



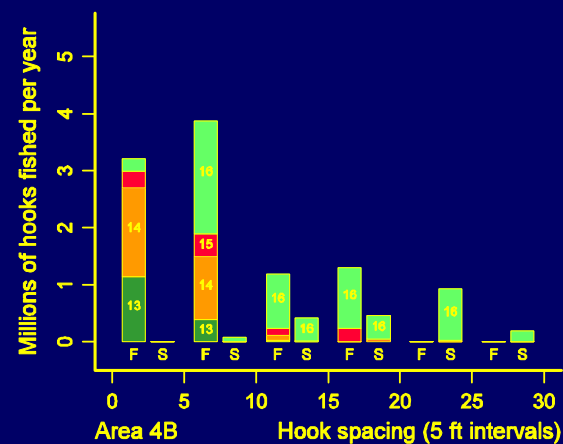
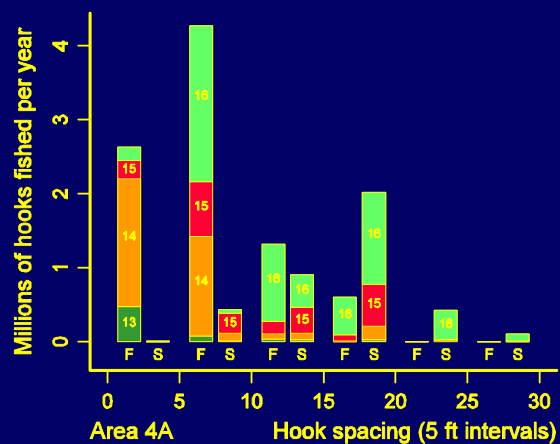
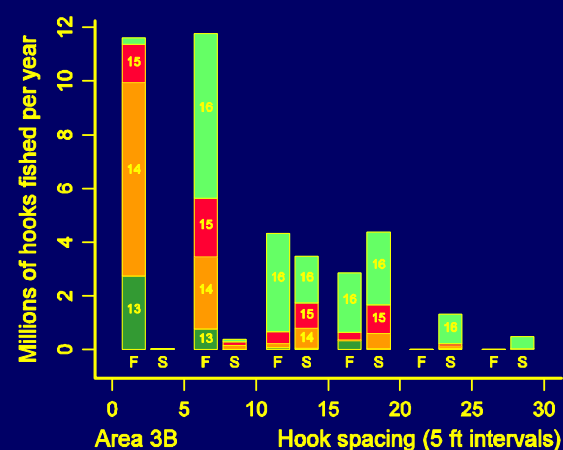
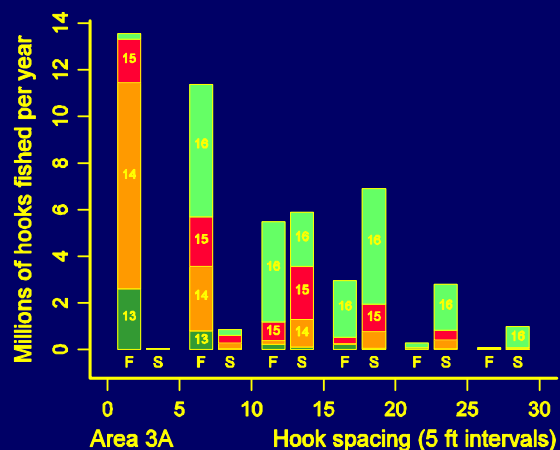
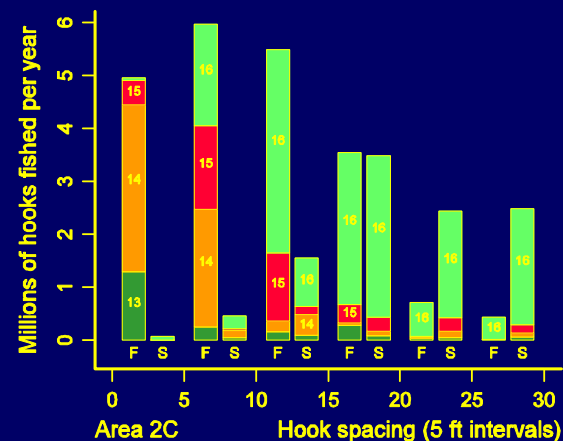
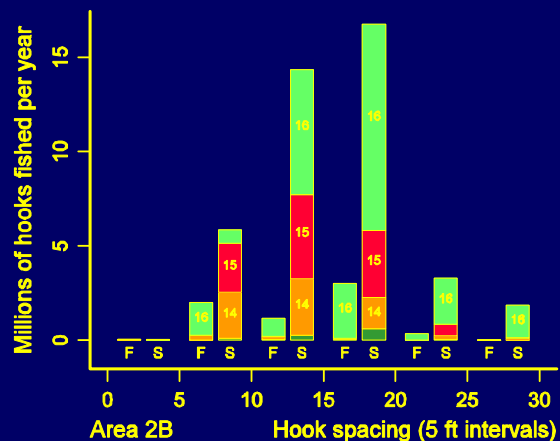
Data preprocessing

