

Modelling the effect of the introduction of Individual Transferable Quotas in fisheries : the rock lobster in Tasmania



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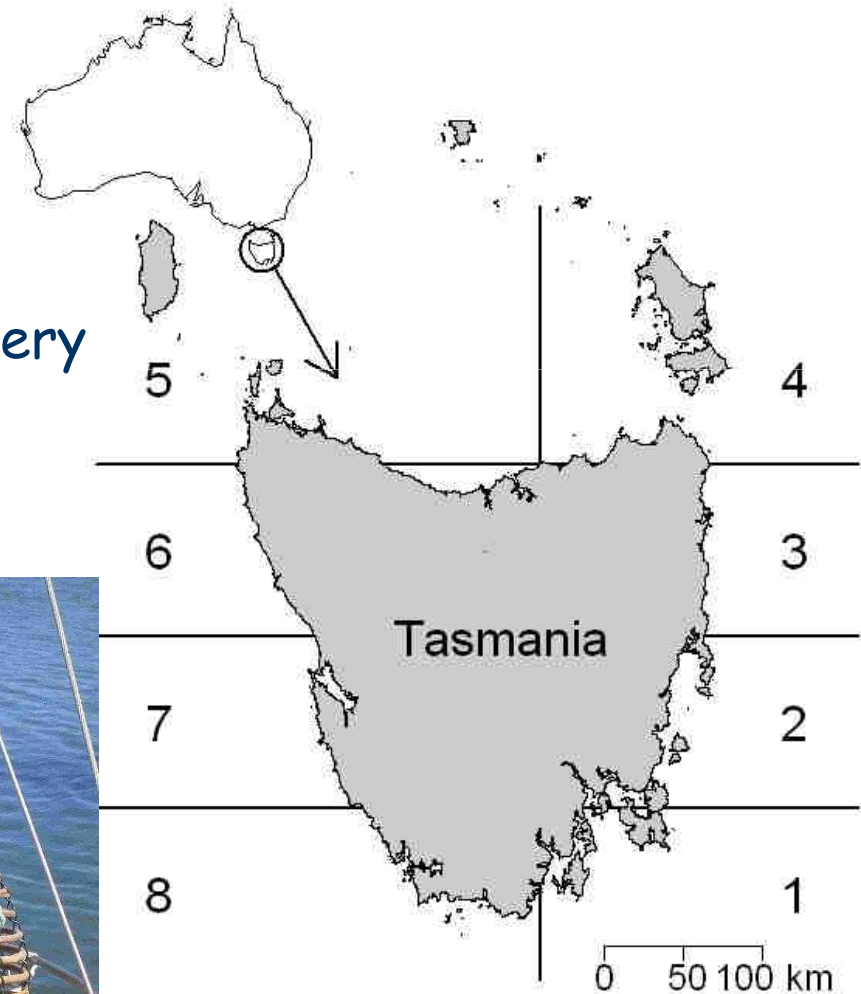
Outline

- I. Case study : the Tasmanian rock lobster fishery
- II. Introduction of ITQs : change of access to the resource
- III. Challenges in modelling the Tasmanian rock lobster fishery
- IV. Model development

I - A case study : the Tasmanian rock lobster fishery

Coastal fishery, single species

- 214 vessels, using baited traps
- 1 500 tons lobster
- AUD \$60m → 2d Tasmanian fishery
- 1st for employment
- 75% of landings exported



