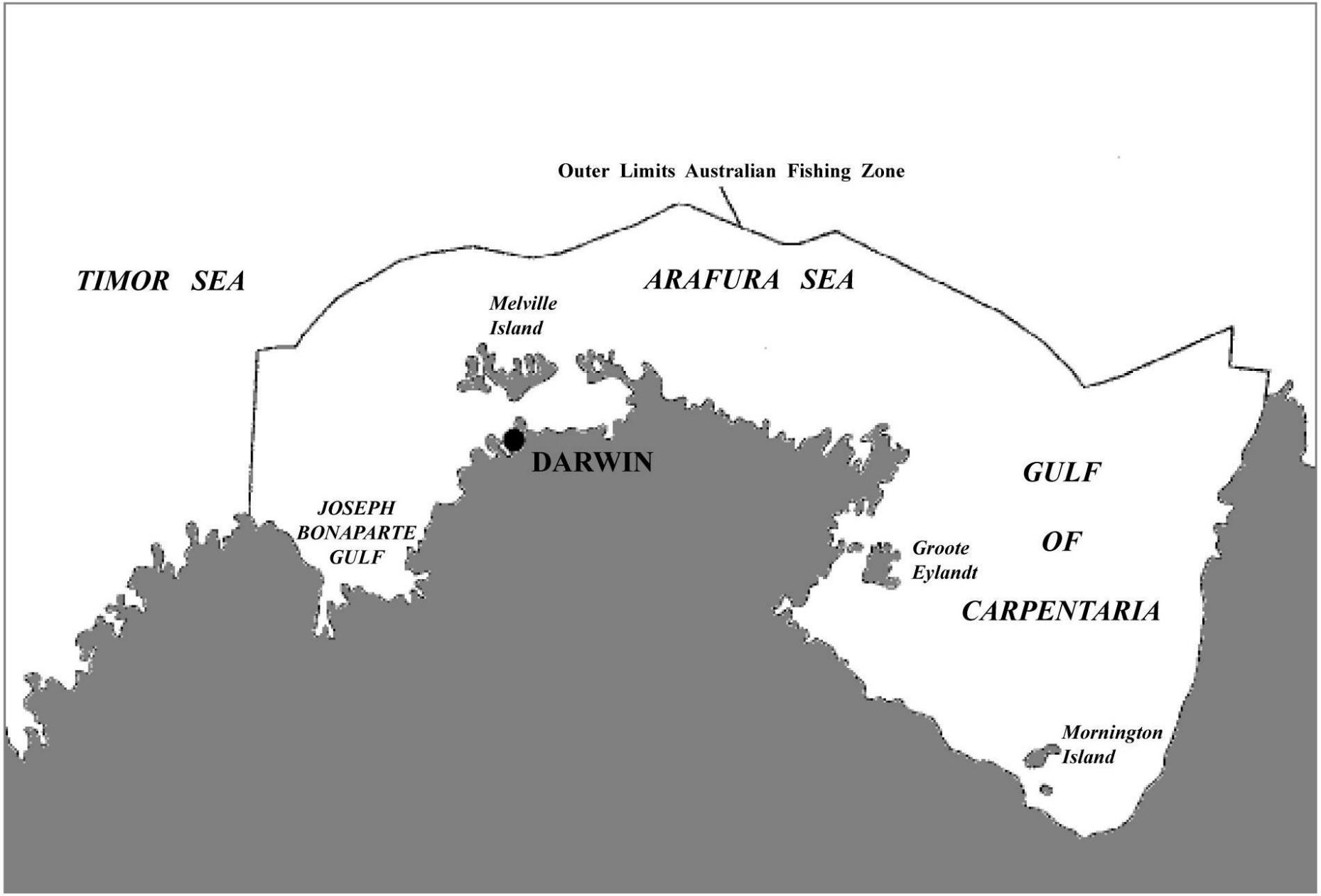
