Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission

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# Hypotheses for the difference between PS and LL indices

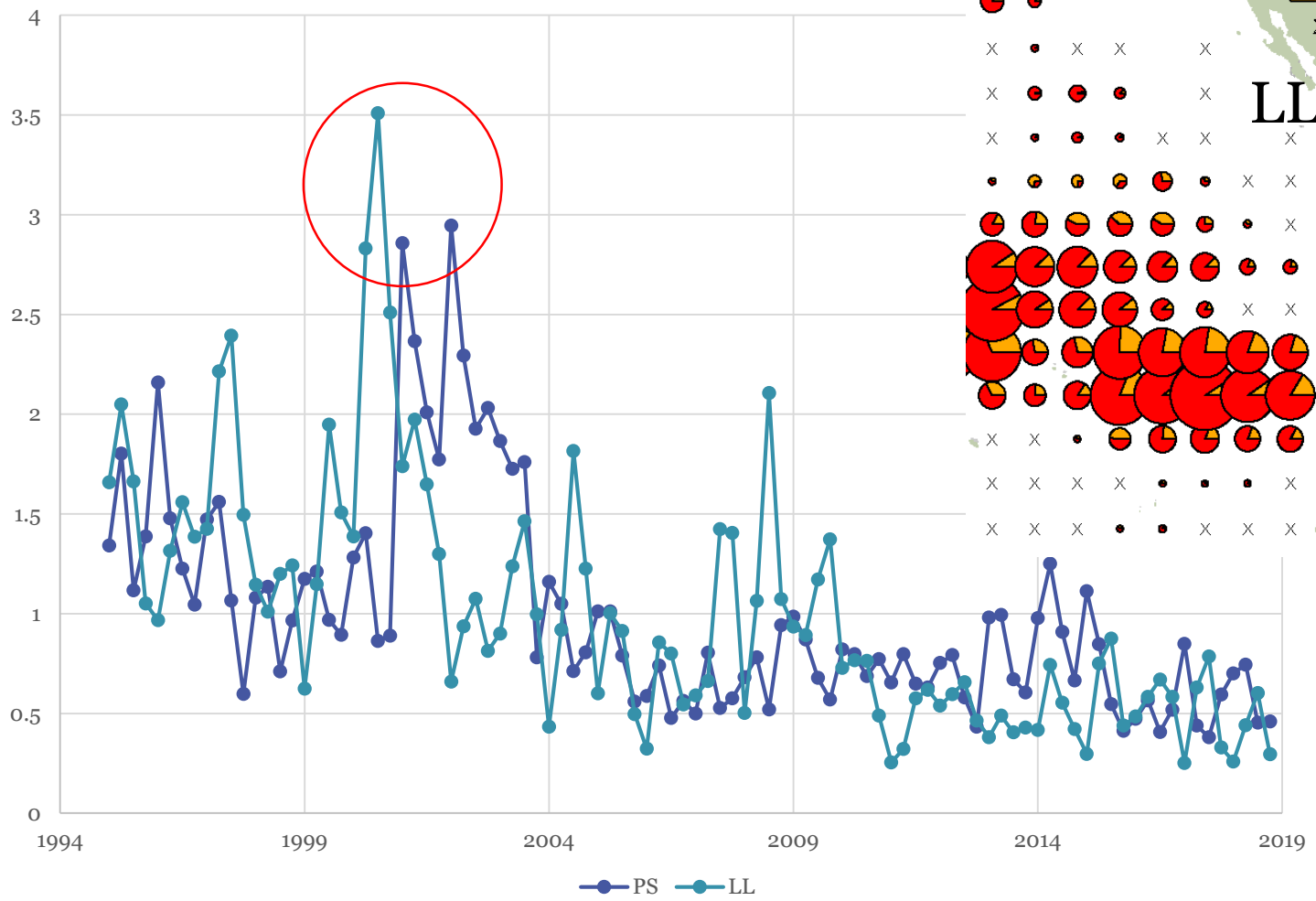
# Rationale for spatio-temporal modelling