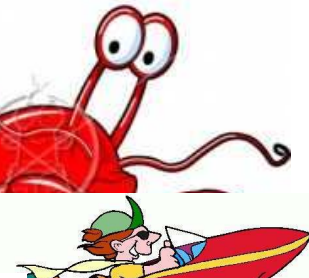
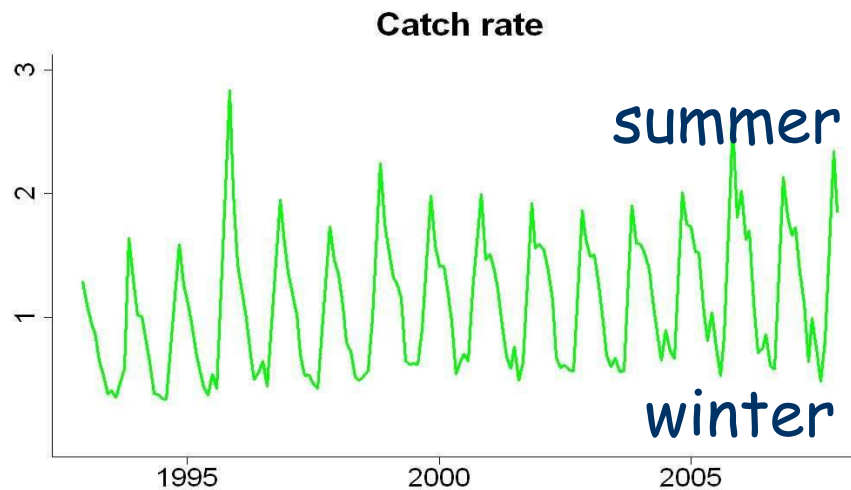
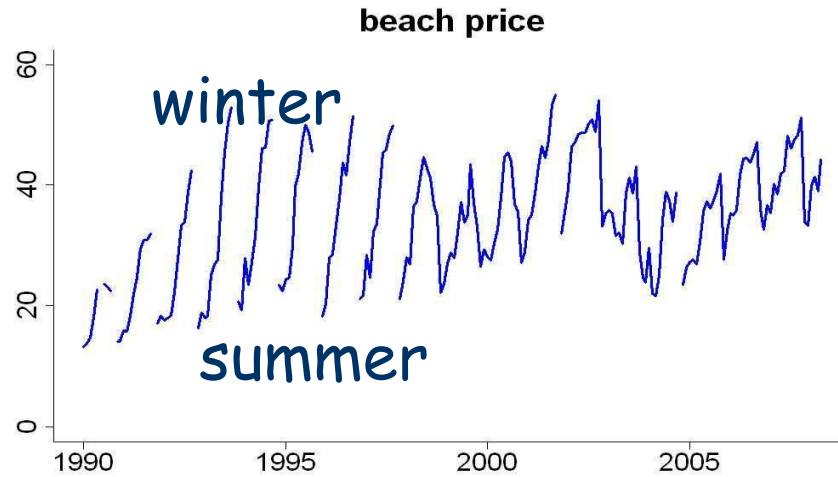
Heterogeneity of the fishery

Spatial

- Size
- Colour
- Fishers

Seasonal

- Price
- Catch rates



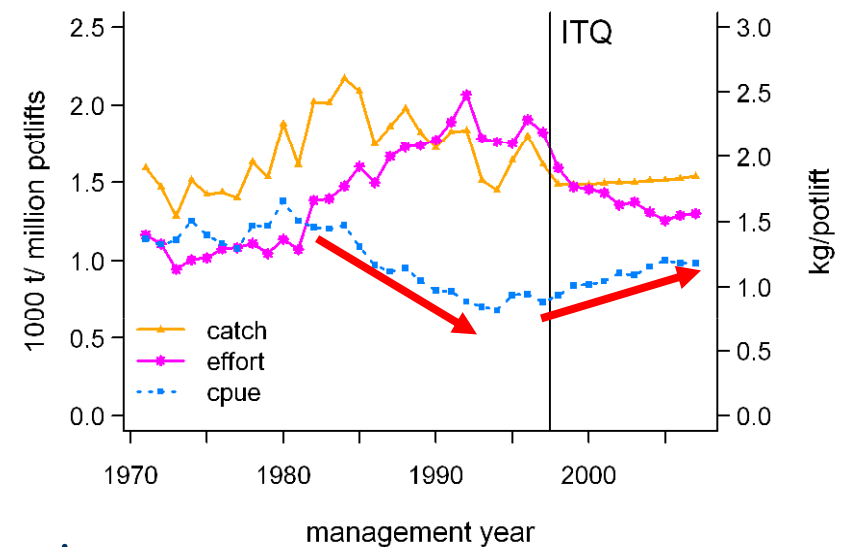
II - Introduction of ITQs : change of access to the resource

Early 90's

- decline of catch rates
- input limitation or ITQ ?

1998 → ITQs introduced

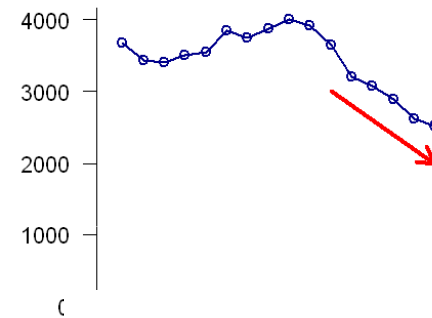
- TAC ~ 1500 t
- Initial allocation mainly based on trap ownership
- Aggregation limit (200 units)
- Control on fishers, quota owners and processors