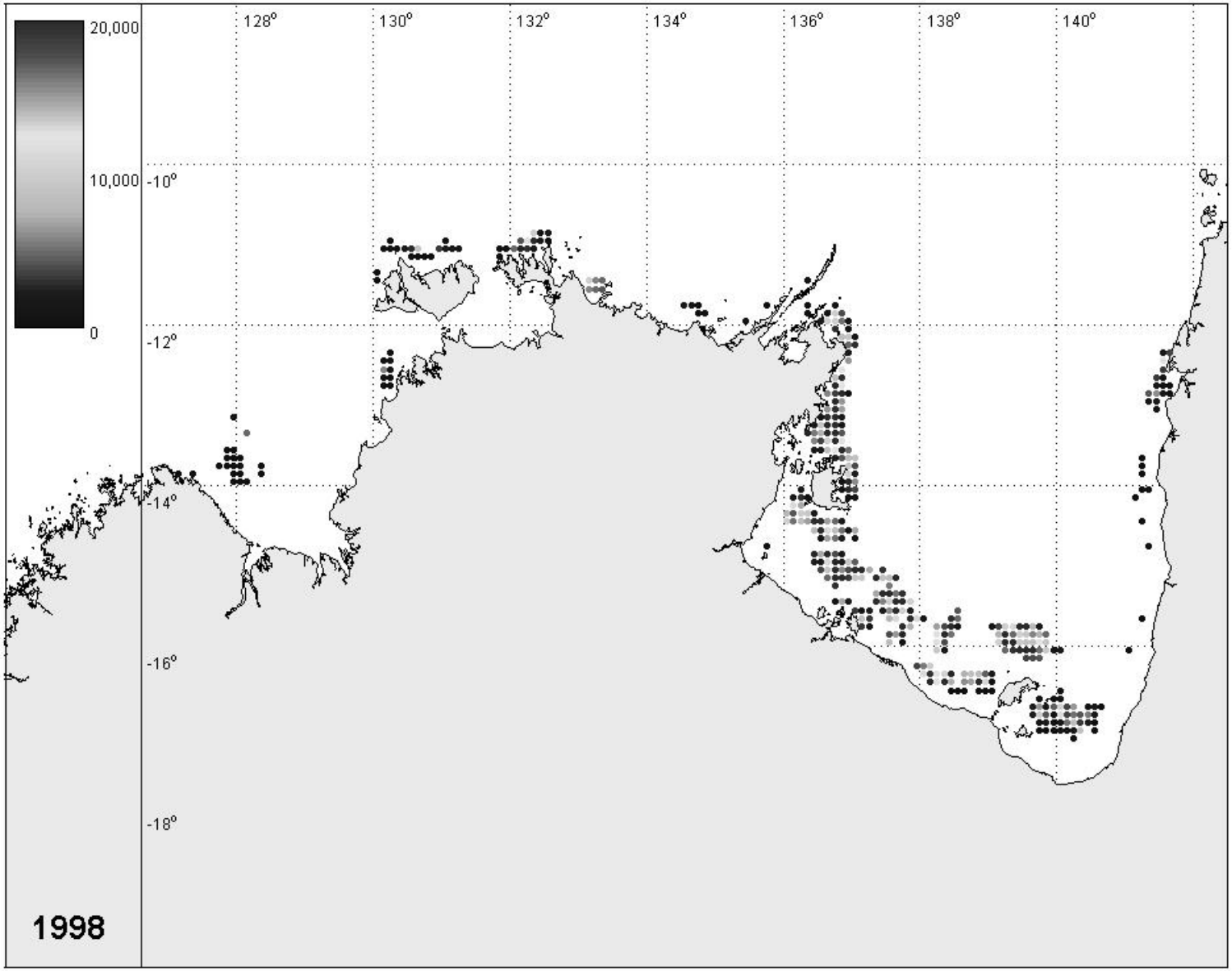
