Atlantis Course Universidad de Concepción

Day 4 - Fisheries

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CSIRO Ocean & Atmosphere
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Anthropogenic Components

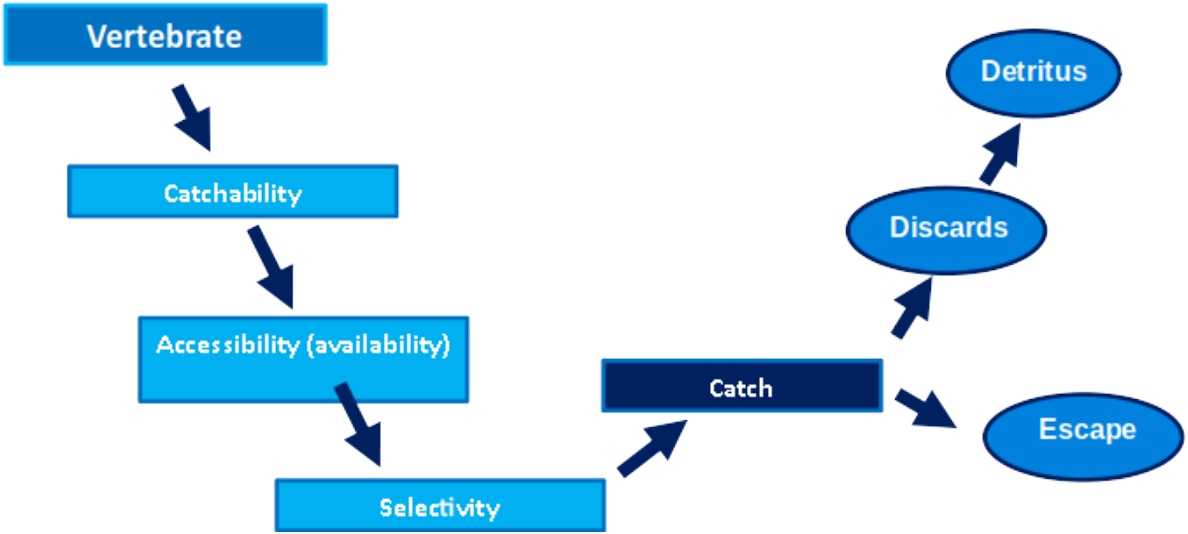
- inputs and pollution
- fisheries (different fleets, commercial, charter and recreational)
- tourism
- shipping
- clearing and coastal development
- ports and dredging
- economics and markets
- management

Sector


Fisheries
Development
Energy
Eco Tourism
Oil & Gas
Conservation
Marine
Sanctuaries
Aquaculture
Etc

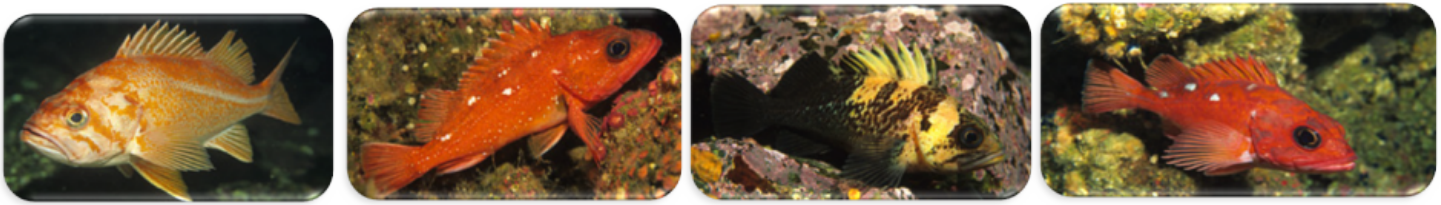
Fisheries

$$F = B \cdot \delta_q \cdot \alpha_{B,xy} \cdot \alpha_{B,z} \cdot \delta_{sel} \cdot (1 - \delta_{escape})$$



Fisheries

- Target species
- Byproduct
- Bycatch
- Vertical distribution
- Availability
  - Homogeneous
  - Patchiness