William G. Clark

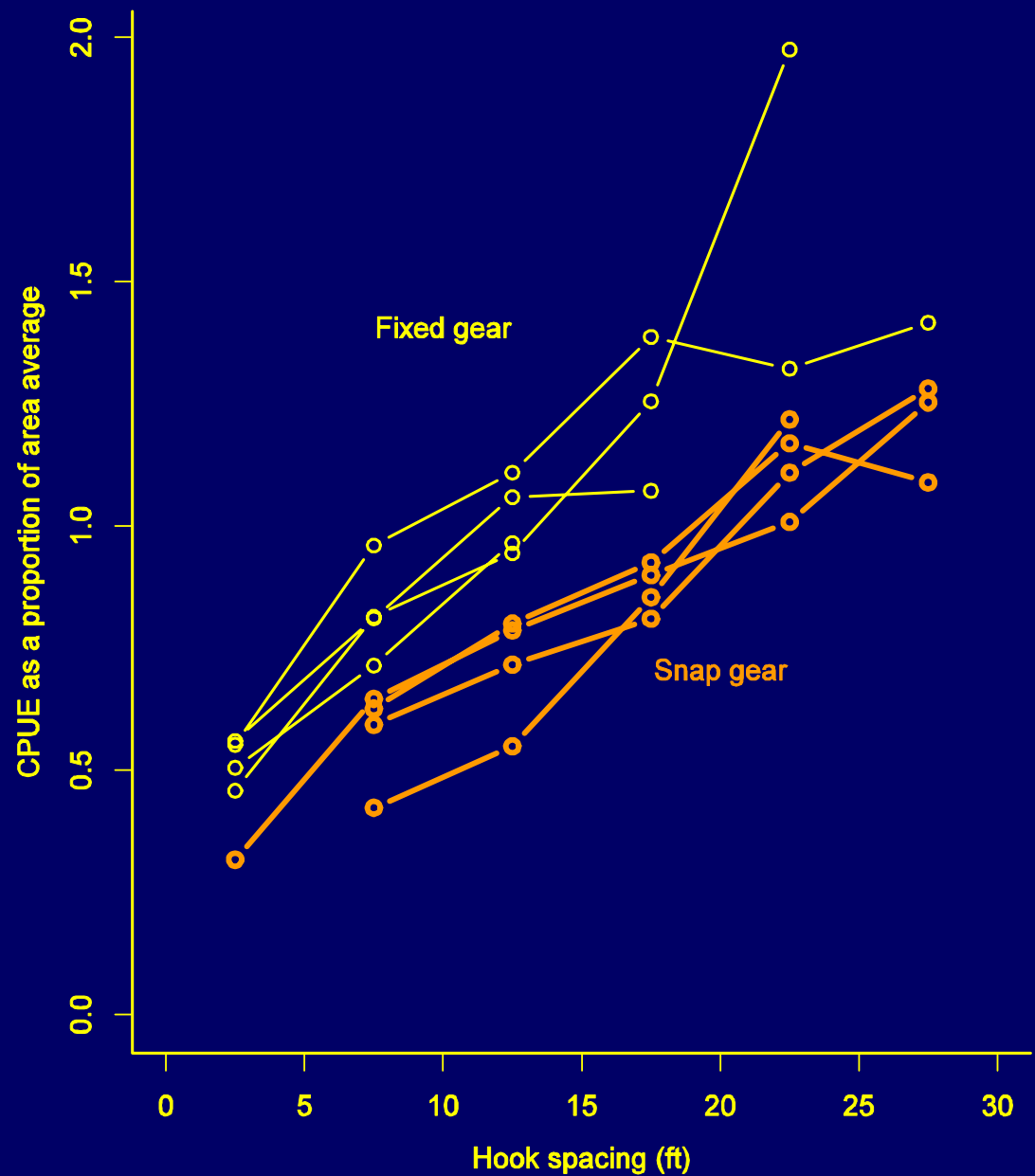
Standardization of commercial CPUE

- Commercial gear consists of a several types (fixed/snap/Autoline), hook sizes, and hook spacings.
- Commercial CPUE uses only fixed gear in Alaska, and fixed plus snap in Areas 2B and 2A.
- Commercial CPUE is adjusted for hook spacing differences using a formula dating from the 1970s.

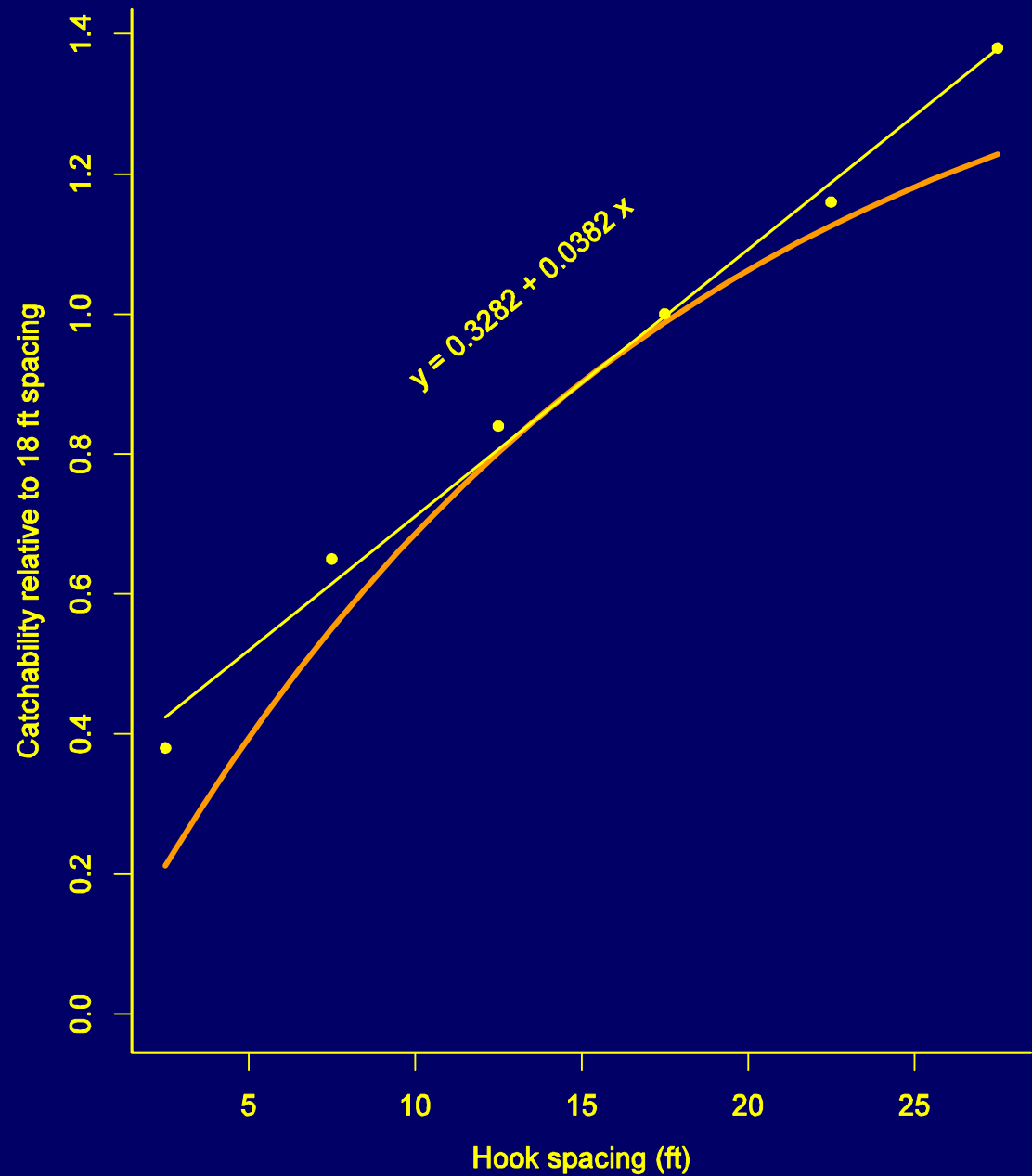
Commercial longline effort by area, gear type (fixed/snap), hook size, and hook spacing (2000-2004 data).



