

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



Katell Hamon

IFREMER- UMR AMURE Marine Economics Department, Brest - Fr

TAFI - Marine Research Laboratories, Hobart - Aus

CSIRO - Marine and Atmospheric Research, Hobart - Aus

UTAS - School of Zoology, Hobart - Aus

[katell.hamon@ifremer.fr](mailto:katell.hamon@ifremer.fr)





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# Outline

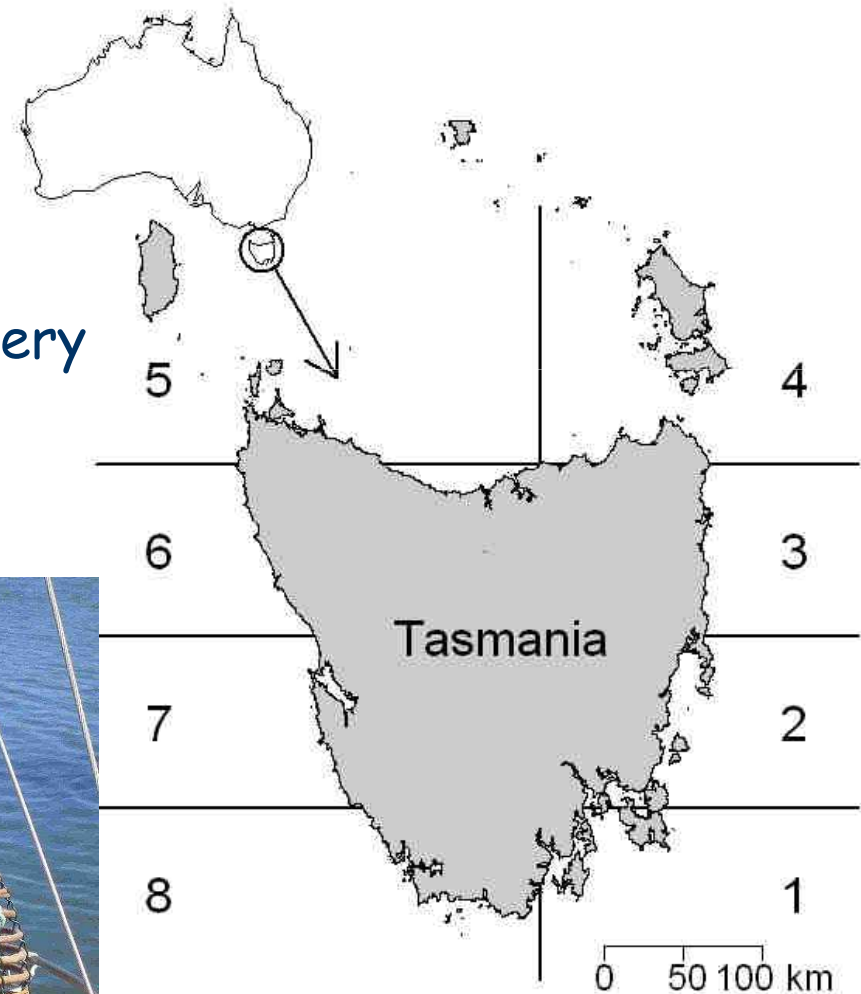
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- I. Case study : the Tasmanian rock lobster fishery
- II. Introduction of ITQs : change of access to the resource
- III. Challenges in modelling the Tasmanian rock lobster fishery
- IV. Model development