Catchability

$$q = K_q * q_{scale} \cdot (1 - P_{uncatchable\_spawn}) \cdot P_{mismatch}$$

- Spatial mismatch
- Spawning closures or “goes off bite”
- Changes through time

Selectivity

- Constant
- Knife-edged
- Logistic
- Normal
- Lognormal
- Gamma
- Bimodal
- Can vary through time
- Swept area also included and can change through time

Escapement & Discarding

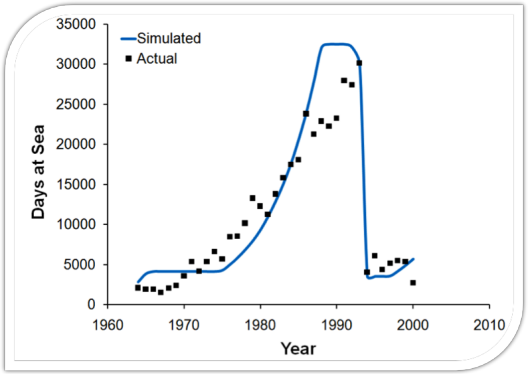
- Escapement
  - proportion of “encountered” not hauled catch
- Discarding
  - constant proportion
  - size-based
    - (minimum or maximum preferred size)
  - forced (time series)
  - dependent on (forced) catch of other groups
  - illegal retention possible

Applying Fishing Pressure

- Historical time series of catch or effort = forcing
  - applied proportional to global distribution of biomass of group in model
  - spatially allocated (“borrow” from neighbouring cells)
- Apply F rate
- Dynamic causal model

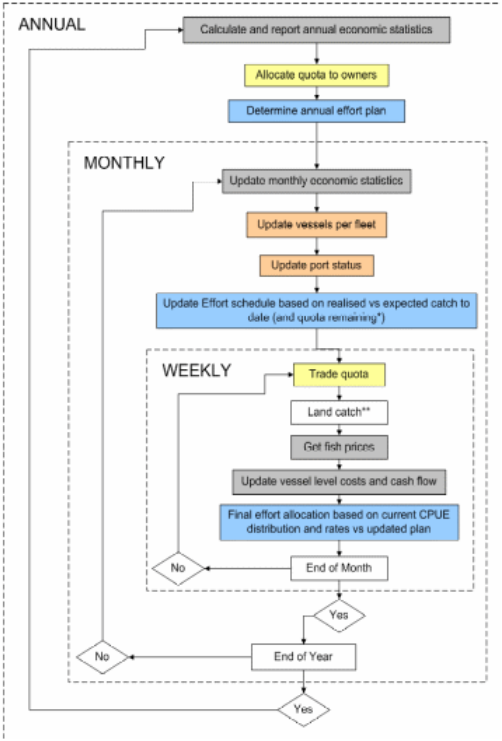
Effort dynamics

- Constant level
- Interpolated from quarterly distributions
- Forced time series
- Allocated proportional to current CPUE distribution
- Based on thresholds of CPUE
- Recreational (tithe)