Effect of gear type (fixed/snap), hook spacing, and hook size on commercial CPUE.



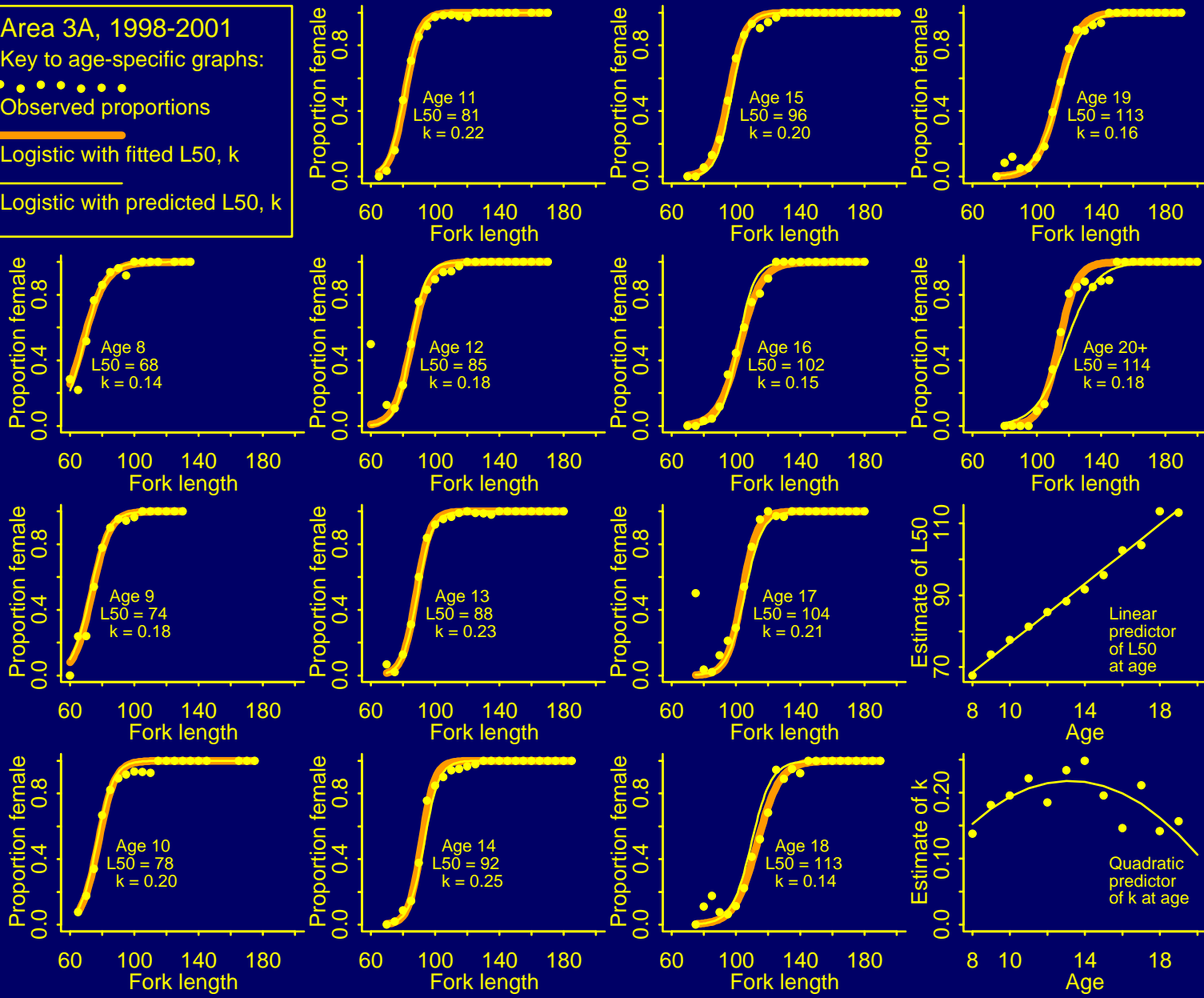
Skud's hook spacing formula (orange) and estimates from recent commercial data.



Estimation of the sex composition of commercial landings

- Halibut are gutted at sea, so commercial samples are unsexed.
- Commercial sex composition needed for the split-sex assessment begun in 2003.

Area 3A, 1998-2001
 Key to age-specific graphs:
 ●●●●●●●●●●
 Observed proportions
 ————
 Logistic with fitted L50, k
 ————
 Logistic with predicted L50, k



