

# Spawning Biomass of Redbait between Kangaroo Island and Southern Tasmania in October 2017

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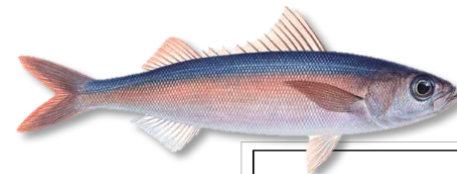
**Draft report - provisional data (not to be cited or distributed beyond SPF Scientific Panel)**



# Redbait (West)

## DEPM Survey

Spring 2017: Oct/Nov



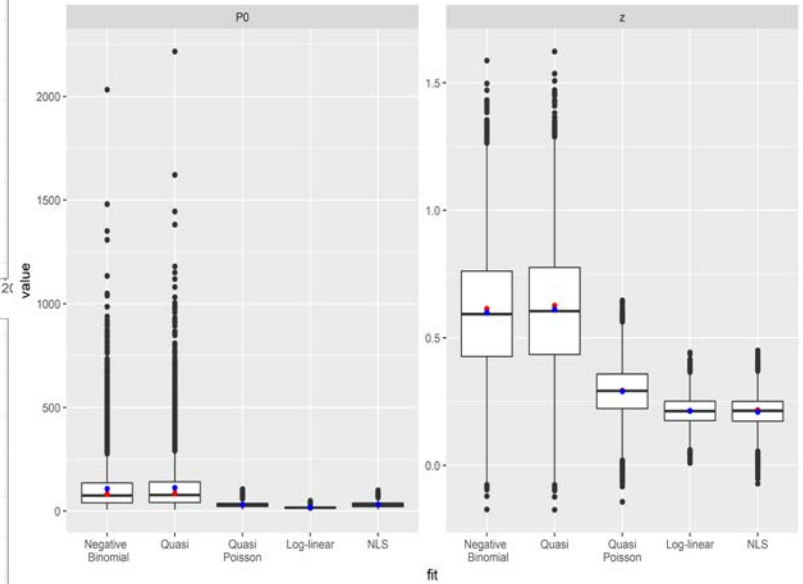
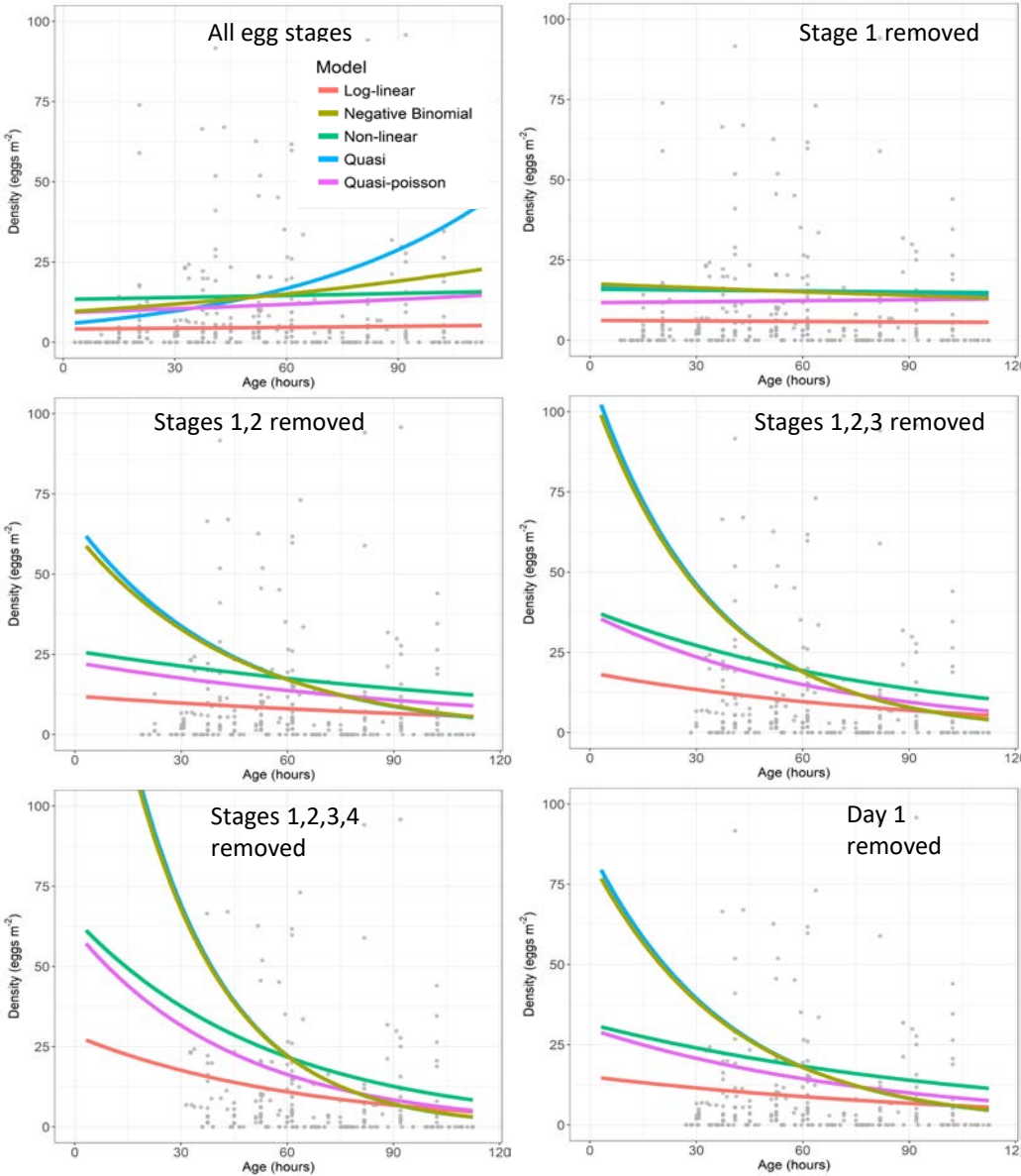
### Eggs:

- 3,280 live redbait eggs from 113/308 sites
- No eggs in Bass Strait
- Spawning area: 28,365 km<sup>2</sup>
- Eggs on end of transects
- More eggs in deeper water?

### Adults:

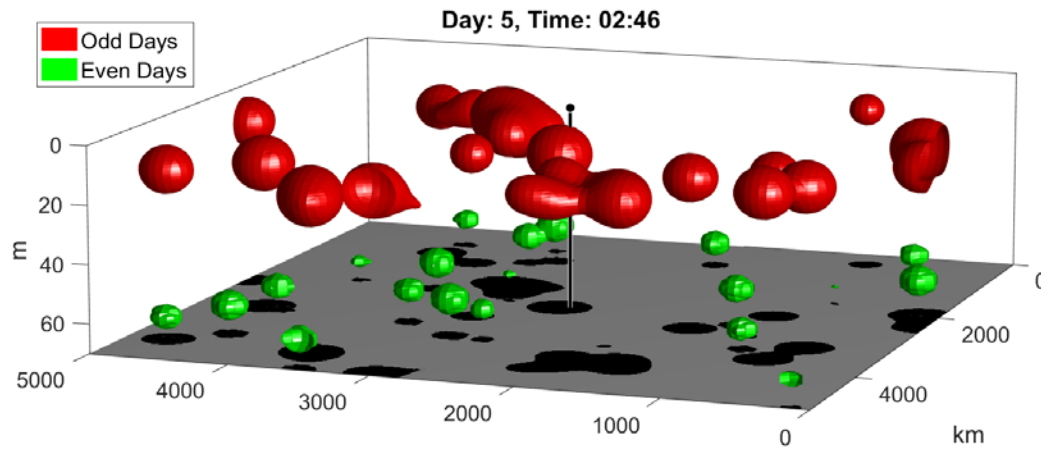
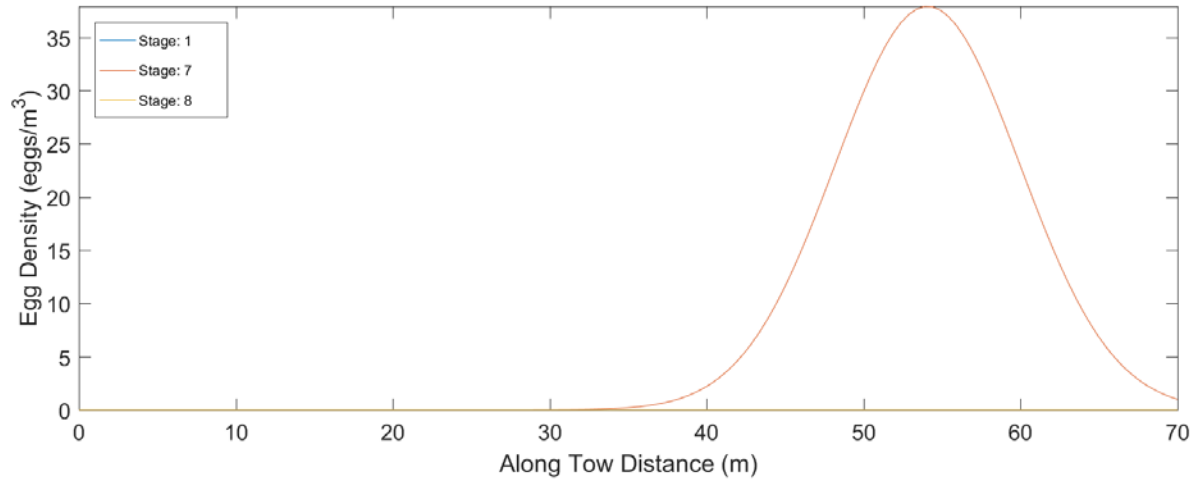
- Collected off TAS (Oct 2017)
- Demersal trawl
- Female n = 826 fish (9 samples)

# DEPM Survey Egg Production



Day-1 Removed Egg Production Model	P <sub>0</sub>	z
	eggs·day <sup>-1</sup> ·m <sup>-2</sup> (95% CI)	day <sup>-1</sup>
Log-Linear	<u>15.1</u> (10.5–27.2)	-0.213
Non-linear Least Squares*	31.4 (13.5–60.6)	0.217
Quasi GLM	86.3 (17.3–423.6)	0.627
Quasi-Poisson GLM	<u>29.9</u> (13.8–58.1)	0.293
Negative Binomial GLM*	83.2 (17.1–400.7)	0.614

Redbait East 60-130 eggs·day<sup>-1</sup>·m<sup>-2</sup>



**Figure 41:** Vertical tow sampling strategy showing the egg-density in  $\text{eggs}/\text{m}^3$  along the 70 m tow in the upper panel and the local egg-space with the 10  $\text{eggs}/\text{m}^3$  isosurfaces of the daily cohorts (red for odd days, green for even days) illustrated in the lower panel.

## DEPM Survey Adults

- Mean female weight ( $W$ ) 106.1 g (95% CI 101.2–110.5)
- Sex ratio ( $R$ ) 0.43 (95% CI = 0.34–0.55)