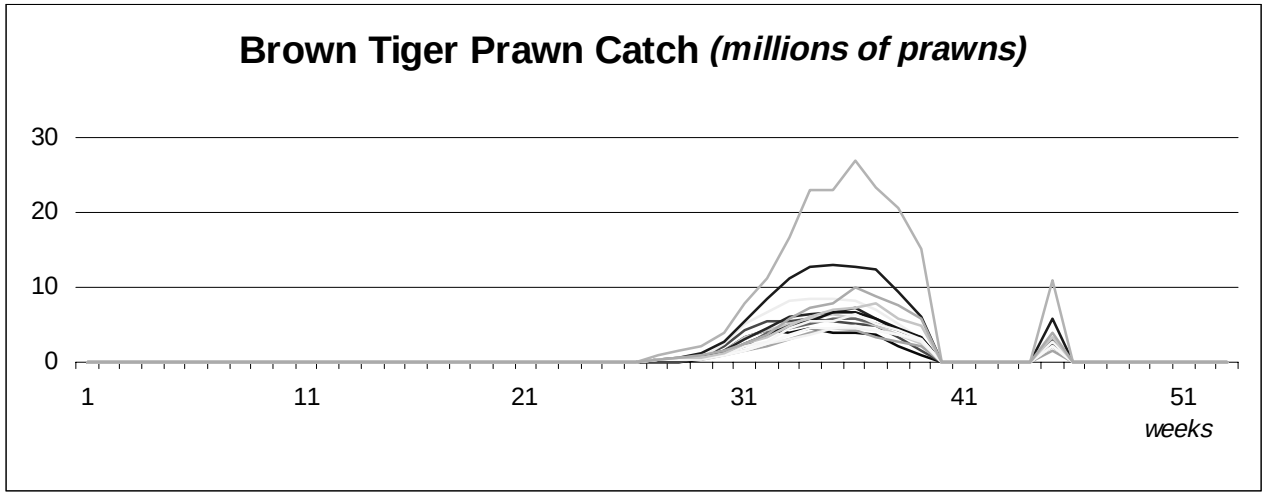
The Northern Prawn Fishery