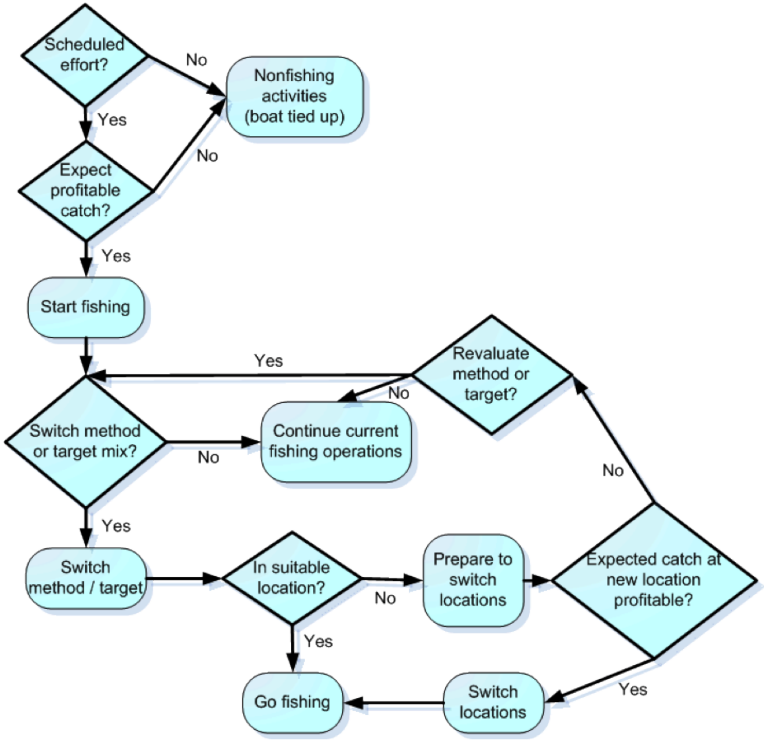


Effort dynamics

- Dynamic (socio-econ yet another variant)
  - aggregate fleet model
  - ports, costs, exploratory fishing, tries for optimal cpue
- Aspects can change through time
- Interactions of fisheries with groups (i.e. catch as food source)
- Displacement to nearest “best return” accessible box



Fishing events

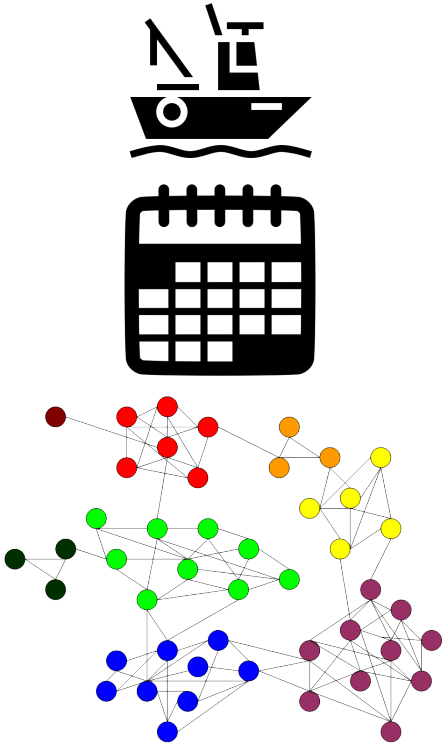


Socioeconomics

- Effort allocation (by subfleet)
  - Behavioural uncertainty
  - Economic drivers
  - Social drivers