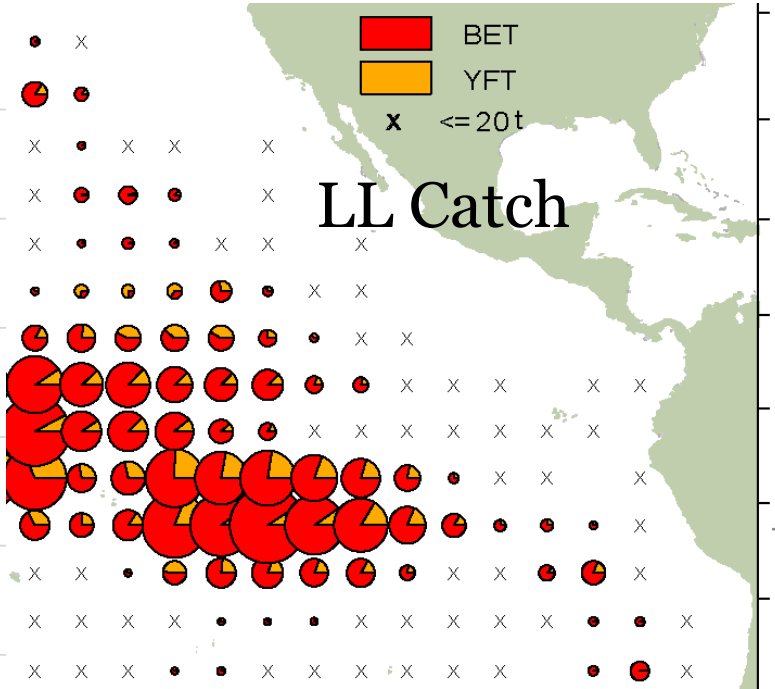
- Represent the whole population
  - Should cover, as far as practical, the whole spatial distribution of the population.
- Spatio-temporal models
  - Needed to fill in missing time-space cells
  - Augment cells with low sample sizes
- Index composition data
  - Should be weighted by the standardized CPUE rather than the catch or sample size
  - Needs to represent abundance composition.
- Remove catch at the appropriate size
  - Without providing catch-curve type information about fishing mortality and abundance
  - Creating fisheries so that selectivity is reasonably constant over time
  - Explicitly modelling time varying selectivity.

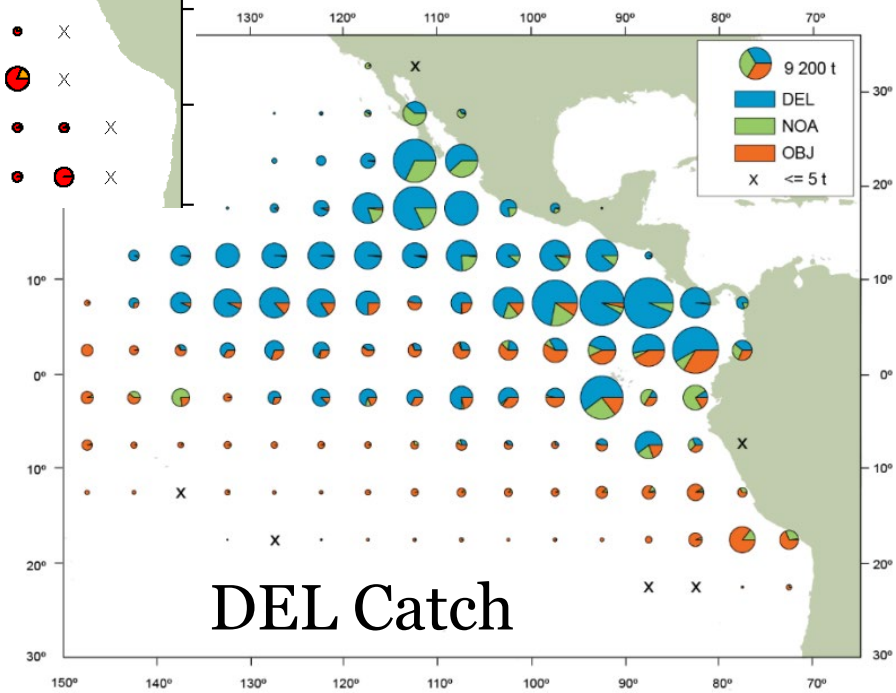
# Rationale for spatio-temporal modelling

- An index based on the whole population is not as impacted by spatial availability so:
  - Selectivity should be less time varying
  - Asymptotic selectivity is more likely
  - Might be robust to stock structure and movement