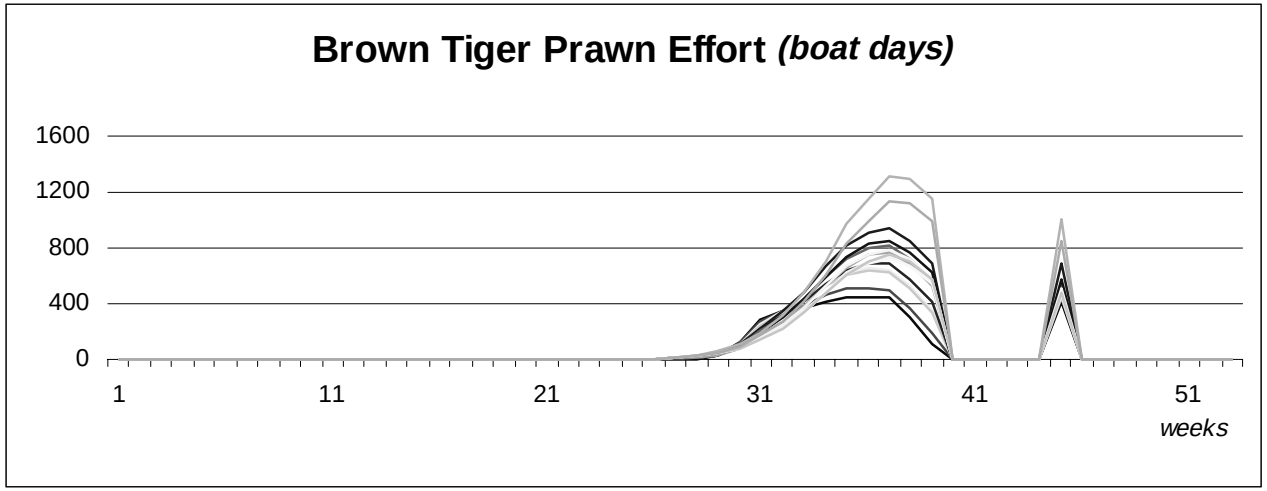


Annual catch of tiger prawns

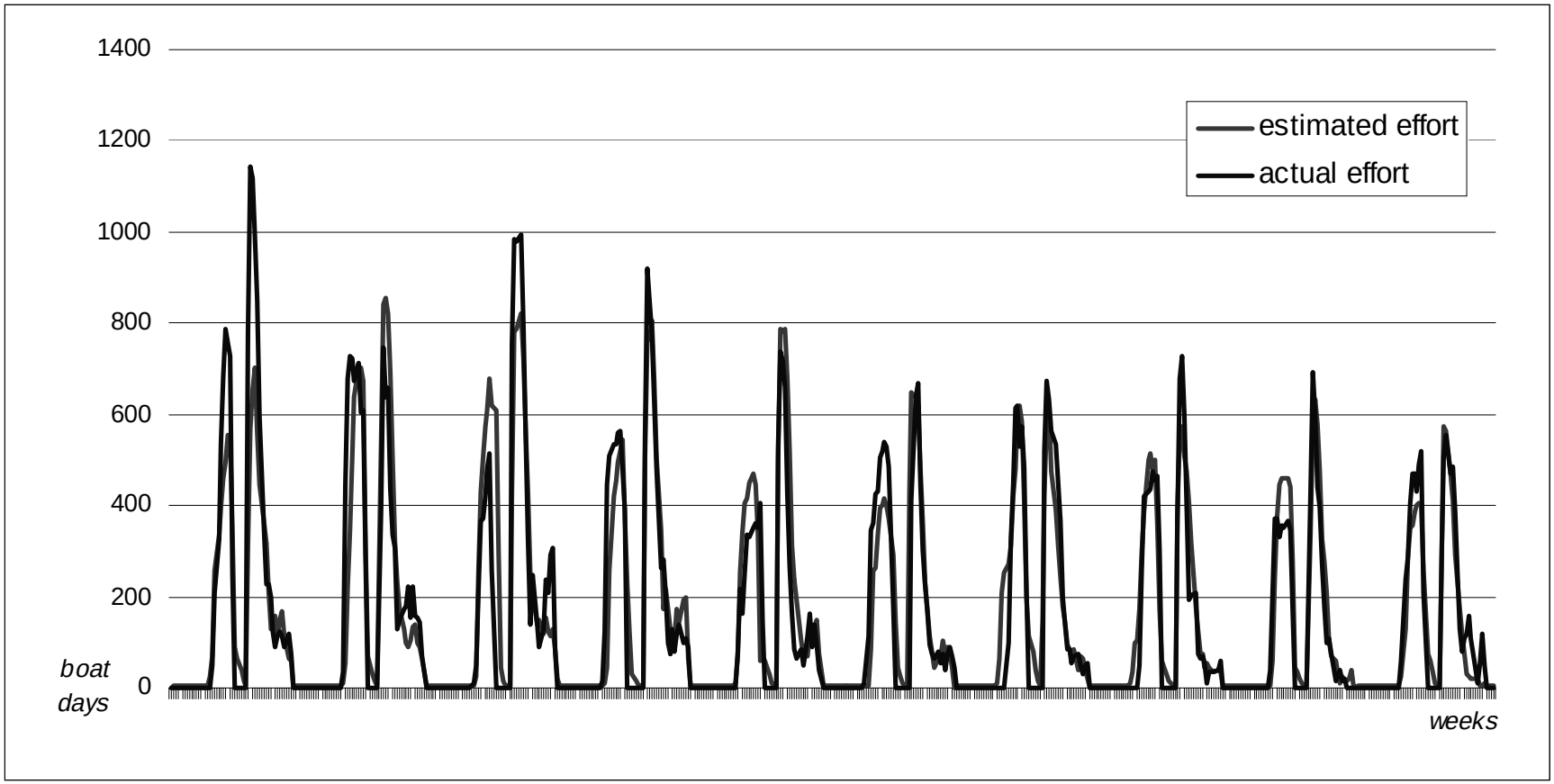


Variability in weekly catch and effort data between years optimal closure week model with full stochastics