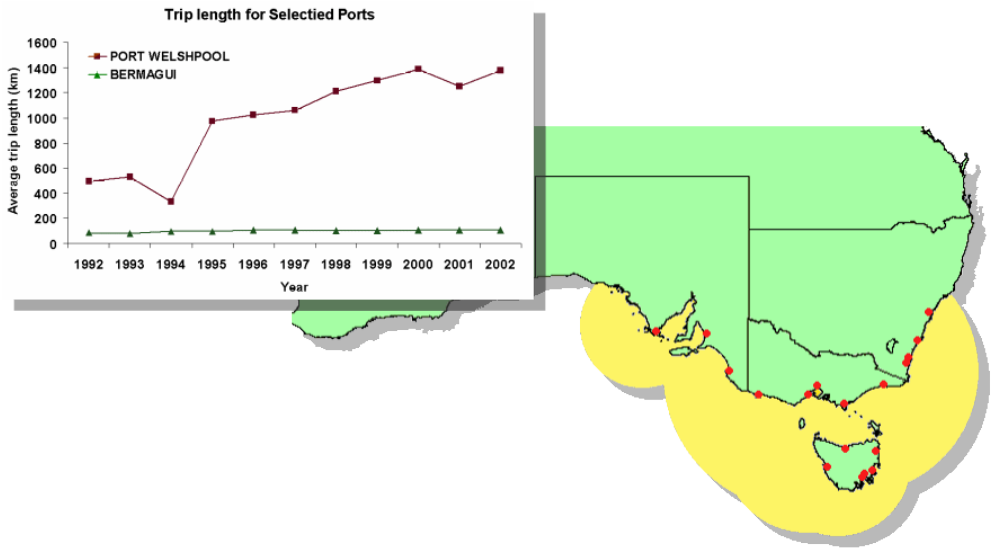
Fishing Decisions

- Tiered planning and effort allocation
- Quota trading
- Markets
- Multiple cost sources (fixed, variable, crew, gear, fuel)
- Investment and disinvestment
- Social and economic indicators
- Costs of management (across compliance, research, infrastructure, monitoring)
- recovered costs
- per sector



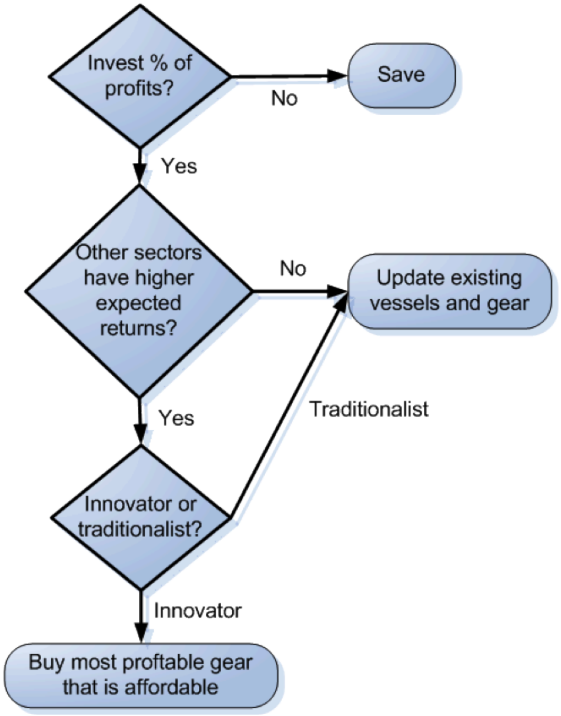
Ports

- Activity levels varies through time
- Feed different markets
- Trip implications
  - steaming vs fishing



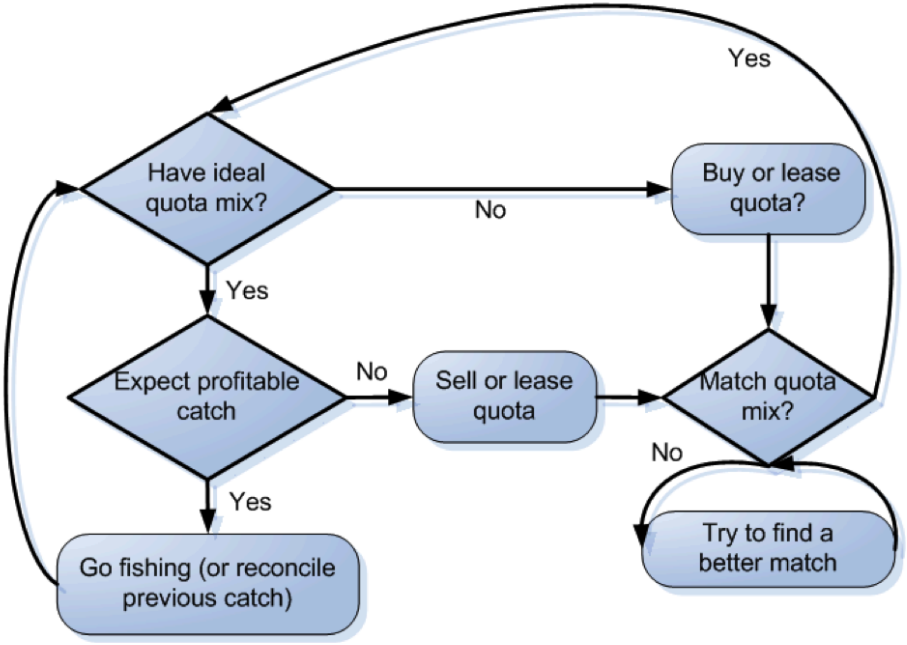
Investment

- Immediate costs/value of new boat (or selling old boat or switching) vs horizon $ return of staying put
  - crew costs
  - land-based costs (or just fish hard and then tie up for rest of year)
  - exhaustion of credit (boats drop out of fishery)