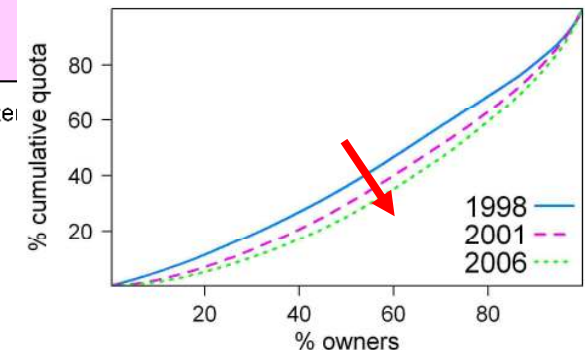
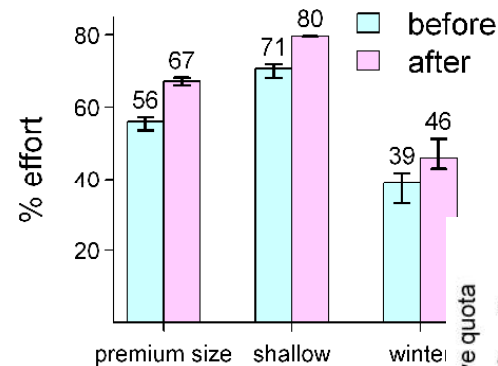
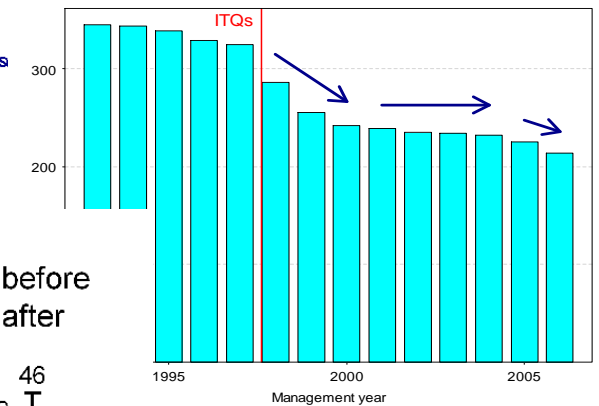
II - Introduction of ITQs : Impacts (Hamon et al, in Press)

1. sustainability of the fishing stock
2. capacity reduction
3. harvesting strategies maximizing the returns
4. concentration of quota ownership

Biomass (t)



ITQ
Number of vessels operating in the Tasmanian rock lobster fishery



III - Modelling the rock lobster fishery : Challenges

- ◆ Stock managed as one but value of lobster variable wrt where/when caught
 - space and seasons explicitly described
- ◆ Fishers diverse (harbour, vessel characteristics, quota allocation)
 - low aggregation of fishers
- ◆ Fishers constrained by quota allocation but quota market
 - exchange market

IV - Model developments : Existing model (A. Punt)

Scales

- 8 to 11 areas

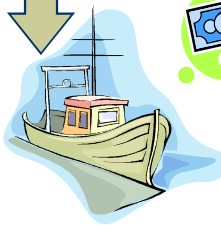
Inputs

- catch & effort data
- biological parameters
- tagging data
- economic data
- catchability



Management scenarios

- TAC
- MLS
- ...



Outputs

- economic statistics
- catch
- stock state

Stock → size structured

- egg production
- natural mortality
- growth
- recruitment

Fleet

- catch distribution

$$P_{area, period, year} = f(B_{a,y}, P_{a,p,y-1}, P_{a,p-1,y})$$

IV - Model developments : Model developped in the project

Scales

- 11 to 16 areas



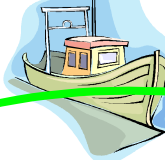
Inputs

- catch & effort data
- biological parameters
- tagging data
- economic data
- quota info
- vessel characteristics



Management scenarios

- TAC
- MLS
- ...



Lobster Price

Stock → size structured

- egg production
- natural mortality
- growth
- recruitment

Fleet → individual based

- quota allocation
- effort distribution (spatial & seasonal)



Outputs

- economic statistics
- catch
- stock state

IV - Model developments : Fleet dynamics (in progress)

Decision process : when, where, whether to fish

RUM nested logit

Fishers attributes

- home port
- quota allocation
- past activity

Choice attributes

- season/weather
- expected vpue
- distance from port

Additional inputs

- quota allocation
- vessel/fisher characteristics
- decision process (interviews)
- economics data : costs/beach price

IV - Model developments : Quota market (in progress)

2 types of exchanges: lease and sale

Decision process for both types of exchanges ? Short term vs long term

Lease market

Twice a year : Feb & Oct

➤ Feb : > 15 QU/fisher +
initial fishing plan

➤ Oct : adaptation to winter

Permanent market

(assessment of current
exchange needed)

Once a year : Feb

Linked to entry- exit model

Additional inputs

➤ quota allocation

➤ quota exchanges (Ingrid's network analysis)

➤ quota prices (new post-doc in TAFI)

Thank you!!

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http://www.utas.edu.au/cms/qms/postgraduates/k_hamon.html

