POP2012-02

New Zealand sea lion – demographic assessment of the causes of decline at the Auckland Islands

Correlative analysis

CSP Technical Working Group

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Jim Roberts, Dan Fu, Chris Francis, Ian Doonan

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Phase II Correlative analysis

What are the demographic drivers of population decline? (candidate **proximate** cause)

•Variation in juvenile survival may be sufficient to explain observed decline in pup production Long term shifts in pup survival to age1 – not just stochastic variation

•Individual years of low pupping probability and adult survival

•Variation in age at first pupping

What are the **ultimate** causes of population decline? (some candidates)

•Relationships between juvenile survival, maturation or breeding rates and biological/environmental correlates or disease events

•How does the survival of vulnerable age classes relate to estimates of fishery-related mortalities?

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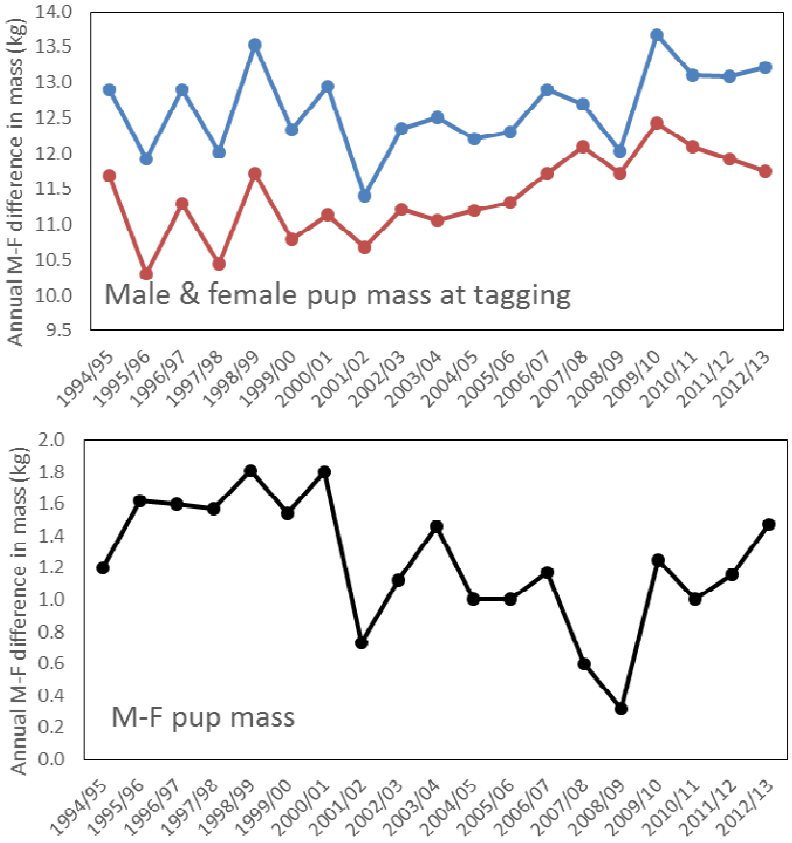
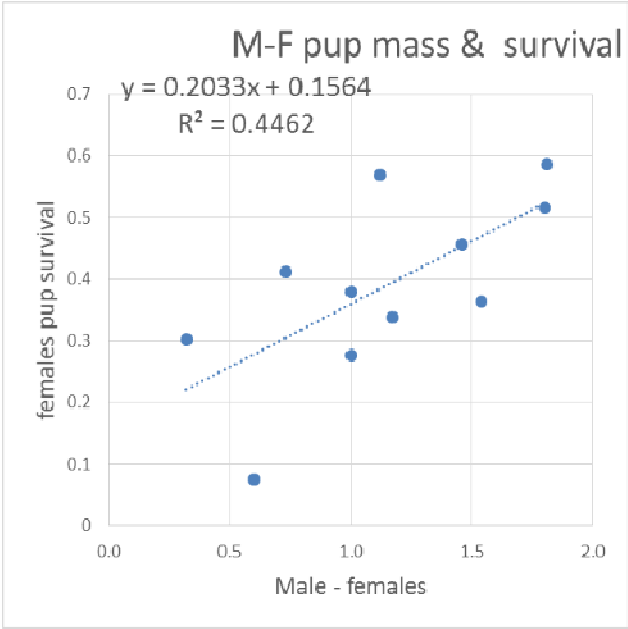
Variation in pup mass