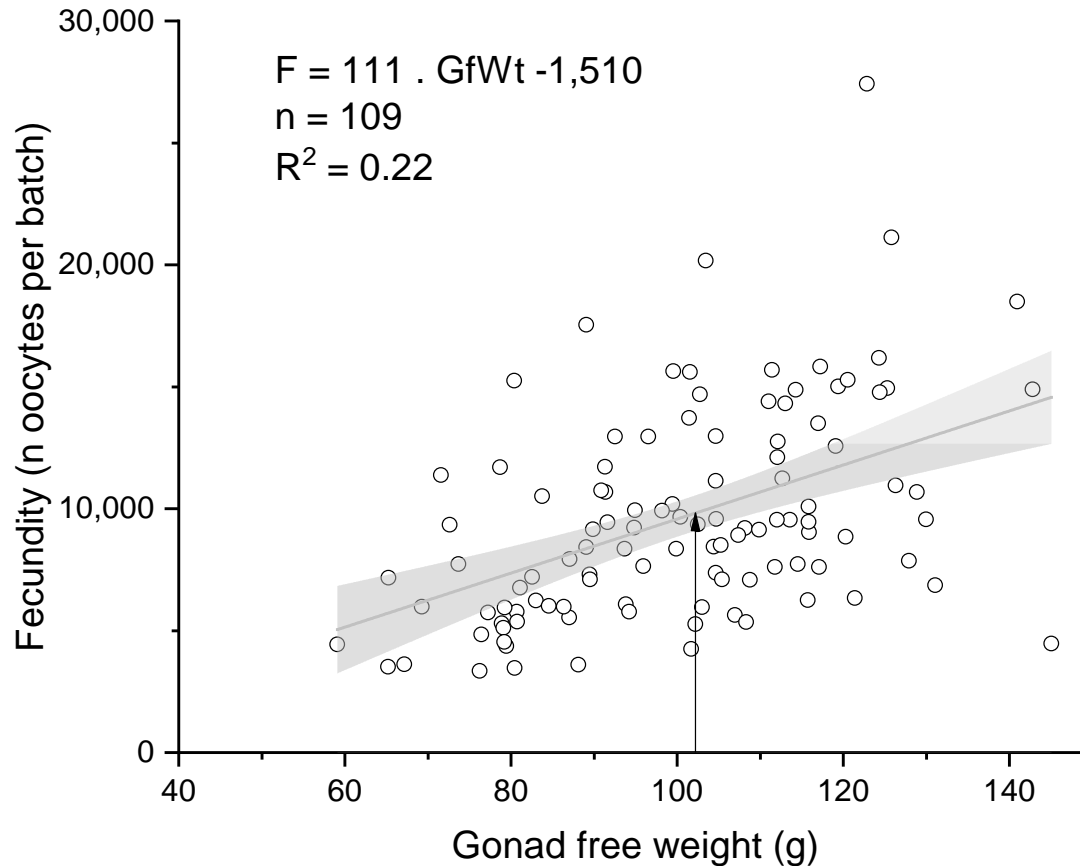
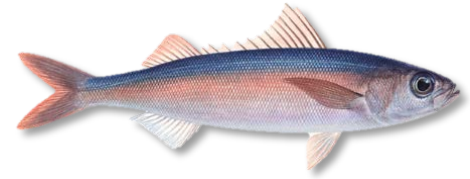


Trawl	Male	Female	Mean male weight (g)	Mean female weight (g, $W$ )	Sex ratio by weight ( $R$ )
1	314	102	96.9	98.4	0.25
2	213	102	96.5	96.9	0.32
3	179	101	95.5	102.6	0.38
4	149	103	100.7	106.1	0.42
5	62	102	110.0	110.5	0.62
7	61	102	105.6	115.8	0.65
8	75	102	101.1	113.8	0.60
9	104	102	105.6	106.7	0.50
12	4	10	80.2	82.8	0.72
Total	1161*	826*	99.2 <sup>#</sup>	106.1 <sup>#</sup>	<b>0.43<sup>#</sup></b>

Redbait East SR 0.3 and 0.44

## DEPM Survey Fecundity ( $F$ )

Batch Fecundity =  $111 \times \text{Gonad Free Female Weight} - 1,510$   
9,821 oocytes per batch (95% CI = 8,883–10,945)



Redbait East  
~69 g 11,000 eggs  
~76 g 11,500 eggs

## DEPM Survey Spawning Fraction (S)

0.21 (95% CI = 0.16–0.24)