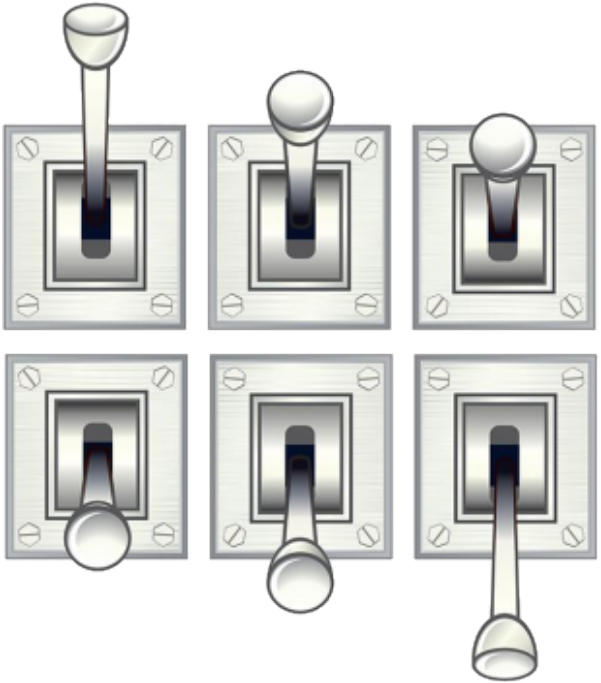
Trading Model

- Cost/value determines sale vs lease
- Social networks influence



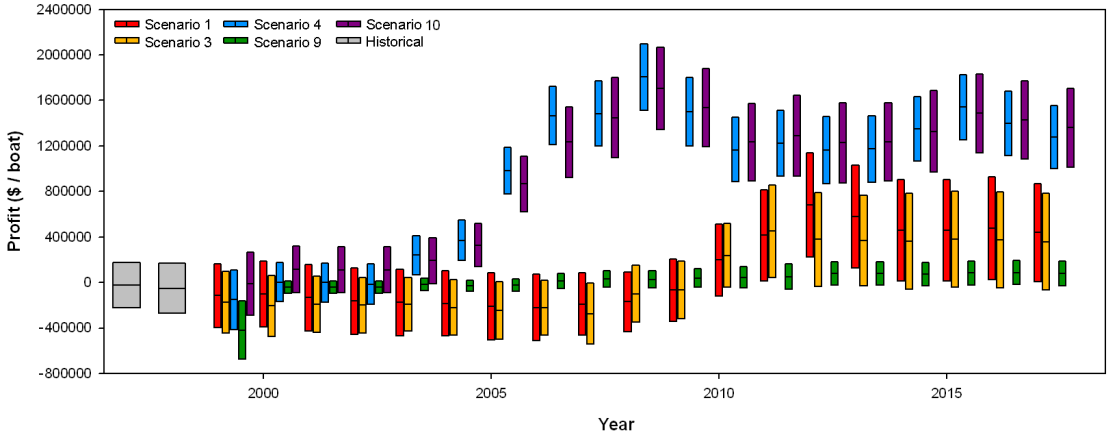
Management Levers

- Gear (size, selectivity, access to habitat types)
- Swept area (or soak time)
- Spatial zoning
- Seasons
- Discarding rules (BRD, size, per species, per area, limits)
- Bag limits
- Quotas (overall, stock-based, regional, basket, companion, bi-monthly)
- Trip limits
- Effort limits (days-at-sea)
- Compliance



Economic & Social Indicators

- Costs
  - per boat (fixed, variable)
  - management (monitor, compliance, research)
- Value
- Profits (per day, tonne, boat)
- Activity and perception



Thank You

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