# 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



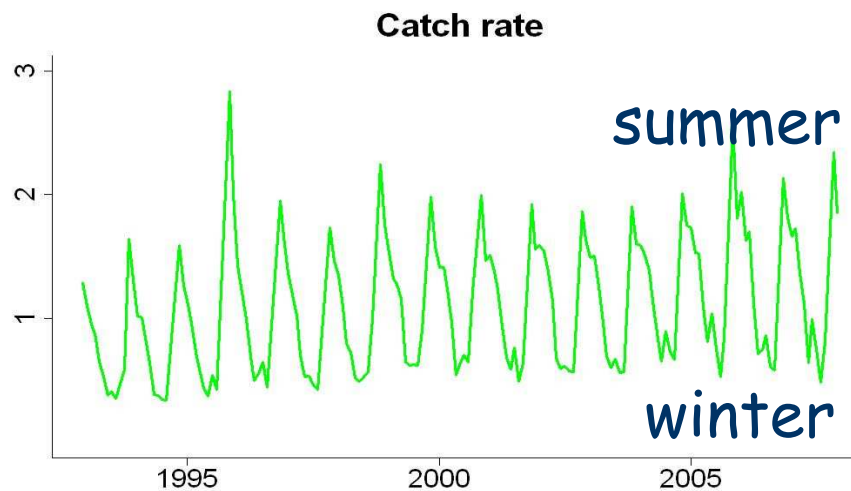
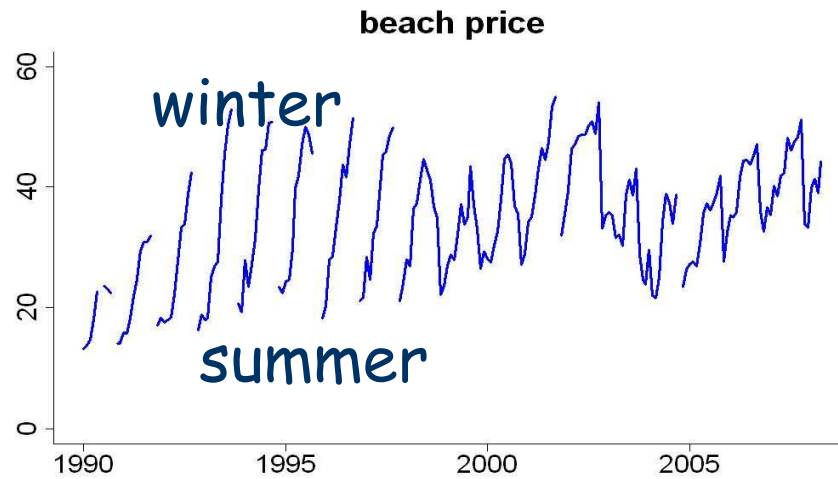
# Heterogeneity of the fishery

## Spatial

- Size
- Colour
- Fishers

## Seasonal

- Price
- Catch rates



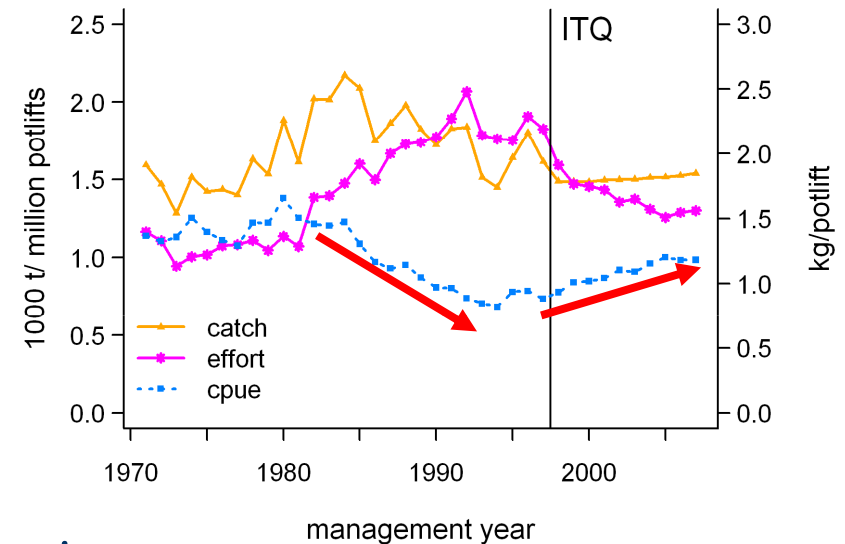
## II - Introduction of ITQs : change of access to the resource

### Early 90's

- decline of catch rates
- input limitation or ITQ ?