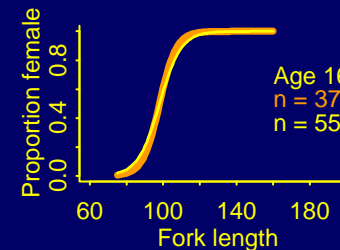
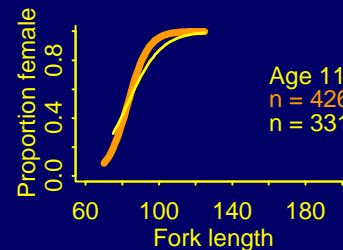
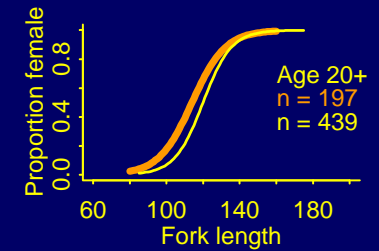
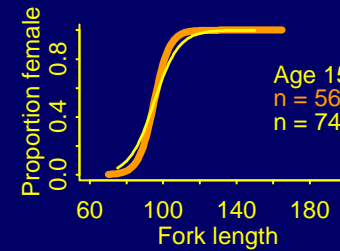
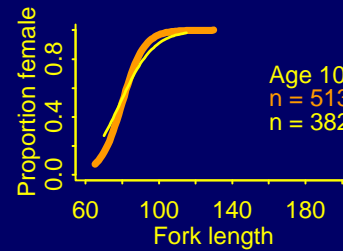
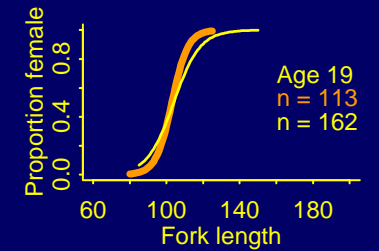
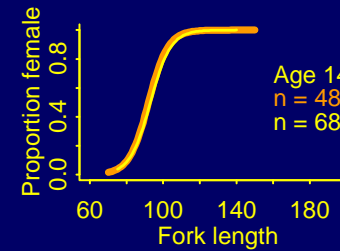
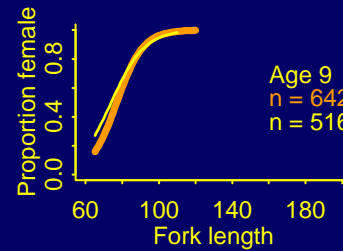
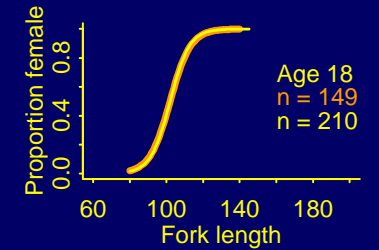
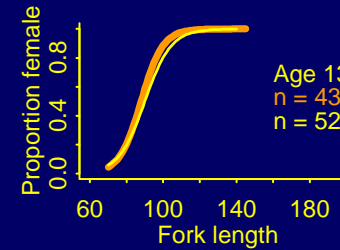
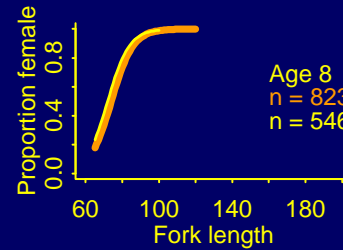
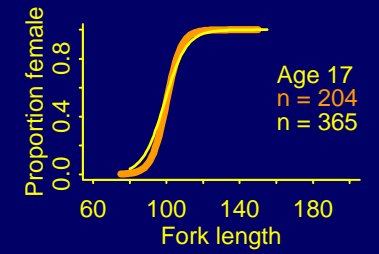
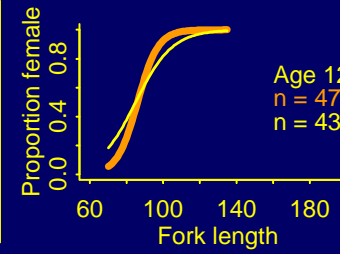
Logistic predictors of the porportion female at length within age.

Logistic predictors do not vary with depth.