- Pup mass at Sandy Bay from 1995-2013
- Decline in difference in male & female pup mass
- Correlation with pup survival estimates





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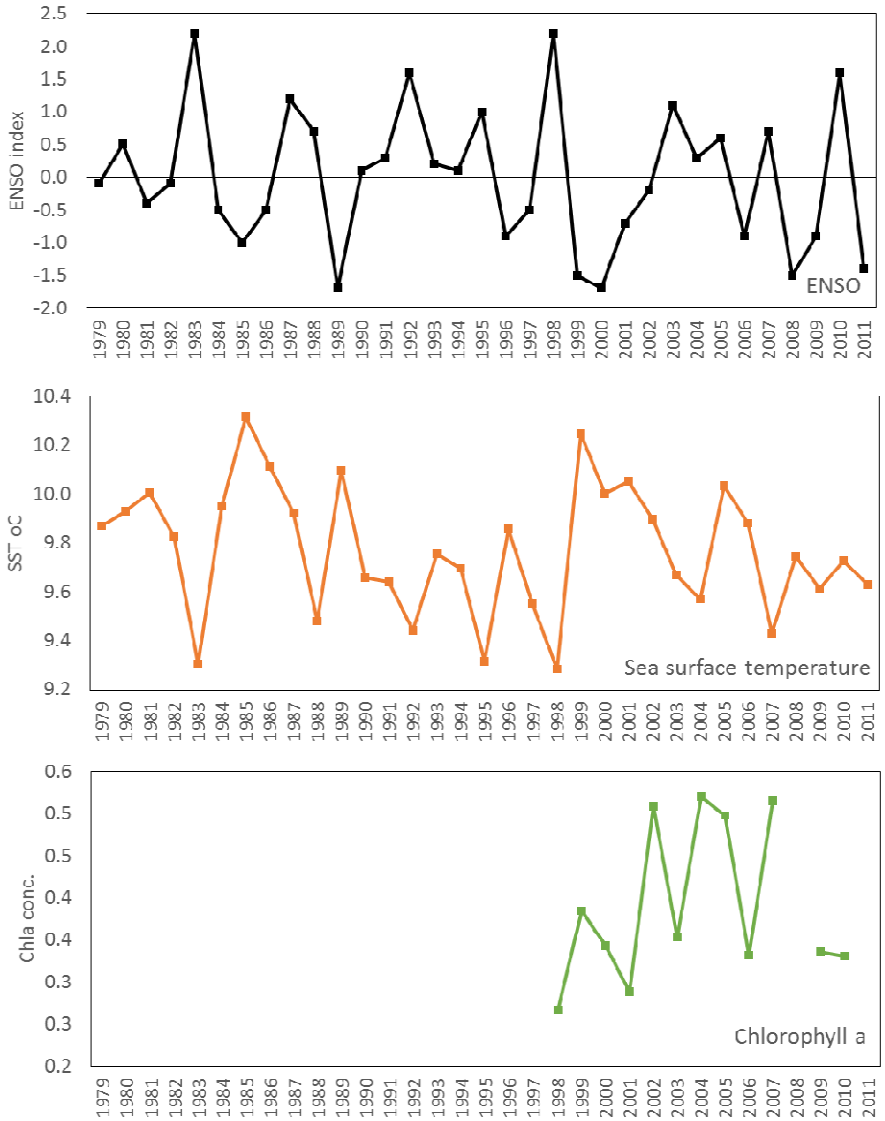
Ocean climate



- Negative correlation between ENSO & SST
- Increased SST post 1998 El Nino (also SSH)
- Increased primary production during mid-2000s

