Observed impacts and adaptation strategies for coastal fisheries in southeast Australia

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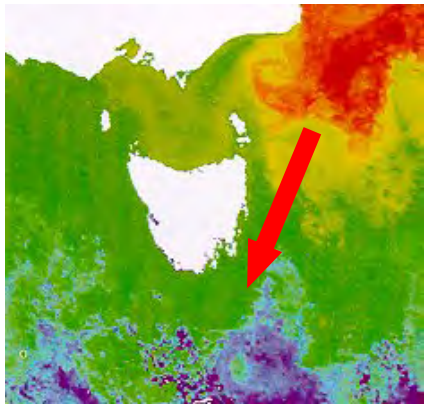
translatingnatureintoknowledge

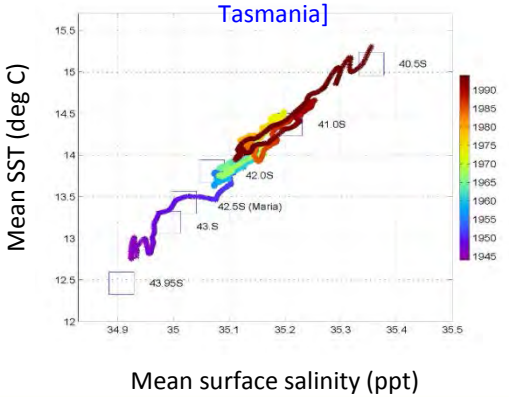
Climate change in SE Australia



Setting the scene

- Observed increase in temperature, strength and southern penetration of East Australian Current
- SE Australia is predicted to be one of the fastest warming region in the southern hemisphere
- Water temperature predicted to rise by 3^0C to 5^0C (3.8 X global average)

Climate Change Signal – Maria Is. [Eastern Tasmania]



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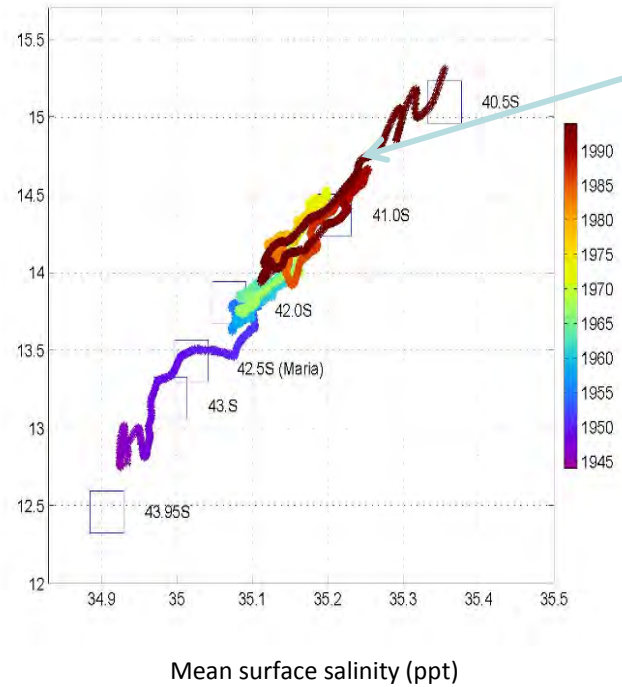


1st IPCC Report (1990)

Ongoing adaptation but under management strategies to pull back effort – input controls and more recently output controls. Management based on stock equilibrium assumptions.

In Tas early records indicate that lobsters were very plentiful in NE. Supported many fishers on Flinders Island and now only 1 part-timer! – is this adaptation by fishers to diminishing stocks – or fishing pressure.

Current Australian Management frameworks

Co-management (advice to Government)

Fishers (commercial, recreational)

Processors

Scientists (assessment),

Managers

Generally sector specific

Fisheries funding

One major national funding body (FRDC)

Reliant on State/National priorities

(often from co-management groups)