# Mis-match between LL and PS index of abundance



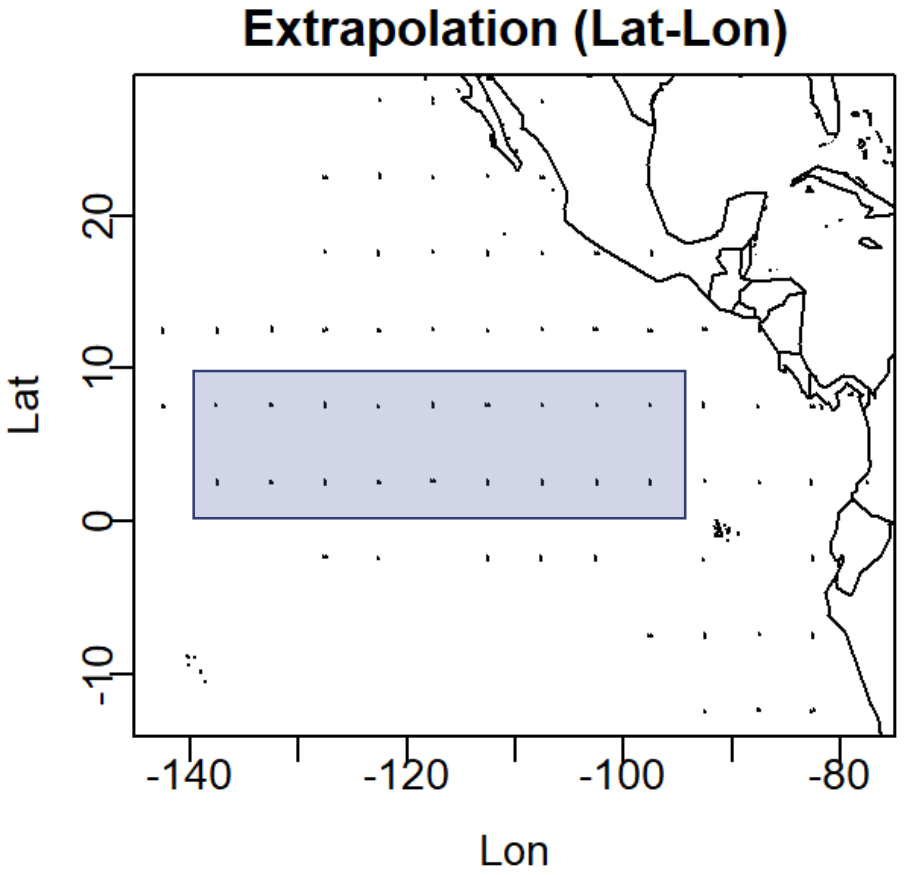
# Hypotheses to explain the timing difference in CPUE peaks

1. The DEL fishery selects older fish.
2. The dolphin fishery catches slower growing fish.
3. Recruitment occurred at different time periods.

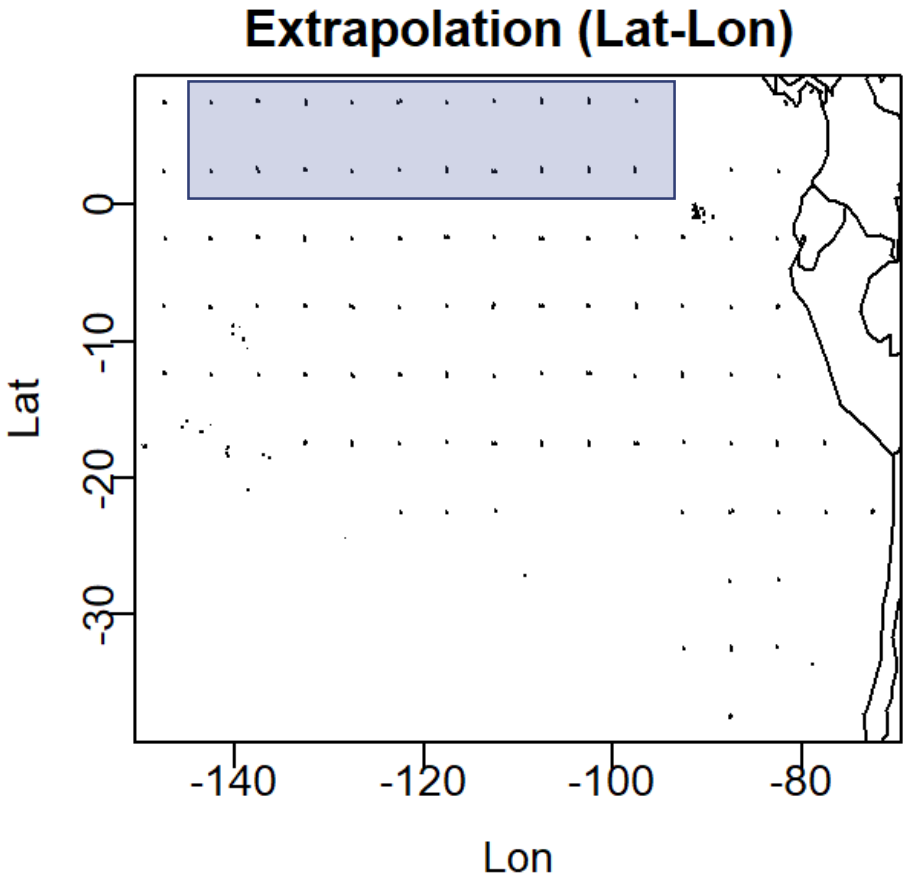
# The DEL fishery selects older fish

Compare standardized length frequency from the two fisheries **in the same area**