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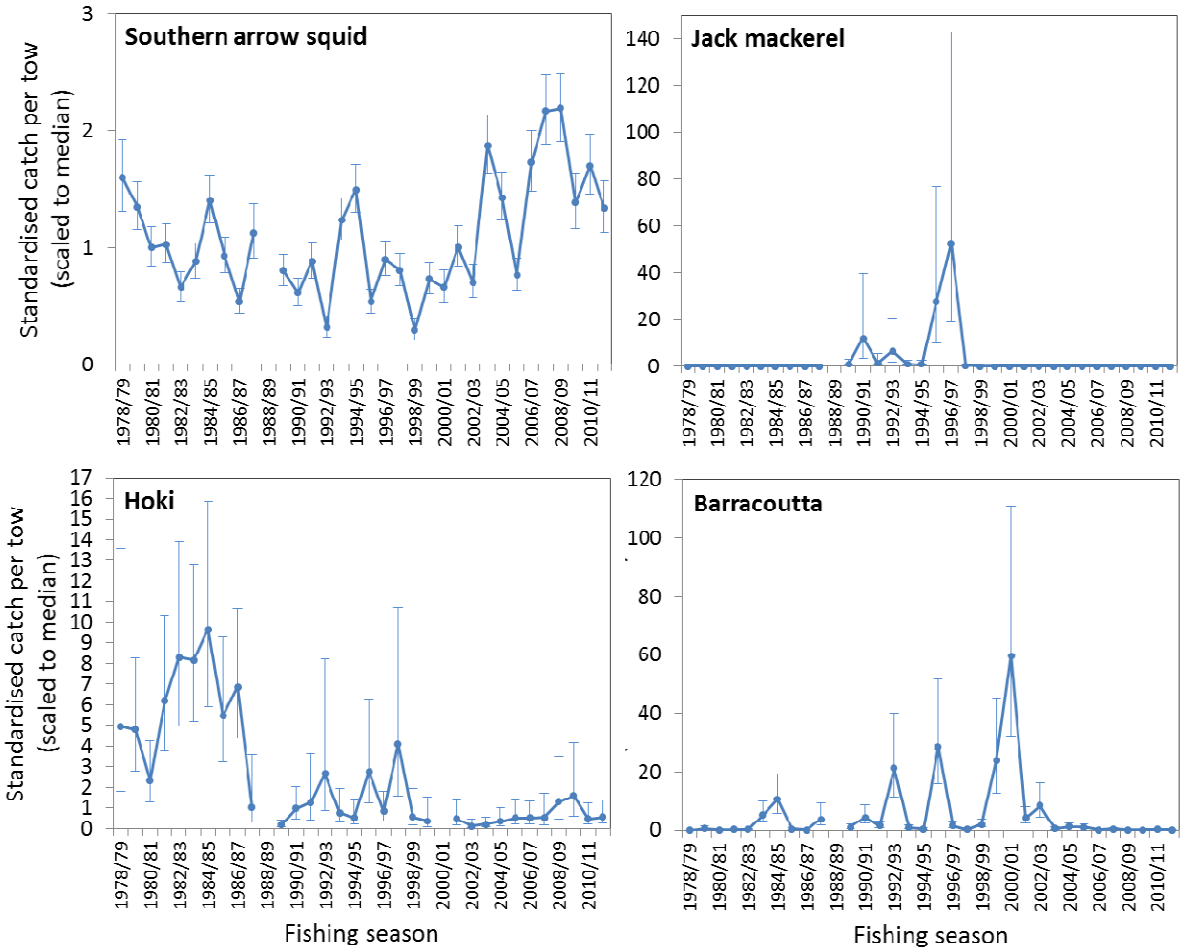
GAM/GLM modelling prey sp. CPUE

gam (*catch*) ~ *β* + ***year*** + *month* + *vessel* + s(*depth*) + s(*latitude*,*longitude*) + s(*duration*) + s(*mid-time*)

glm (*pres/abs*) ~ *β* + ***year*** + *month* + *vessel* + *depth* + *latitude* * *longitude* + *duration* + *mid-time*



- Shifts in abundance (CPUE!) of common prey sp.
- Occurrence of some high-energy prey intermittent (BAR) or temporary (JMM)

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Some early output from phase II

1. Reduced pup survival & male-female pup mass during period of declining pup counts – indicates food limitation?
2. Pup mass a proxy for Surv0+Surv1 of a cohort?
3. Long-term shifts in prey abundance, including abundant and high energy species
4. Positive correlations tween fishery CPUE and diet

<u>Future work</u>

Two-day workshop planned in December 2013

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References

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