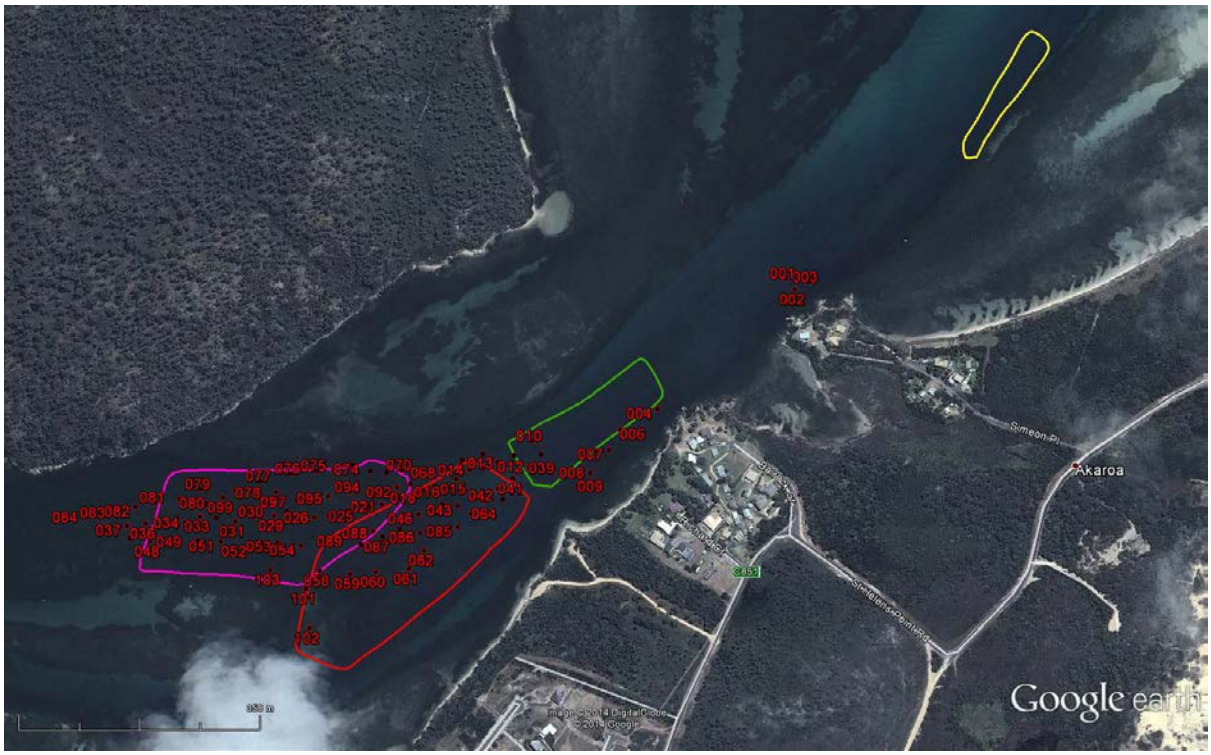

Figure 1. Georges Bay, showing the position of the four clam beds mapped in 2009 (magenta, red, green and yellow polygons), relative to the position of the 103 sample quadrats (red markers) in 2014. In 2014, the bed outlined in yellow was not sampled. Three samples were taken from a previously un-sampled small bed to the southwest of the yellow bed. The sampled areas of the beds outlined in green and red were reduced, while the area of the bed outlined in magenta was increased. The sum of the 2014 clam bed areas was estimated at 96,393 m^2.

The fished areas for 2014, in square metres are summarised below.

Bed label	Fished area
Bed 1 (yellow outline):	0
New bed at Simeon Place point	300
Bed 2 (south of green outline):	3,750
Bed 3 (red outline, reduced):	35,003
Bed 4 (magenta outline, increased):	57,340
The sum of the areas:	96,393

2. Venerupis clam length-weight relationship in the Georges Bay Northern Zone.
The length weight relationship was obtained using combined samples collected in 2014 and earlier surveys, using the power function $weight=a.length^b$. The parameters *a* and *b* were estimated to be 1.4864E-04 and 3.1479 respectively, $R^2 = 0.99$.

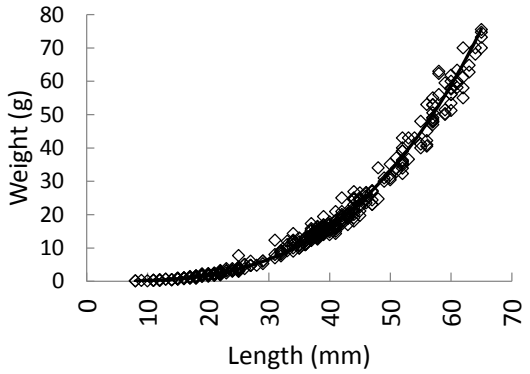

Figure 2. Length-weight relationship, Georges Bay Northern Zone Venerupis fishery.