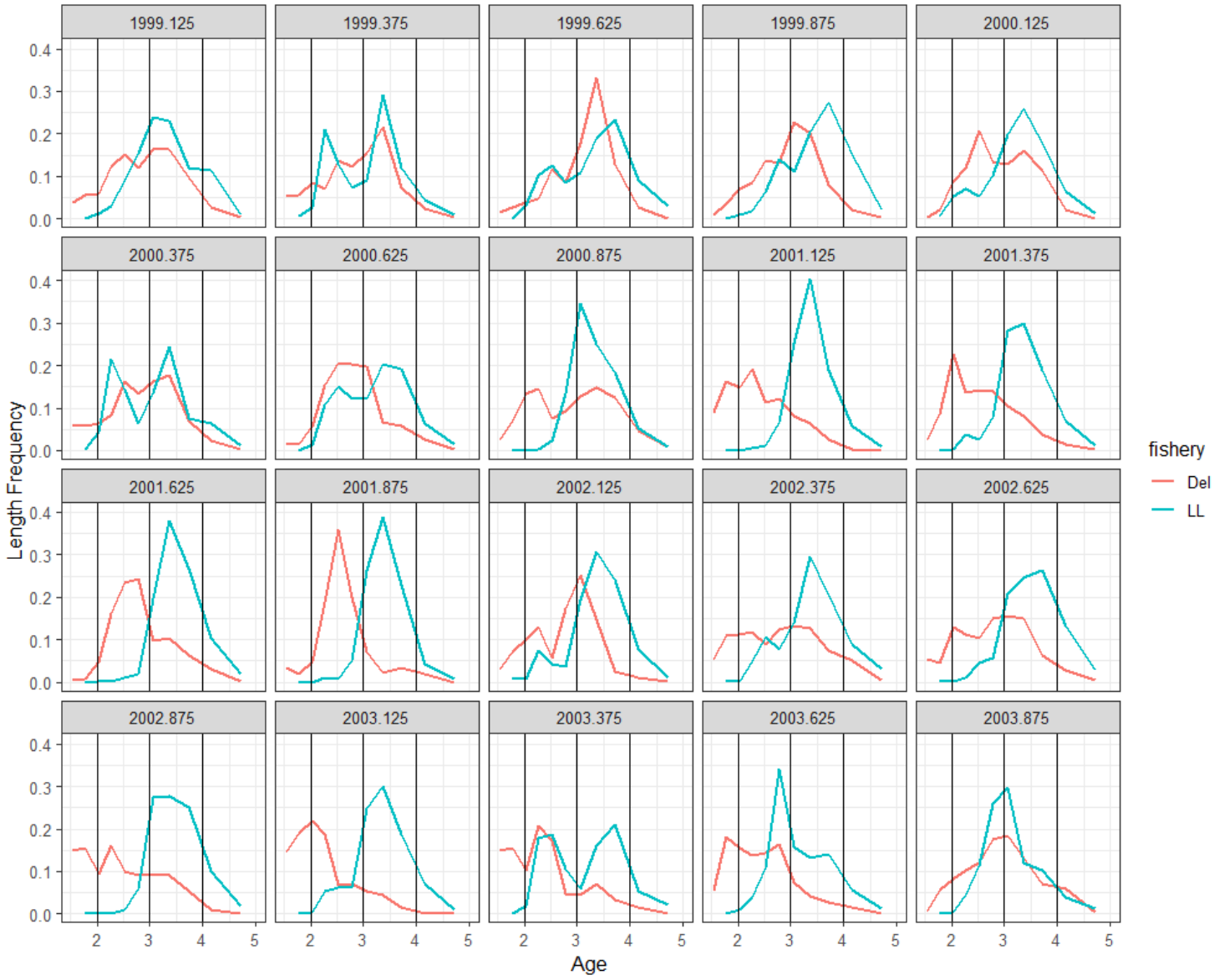
Dolphin

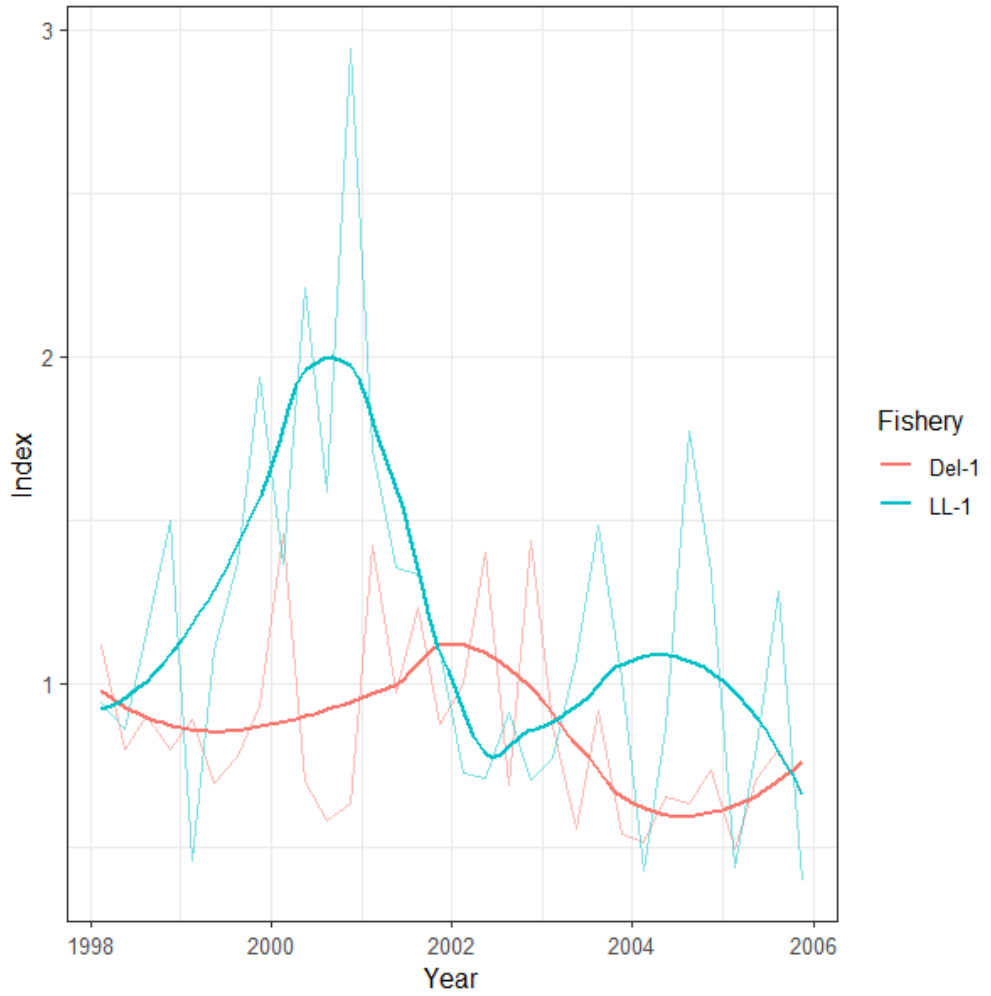



Longline



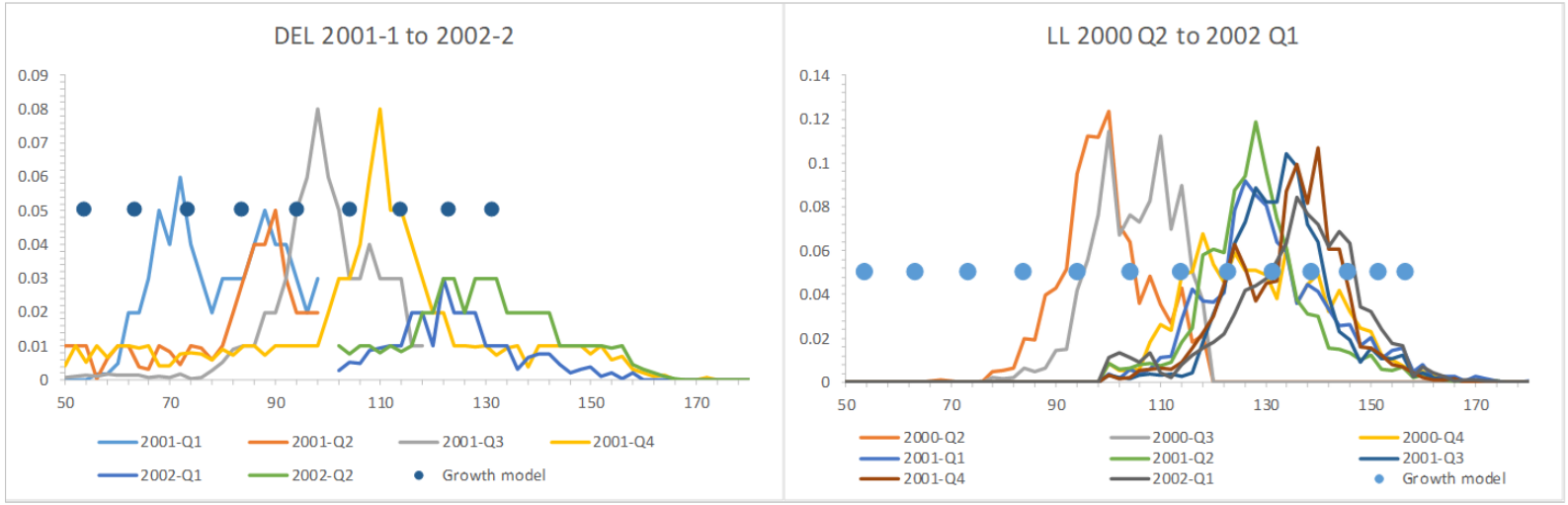
# The DEL fishery selects older fish



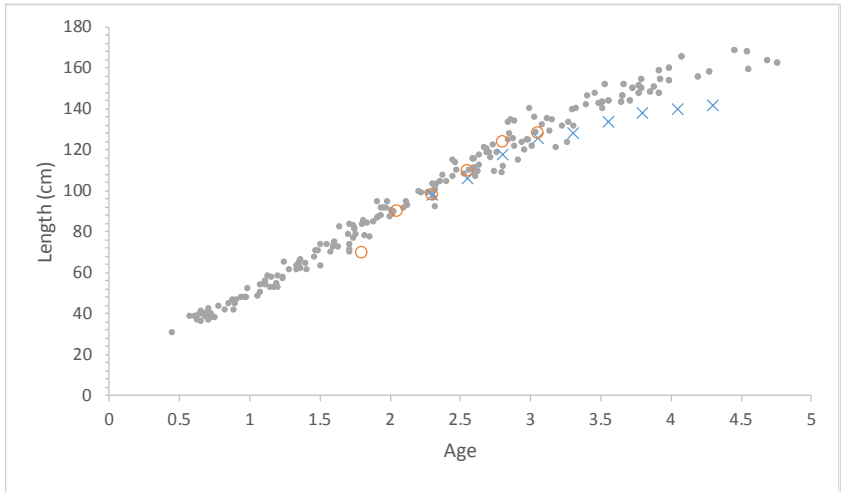
# The DEL fishery selects slower-growing fish

## Similar growth for purse seine fisheries on yellowfin associated with dolphins and longline caught fish: Growth comparison between the DEL and LL indices using modal progression