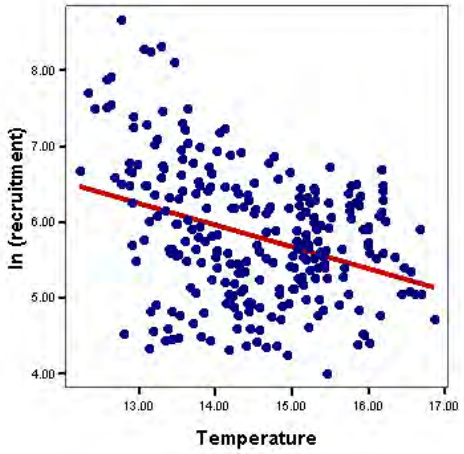
Or Industry partnership agreement

Applications - Consultation with Industry

Strong Industry input into research and management

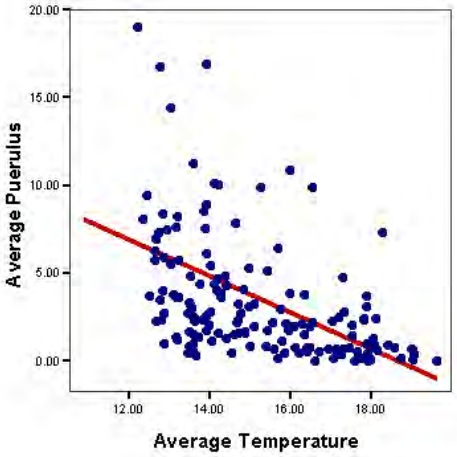
Tasmanian rock lobster fishery

Productivity – fishery recruitment



Assessment model hindcast estimates

Observed larval (puerulus) settlement



- Increased growth rates

(Pecl et al, 2009)

Response (Adaptation): Adjust assessment model
Who: Management and scientists
What is the context: Observed puerulus catches – overly optimistic model outputs
What factors facilitated or hindered adaptation? Declining catch rates/Output controls

Response (Adaptation): Reduce catch (TAC)
Who: Managers and Industry
What is the context: as above
What factors facilitated or hindered adaptation? Declining catch rates

Response (Adaptation): Increased industry support for enhanced puerulus collection
Who: Scientists and Industry
What is the context: as above
What factors facilitated or hindered adaptation? Links to low settlement on East Coast

Salmon – (aquaculture)

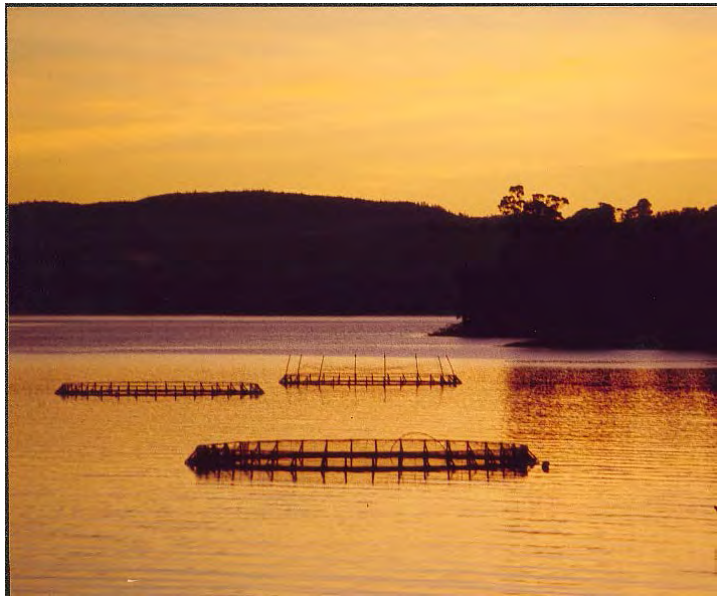
At upper edge of thermal limit

Increased temperature

Increased incidence of amoebic gill disease

Largest impact on industry

Bathe with freshwater



Response (Adaptation): Purchase land to build farm dams (access to freshwater) – future predictions are for drier years
Who: Industry

Response (Adaptation): Explore other (cooler) growing sites (West coast/deeper water)
Who: Scientists and Industry
What is the context? Desire to expand
What factors facilitated or hindered adaptation? Lack of knowledge

Response (Adaptation): Seasonal forecasting
Who: Scientists and Industry
What factors facilitated or hindered adaptation? Willingness to pay

Response (Adaptation): Development of experimental aquaculture facility
Who: Scientists, managers and Industry
What worked/what didn't? Who pays
What factors facilitated or hindered adaptation? Industry value & Industry cohesion

Harmful Algal Blooms

Range extensions

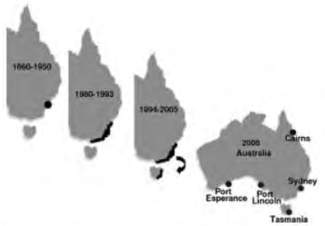


FIG. 4. Apparent range expansion of *Noctiluca scintillans* in the Australian region, comparing distribution records in 1860–1950, 1980–1993 (expansion of blooms in the Sydney region), 1994–2005 (range extension into Tasmania), and 2008 (first reports in Queensland, West Australia, and South Australia). After Hallegraeff et al. (2008).