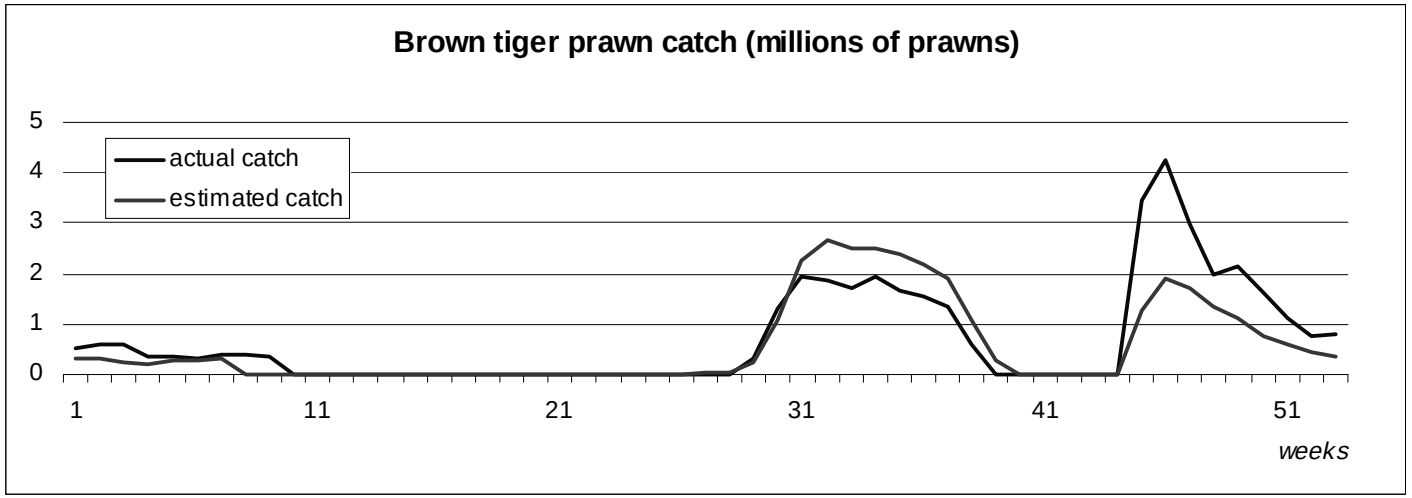


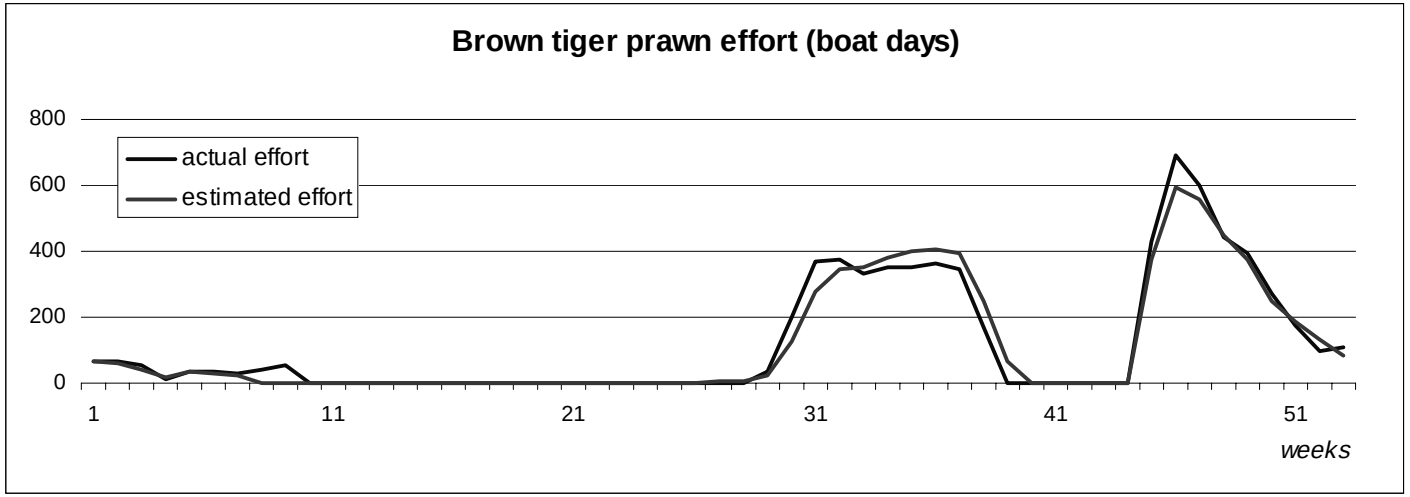


Model predicted effort versus actual effort data
brown tiger prawns



Historical Validation





Biological Model

- Cohort
  - 53 weeks
  - weight / grade

- Recruitment
  - Ricker's equation $R_t = \gamma_1 S_{t-1} e^{\left(\gamma_2 S_{t-1}\right)}$

Fishery Model

- Effort

$$e_{1t} = \alpha_{01} + \alpha_{11} e_{1,t-53} + \alpha_{12} e_{1,t-106} + \alpha_{13} \sum_{j=1}^{4} c_{1,t-j} + \alpha_{14} \sum_{j=1}^{4} c_{2,t-j} + \eta_{1t}$$

- Catch

$$catch = \mathrm{m}_{\mathrm{f}} \cdot stock \cdot \frac{1 - \exp\left(-\mathrm{m}_{\mathrm{tot}}\right)}{\mathrm{m}_{\mathrm{tot}}}$$