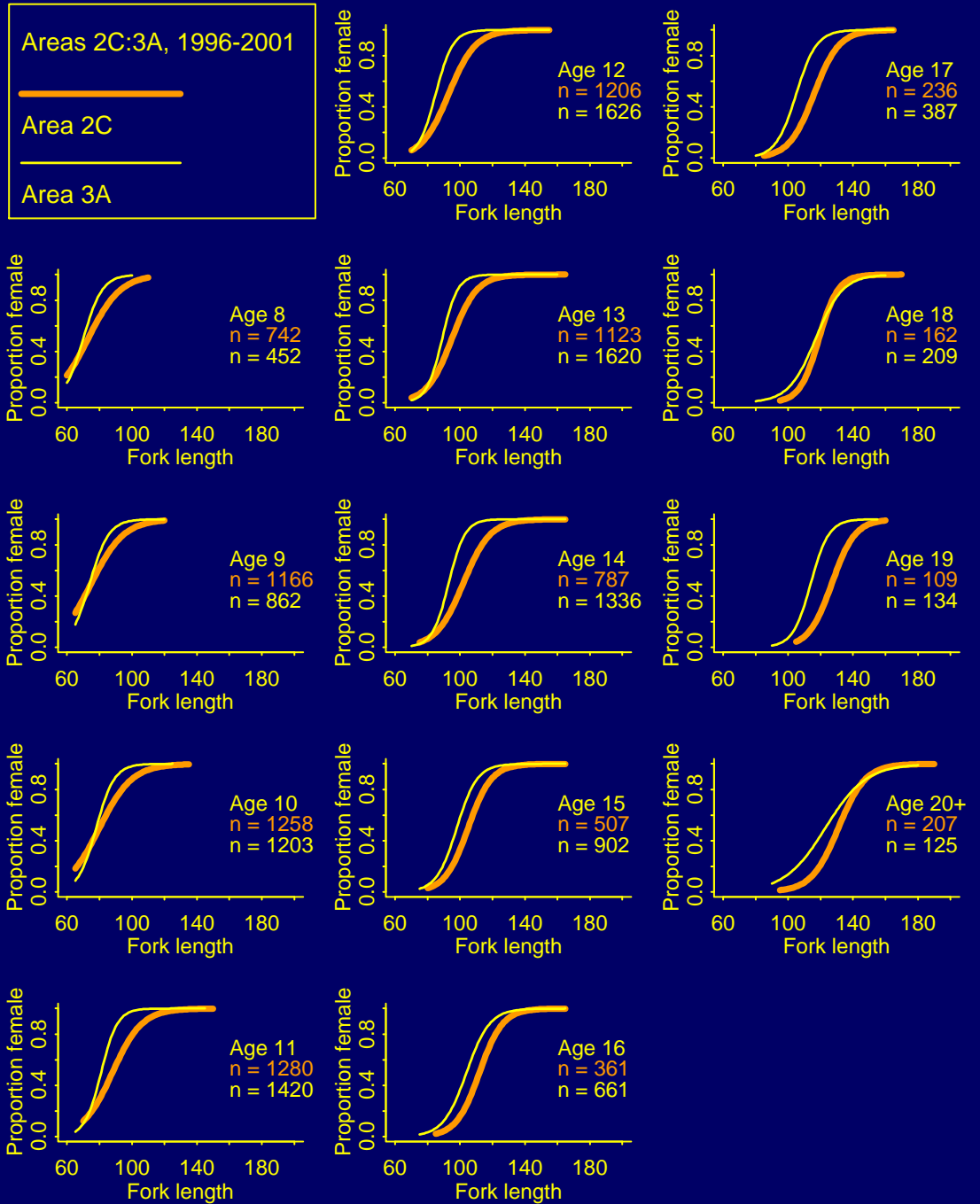
Area 2, 2002-2003

Shallower stations

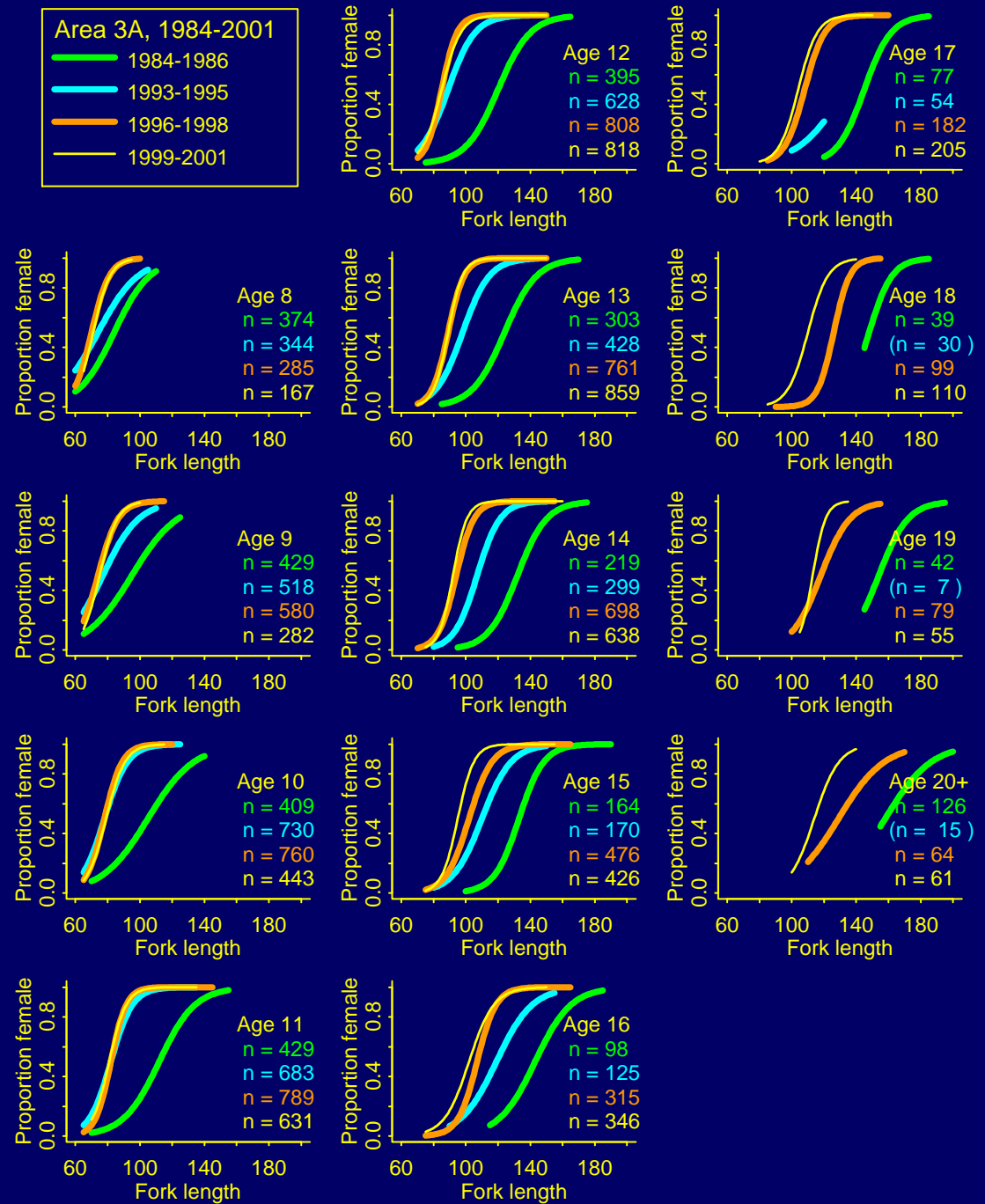
Deeper stations



Logistic predictors do vary among regulatory areas.



Logistic predictors have changed over time within regulatory areas because growth has changed.