Increased impact windows

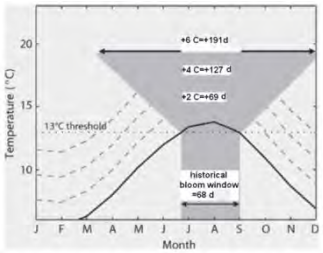
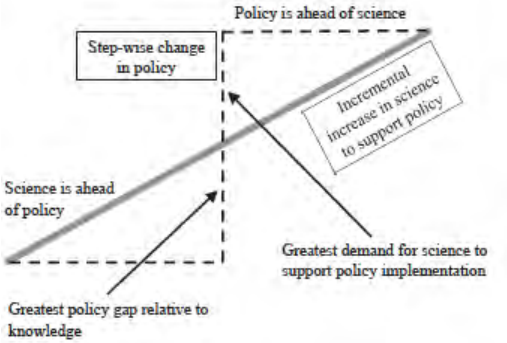


FIG. 7. Scenarios for warmer sea surface temperature conditions in Puget Sound by 2, 4, and 6°C would widen the >13°C window (in gray) of accelerated growth for the PSP dinoflagellate *Alexandrium catenella*. After Moore et al. (2008b). PSP, paralytic shellfish poisoning.

New species/strains (*Alexandrium sp*)

Surprises

Response (Adaptation): Increased industry support for research: understanding to traceability of product
Who: Scientists (local - global)
What factors facilitated or hindered adaptation? International market closure/$$$ ($23 M from October – December 2012)

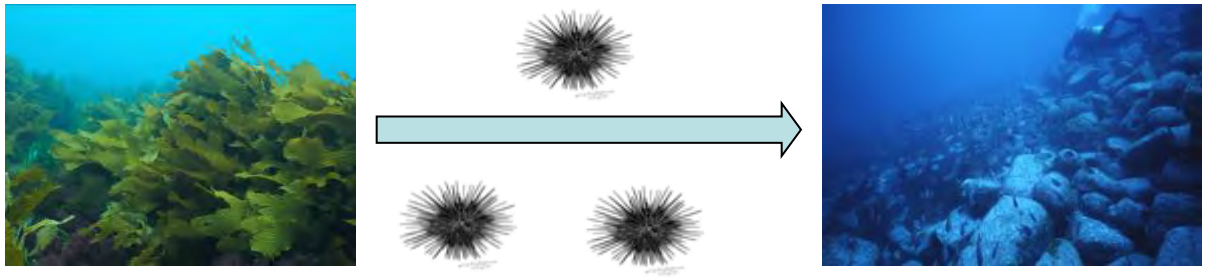


Rice, 2011

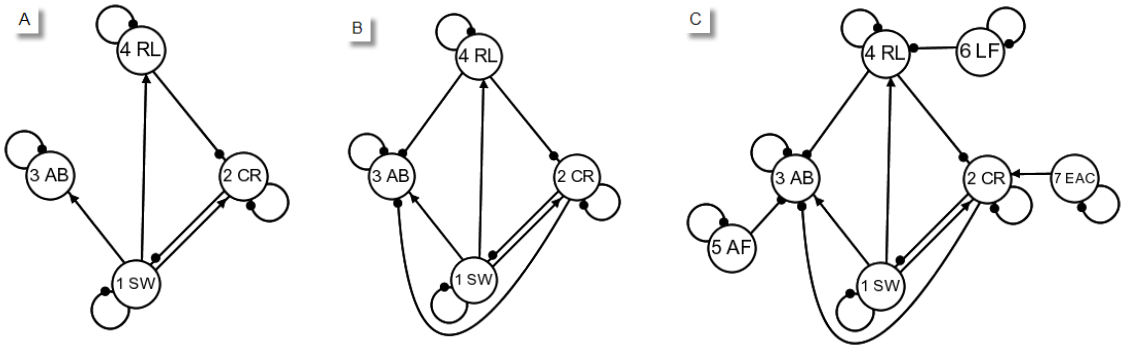
Increased incidence (larger window)

Response (Adaptation): Increased industry co-ordination and sampling
Who: Industry (oysters) and scientists (data management/visualisation & technical development)
What factors facilitated or hindered adaptation? Loss of market access

Ecosystem
(range shifting species)



Qualitative models of climate impact on urchins, lobster, abalone and seaweeds



Marzloff et. al., *Ecological Modelling*, 222: 2651-2662

Urchin response

Response (Adaptation): Spatial management (East Coast CAP)/Smashing urchins/New fishery/ Large (supra-legal) lobsters
Who: Researchers followed by Co-management committee (Industry, managers and scientists)
What factors facilitated or hindered adaptation? Hindered – multiple interests and objectives. Facilitate – research $$$ support

Fish response

Response (Adaptation): Introduced bag limits (easy option) /Consideration of cross-jurisdictional boundaries
Who: Managers
What factors facilitated or hindered adaptation? Recreational fishing magazines!!

Adaptation responses

Knowledge production – stakeholder driven

Co-management intervention