### 1998 → ITQs introduced

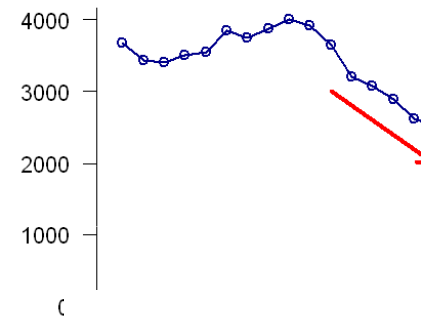
- TAC ~ 1500 t
- Initial allocation mainly based on trap ownership
- Aggregation limit (200 units)
- Control on fishers, quota owners and processors



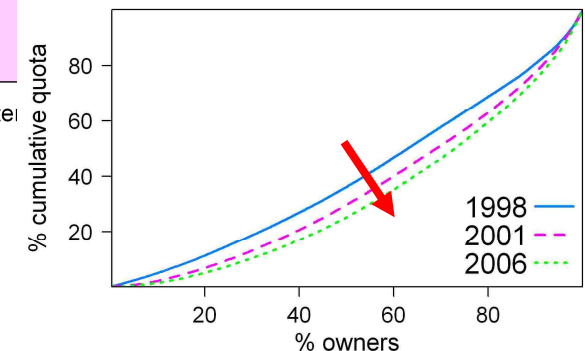
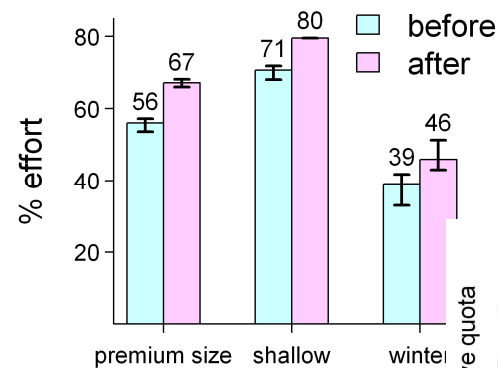
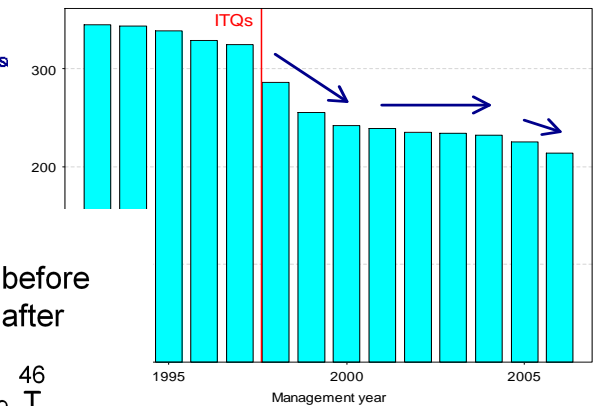
## II - Introduction of ITQs : Impacts (Hamon et al, in Press)

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

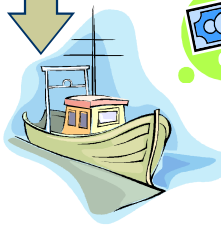
### Inputs

- 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

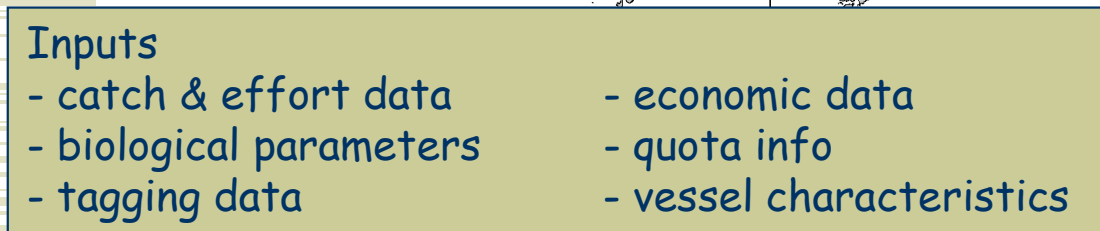
- catch distribution

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

# IV - Model developments : Model developped in the project

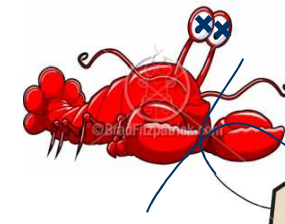
## Scales

- 11 to 16 areas



## 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](http://www.utas.edu.au/cms/qms/postgraduates/k_hamon.html)