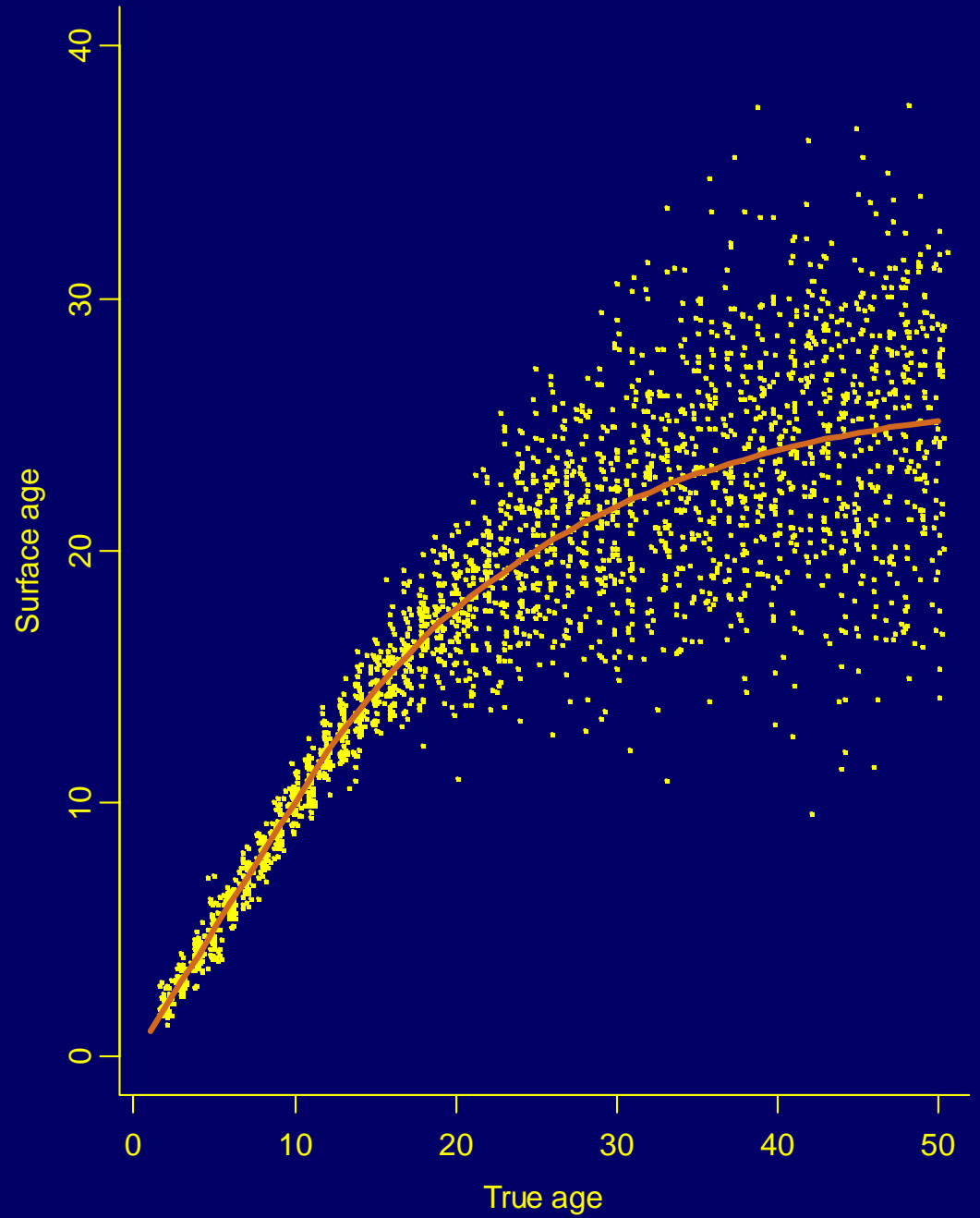
Sex decomposition calculations

- Fitted logistics are used to assign a probability of being female to each fish in the commercial sample, based on its age and length.
- These probabilities are used to estimate the sex ratio of each age group and the length distributions of females and males therein.
- Survey data are available for Areas 3B and 4 only back to 1996, so that is the start of the assessment data series.

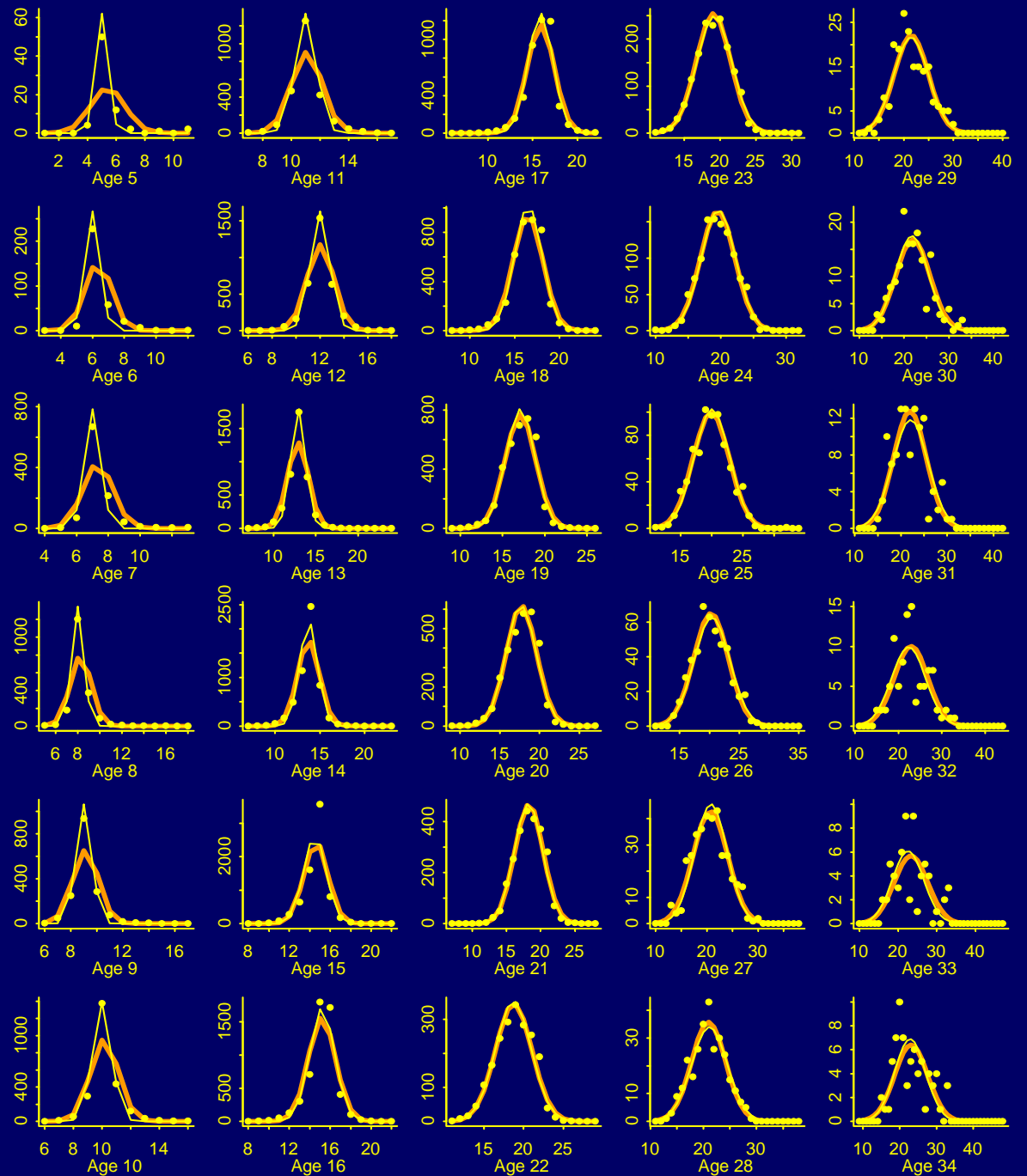
Estimation of age misclassification

- Age readings are all surface readings through 2001, and all break-and-burn since then.
- Estimated misclassification matrices are applied to both kinds of age compositions.