Trawl	Hydrated	Day 1 POF	Day 2 POF	Day 3 POF	Total females	H_only	H+1	H+1+2	H+1+2+3
1	12	10	26	20	102	0.12	0.11	0.16	0.17
2	28	10	25	18	102	0.27	0.19	0.21	0.20
3	25	17	19	24	101	0.25	0.21	0.20	0.21
4	32	28	20	7	103	0.31	0.29	0.26	0.21
5	16	30	30	17	102	0.16	0.23	0.25	0.23
7	20	26	26	14	102	0.20	0.23	0.24	0.21
8	21	17	28	20	102	0.21	0.19	0.22	0.21
9	13	33	27	13	102	0.13	0.23	0.24	0.21
12	6	1	2	1	10	0.60	0.35	0.30	0.25
	<b>173*</b>	<b>172*</b>	<b>203*</b>	<b>134*</b>	<b>826*</b>	<b>0.21#</b>	<b>0.21#</b>	<b>0.22#</b>	<b>0.21#</b>

Redbait east SF 0.32

## DEPM Survey



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<b>Reproductive Parameter</b>	<b>Estimate (95% CI)</b>
Female Weight ( $W$ , g)	106.1 (101.2–110.5)
Batch Fecundity ( $F$ , eggs·female <sup>-1</sup> )	9,821 (8,883–10,945)
Sex Ratio ( $R$ )	0.43 (0.34–0.55)
Spawning Fraction ( $S$ )	0.21 (0.16–0.24)

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# Redbait (West)

## DEPM Survey (2017)

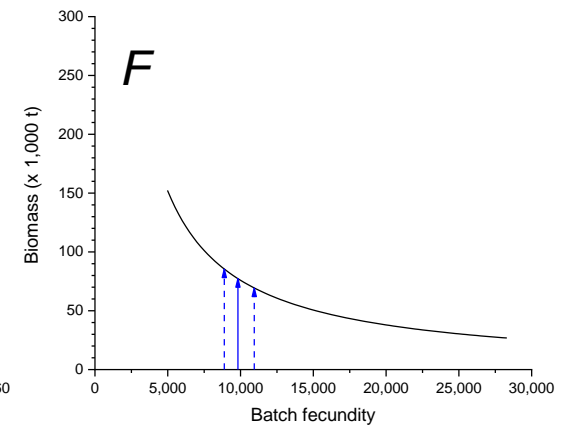
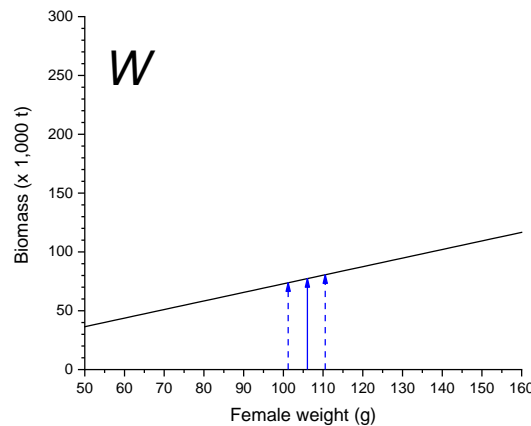
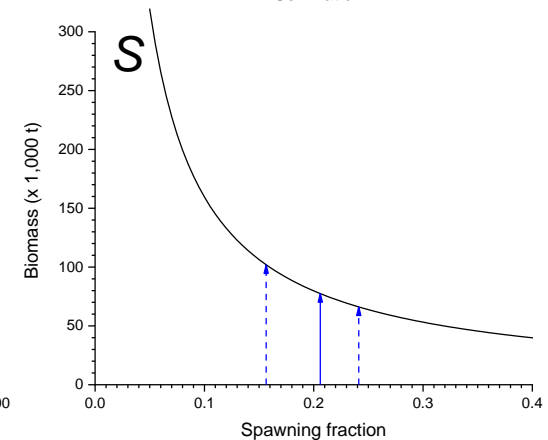
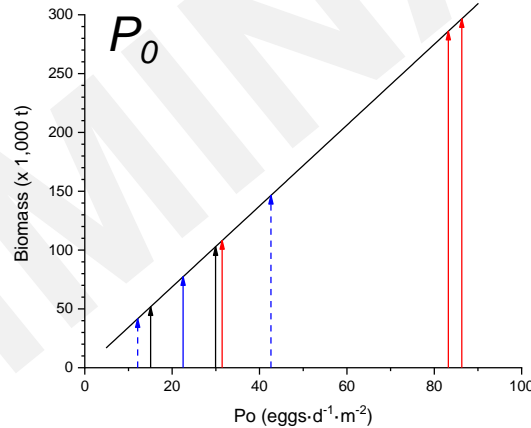
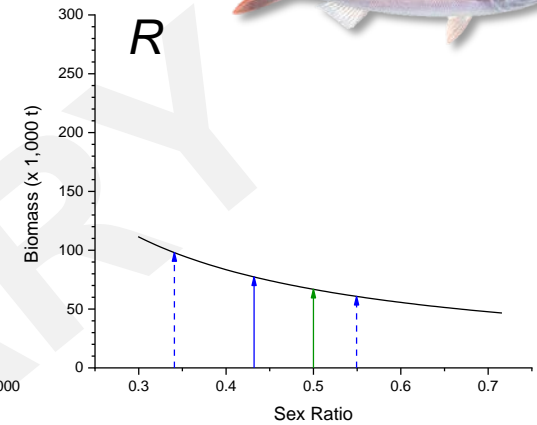
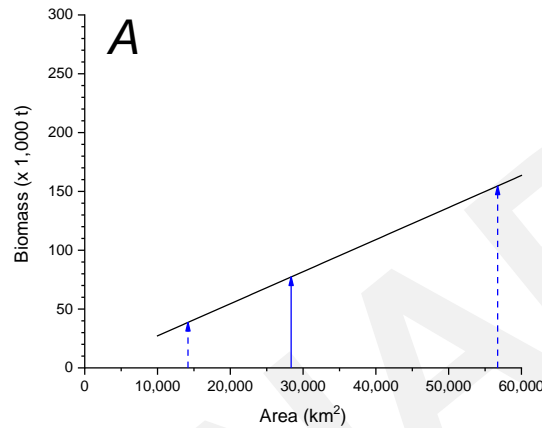
### Sensitivity analysis