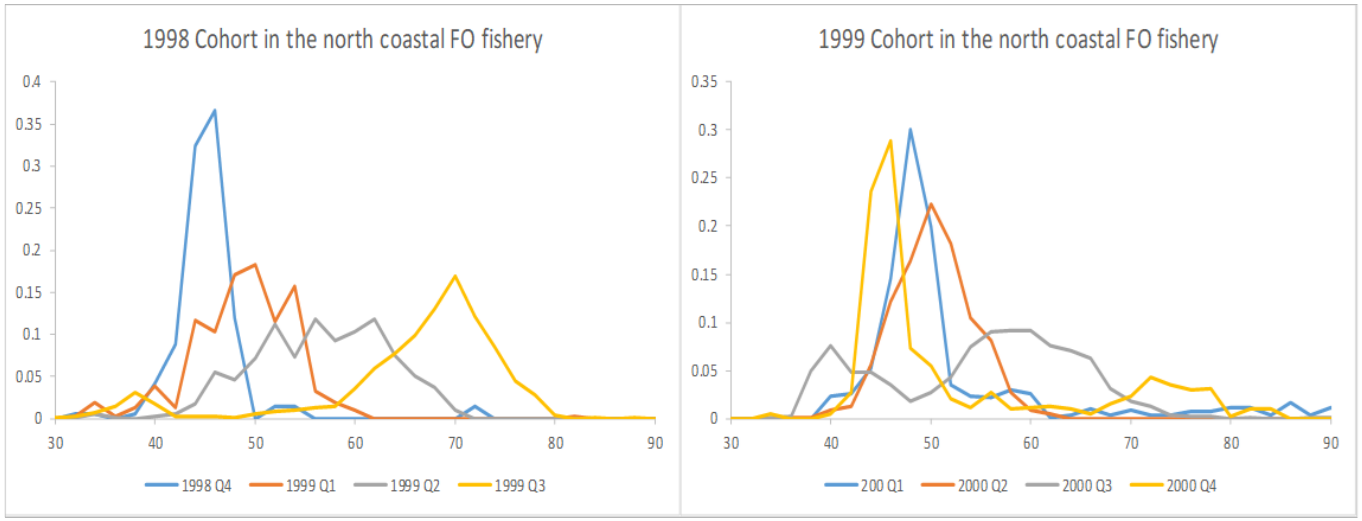






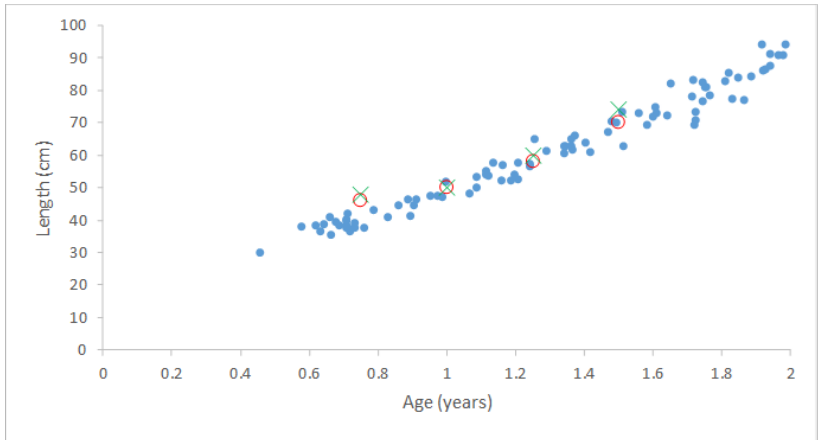
# The DEL fishery selects slower-growing fish