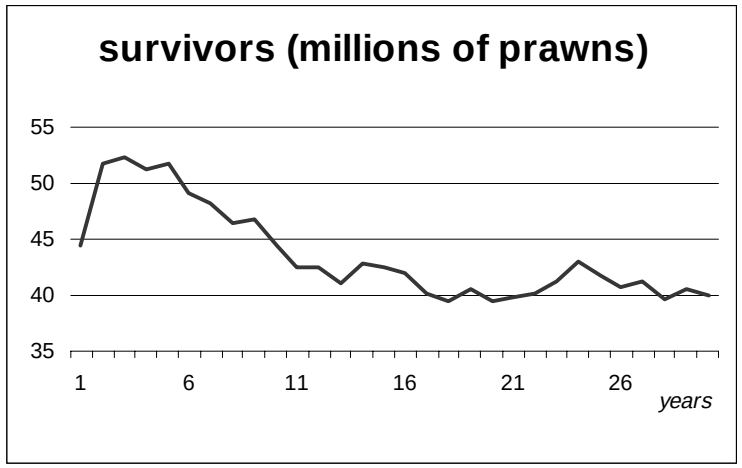
Economic Model

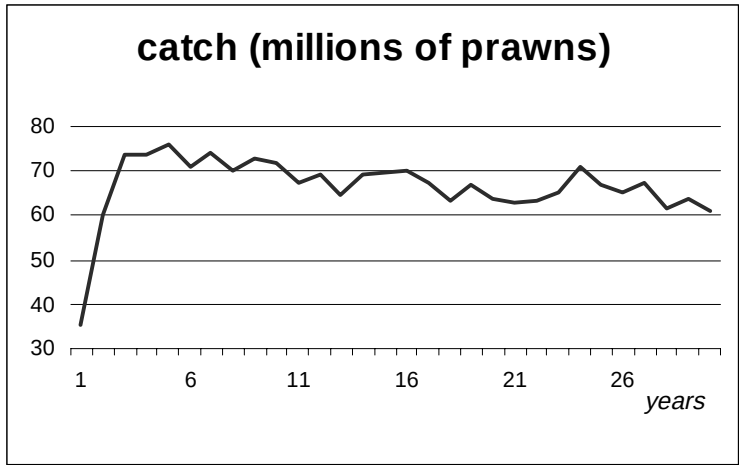
- Prices

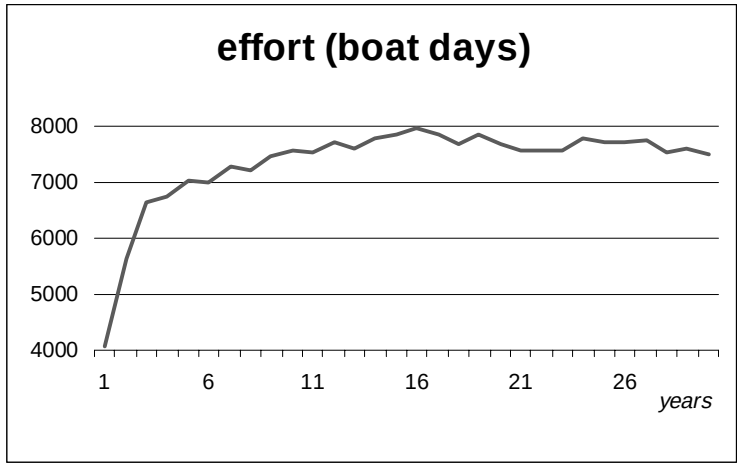
$$p_{gt} = \beta_0 + \sum_{g=1}^{5} \sum_{k=1}^{2} \beta_{gk} p_{g,t-k} + \varepsilon_{gt} \qquad for\ g = 1\ to\ 5$$

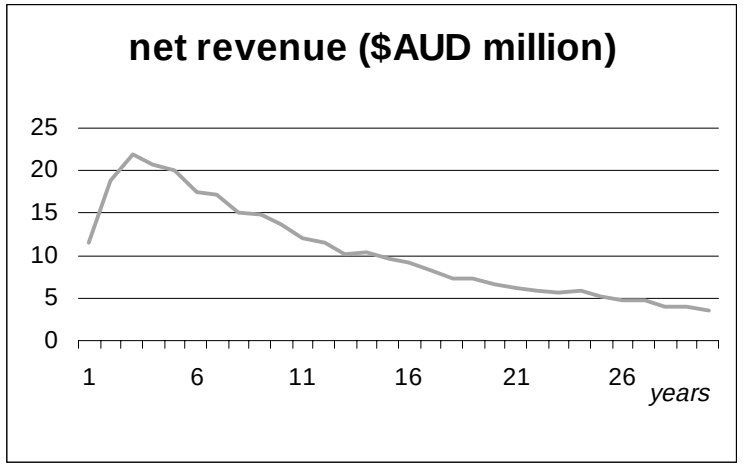
- Costs
  - Fuel
  - Crew
  - Packaging

Optimal CPUE rule with full stochastics
Brown Tiger Prawns









Net Present Value of the Fishery ($m)

	Optimal Closure Date				Optimal CPUE Closure Rule			
	Brown		Grooved		Brown		Grooved	
	Mean	*Std Dev*	Mean	*Std Dev*	Mean	*Std Dev*	Mean	*Std Dev*
Deterministic	13.5	*na*	9.9	*na*	13.5	*na*	10.1	*na*
Partial Stochastics	15.2	*7.4*	12.5	*4.0*	15.7	*7.8*	13.2	*5.0*
Full Stochastics	15.2	*7.5*	12.5	*4.0*	15.3	*7.9*	12.7	*4.4*