2017 SB estimate: **77,292 t**

Sex Ratio 50:50 = **66,787 t**

Parameters in sensitivity analysis:

- **Blue:** values used in DEPM calculations to estimate SB (solid) and their 95% CIs (dashed)
- **Black:**  $P_0$  of log-linear & Quasi-Poisson GLM models: mean  $P_0$  of these models used in SB estimate (51,765 and 102,867)
- **Red:**  $P_0$  estimated from alternative egg production models.
- **Green:**  $R$  estimate forced to 50:50 (66,787 t)



# Redbait (West)



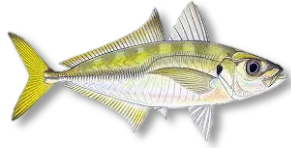
## % DEPM & TAC

Zone	DEPM Date	DEPM Biomass Estimate (t)	2017/18 RBC (t)	2017/18 TAC (t)	2017/18 Catch (t)	Total Catch % DEPM estimate	Total Catch % RBC	SPF Catch % TAC
West	2017	77,292	825	820	Total: 0 SPF: 0	0	0	0
		SR 50:50 66,787 (mean of estimates below)						
		51,765 (log-linear)						
		102,867 (quasi-Poisson GLM)						

→ SB Estimate (Redbait - West): **Preliminary**



## Summary and Conclusions



- Preliminary DEPM spawning biomass estimate for Redbait West
- Good adult samples but biased towards males
- Other adult parameter estimates OK
- Egg production typically uncertain
- Most suitable models suggest  $15-30 \text{ eggs} \cdot \text{day}^{-1} \cdot \text{m}^{-2}$
- Likely SpB 50,000-100,000 t
- Use lower-middle end of range to inform RBC?
- Precautionary weight of evidence estimate of SpB: 66,787 t?



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