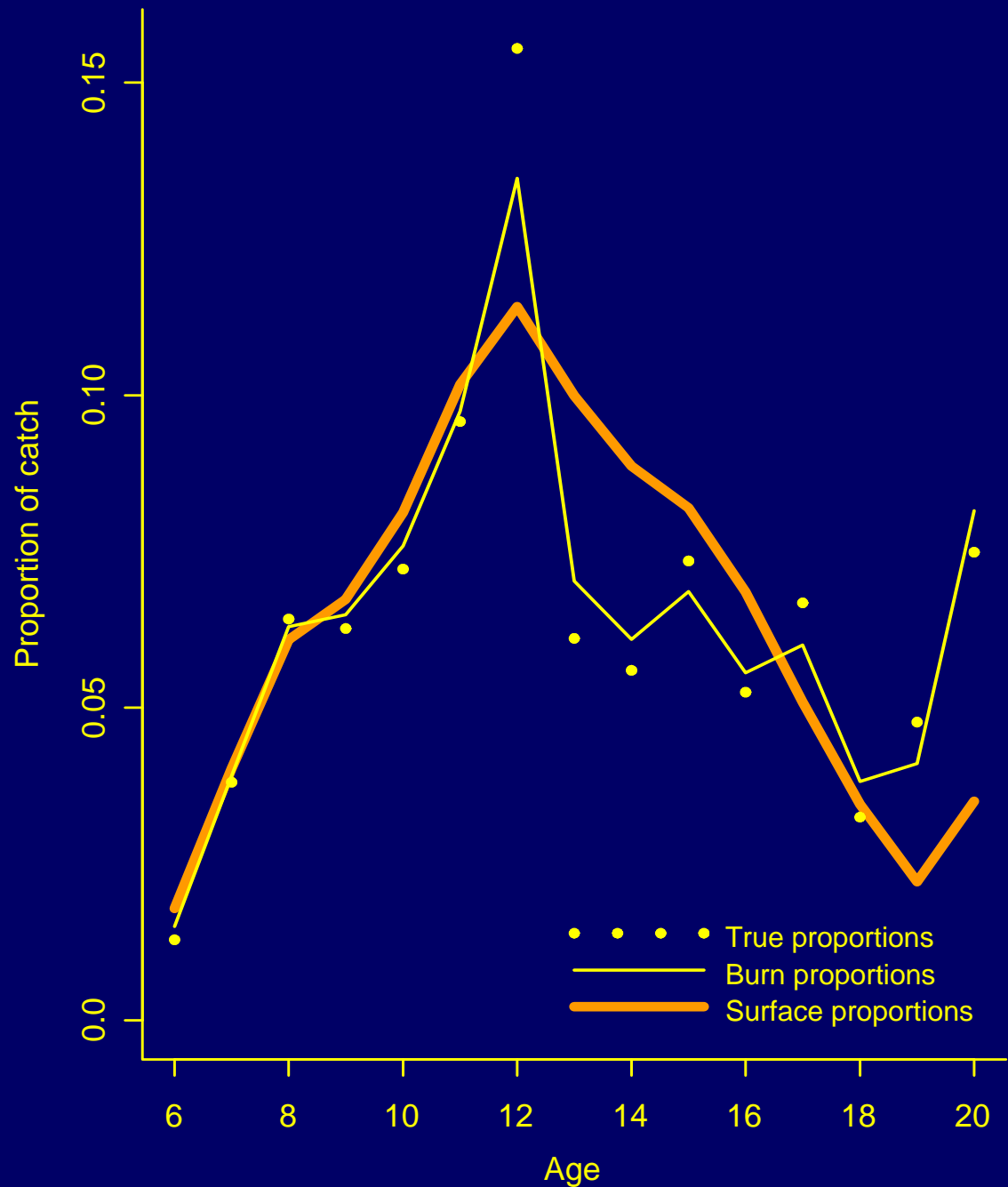
Distribution of surface ages.



Normal or near-normal distributions of surface age readings at each break-and-burn age.



Surface and burn
age compositions in
the presence of
variation in year
class strength.