There is a rapid increase in weight between 30 and 50 mm shell-length. For example, a clam of legal length (40 mm) weighs 16.4 g, but is double that weight (33.0 g) when 50 mm long. Consequently, seemingly small changes in the size of clams can have a profound effect on the biomass estimate.

3. Changes in the size of clams.
In 2014, three size-classes of clams were observed (Figure 3). There were modes at approximately 20 and 40 mm that appear to represent consecutive year classes, given estimates of growth rates at ~ 2 mm/month (Gribben *et al.*, 2002; Kent *et al.*, 1999).

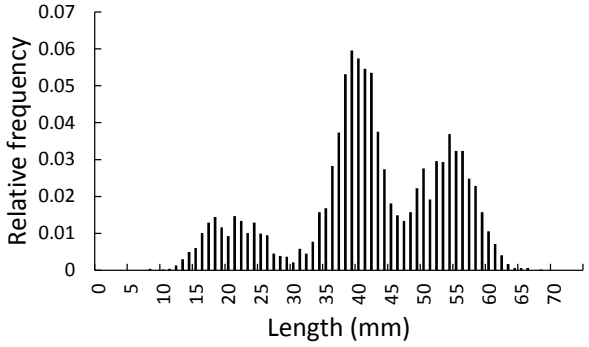

Figure 3. Length frequency distribution of Venerupis clams from Georges Bay Northern Zone, 2014.

The largest size class, modal at 54 mm appears to be the remnants of the cohorts that produced the large biomass of 2012 (Figure 4). In comparison with previous years, the smaller successive year-classes are strongly represented which gives confidence that stock levels will remain high in the short term.

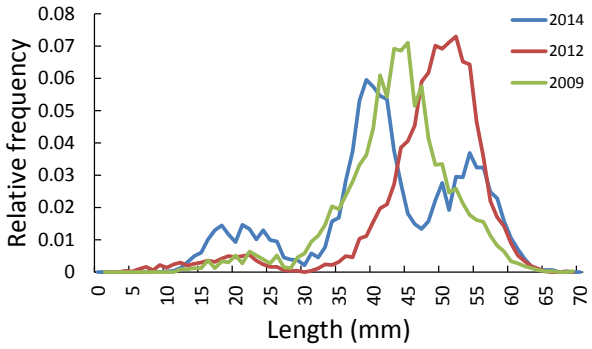

Figure 4. Length frequency distribution of Venerupis clams from Georges Bay Northern Zone surveys, 2009-2014. In 2014, the pre-recruit size class modal at 20 mm is proportionally larger than in the previous surveys.

Fishery assessment

Like previous assessments, the 2014 survey used a stratified random sampling design that covered the 2014 fished area (96,393 $m^{2)}$. The survey collected 103 samples across this part of the seabed. The sample area (quadrat) was ¼ m^2. The clams in each quadrat were measured (total 4,637 measurements). The weight of clams per quadrat was calculated using the length-weight relationship described above. The mean density of clams per square metre across all strata was 4,842.5 g/m^2. The total biomass was estimated as the product of the mean density and the area of the productive seabed. This biomass was 466.8 t, with lower and upper 95% confidence limits of 365.4 t and 568.1 t respectively. Fishery policy specifies a TAC of 10% of biomass (DPIPWE, 2007) which in this case is 46.7 t.

Given the reduction in fished area, and the smaller size of clams compared with 2012, it might be expected that the biomass estimate would be considerably smaller. However, clam densities in the largest bed (Bed 4) were almost 20% greater than in 2012, and together with its increased size, helped offset the reductions elsewhere.

References

DPIPWE. (2007). Shellfish fishery policy document. Tasmanian Department of Primary Industries, Parks, Water and Environment, Hobart.

Furlani, D. M. (1996). A guide to the introduced marine species in Australian waters. Hobart: CSIRO Division of Fisheries.

Gribben, P. E., Creese, R. G. and Hooker, S. H. (2002). Growth rates of the venus clam *Ruditapes largillierti* grown under experimental culture conditions in New Zealand. *Aquaculture* **213**, 187-197.

Grove, S. G. (2011). The seashells of Tasmania: a comprehensive guide. Hobart: Taroona Publications.

Kent, G. N., Maguire, G. B., Duthie, I. and Pugh, R. (1999). Spawning, settlement, and growth of the New Zealand venerid *Ruditapes largillierti* (Philippi 1849) in culture. *New Zealand Journal of Marine and Freshwater Research* **33**, 55-62.