## 1998 and 1999 cohorts seen in the OBJ fisheries: growth rates validate two cohorts





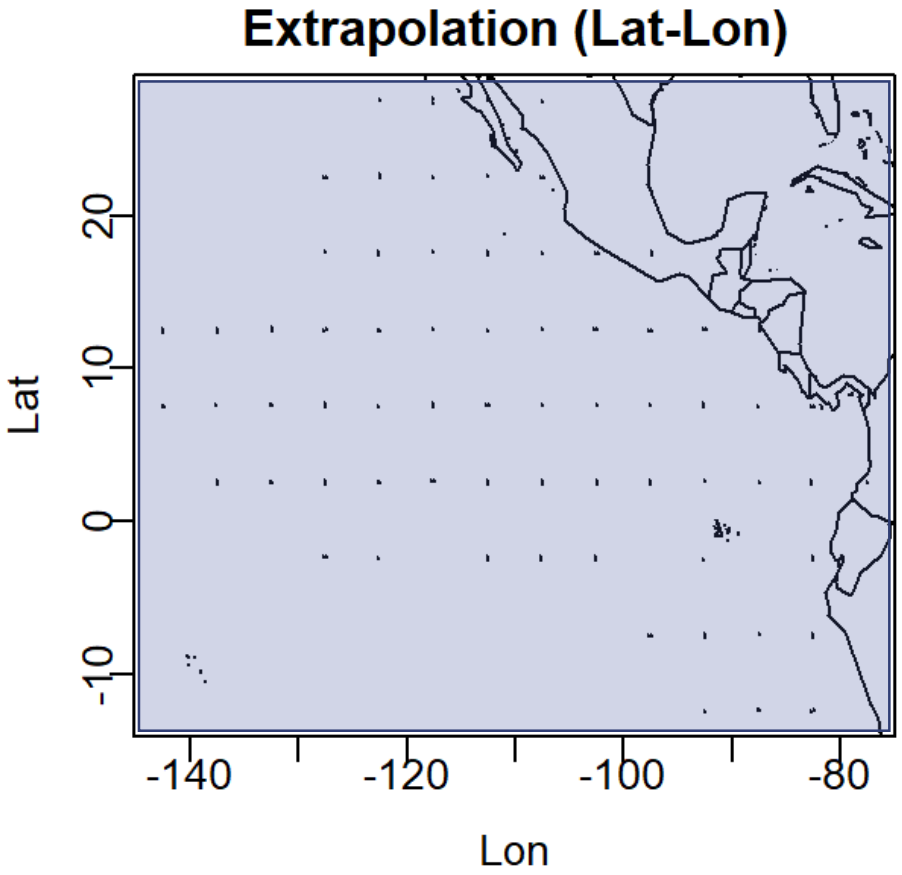




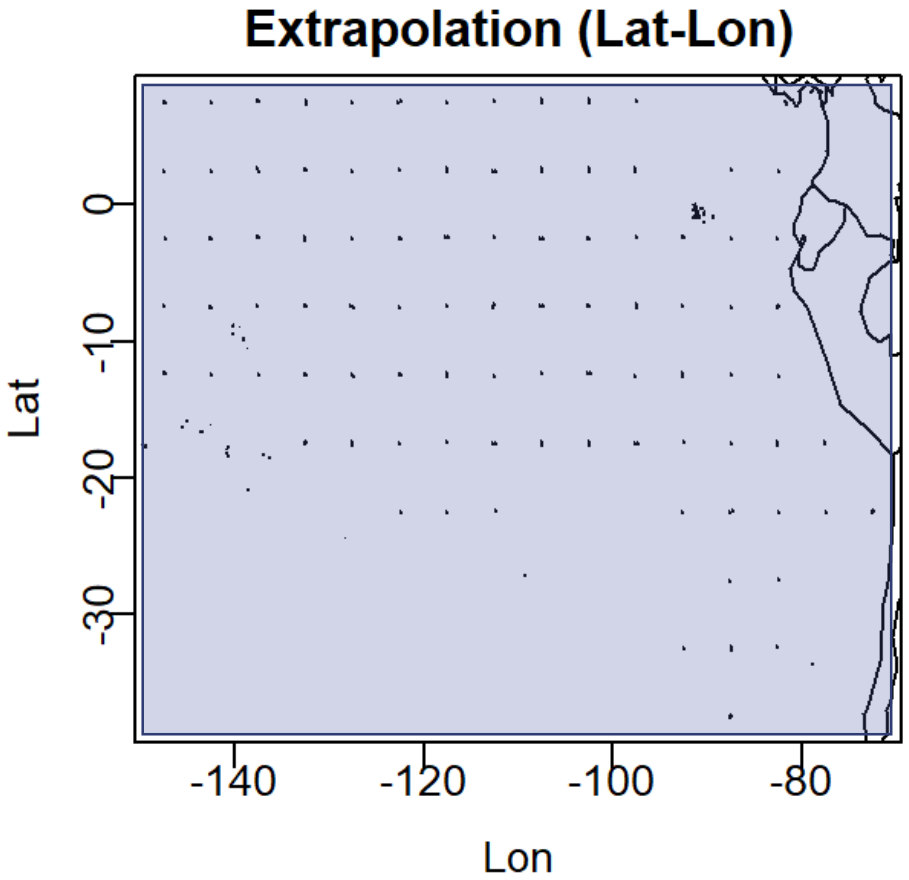
# DEL catches slower growing YFT than LL?

Compare length-specific index of abundance from the two fisheries

Dolphin

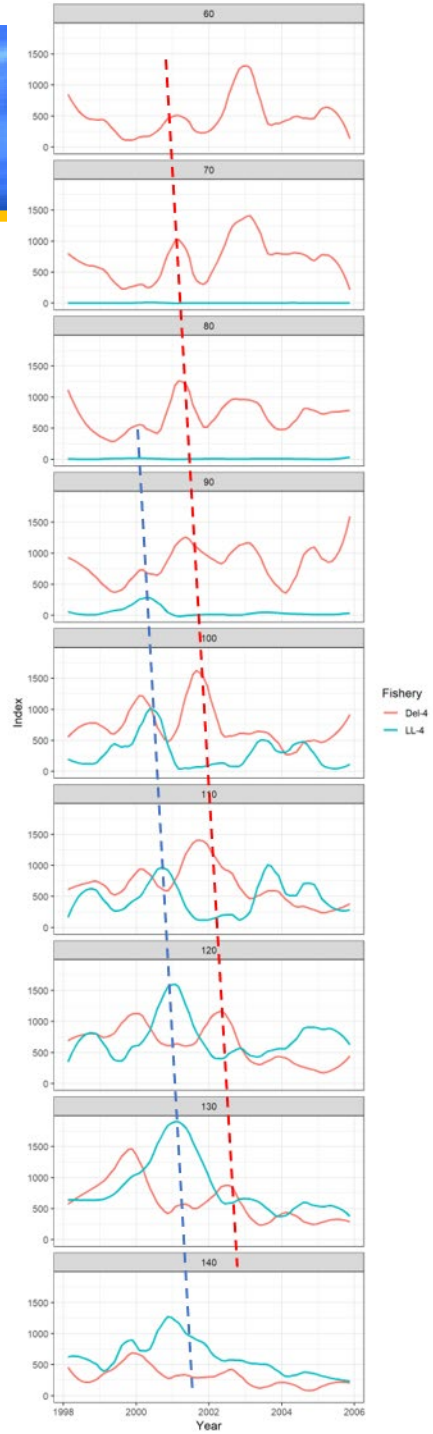



Longline



# DEL catches slower growing n LL?

Standardized length-specific (60, 70, … 140cm) index of abundance from the LL and DEL fishery:



# Hypotheses to explain the timing difference in CPUE peaks

1. The DEL fishery selects older fish.
   - The DEL fishery catches smaller yellowfin than the longline fishery
2. The dolphin fishery catches slower growing fish.
   - The growth rate of the two cohorts are similar (except possibly for the larger yellowfin in the longline fishery)
3. Recruitment occurred at different time periods.
   - Modes in the two indices extrapolated back to birth indicate they are born at different times
   - LL: the first or second quarter of 1998
   - DEL: first or second quarter of 1999
   - These birth dates also correspond to strong cohorts seen in the floating object and unassociated fisheries
   - The 1998 cohort is seen mainly in the southern fisheries and the 1999 cohort seen in the northern fisheries

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# Questions