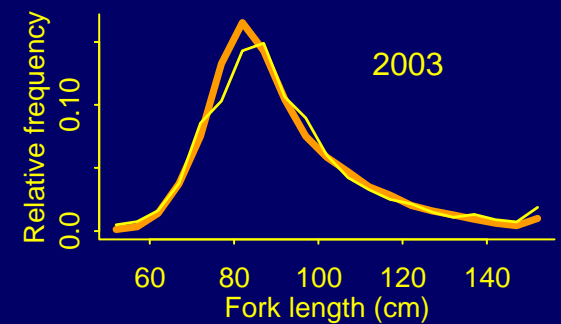
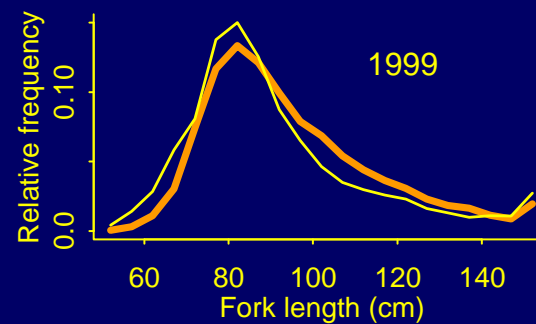
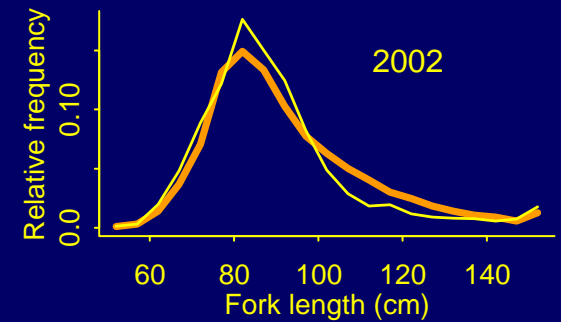
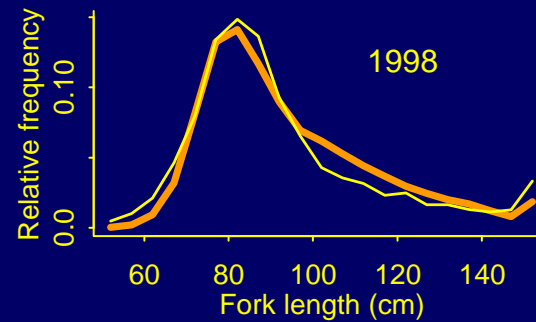
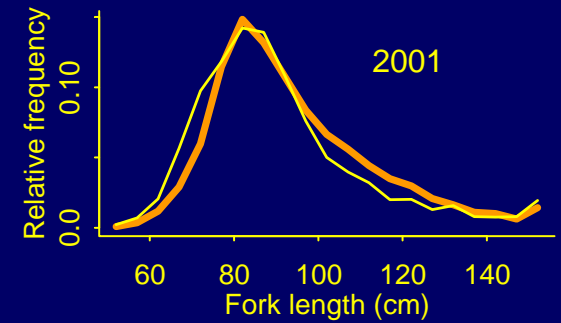
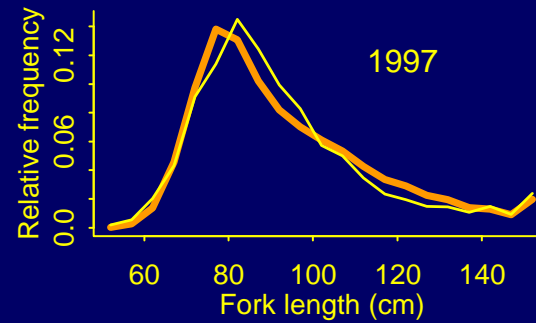
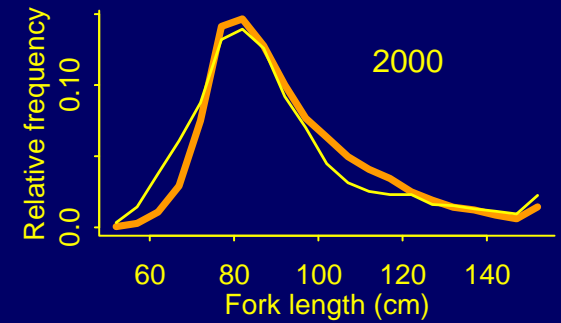
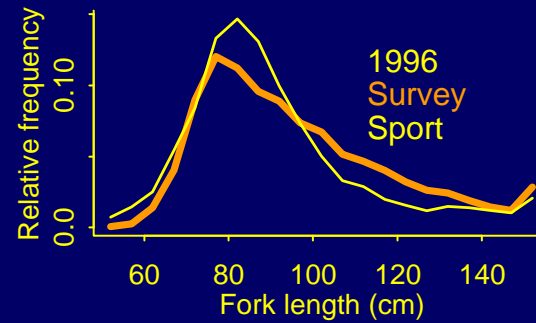
Estimation of size at age

- What size? Commercial, survey, bycatch?
- What age? True, break-and-burn, surface?

Survey size at age/sex

- Survey and commercial selectivity are treated as functions of survey mean length at age/sex.
- Spawning biomass and spawning biomass per recruit are computed using survey sizes.
- Mean survey size at true age is estimated externally for selectivity predictions in the surface age years.
- Survey size imputed to sport/personal catch.

Sport and survey length compositions from Area 3A.

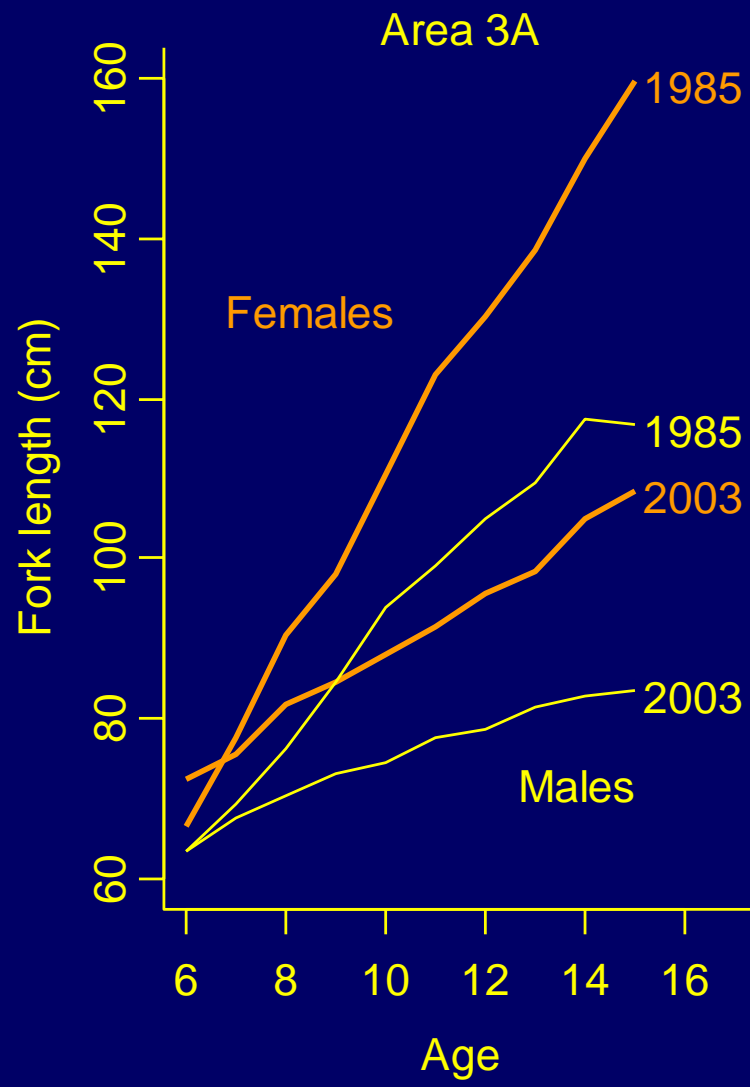
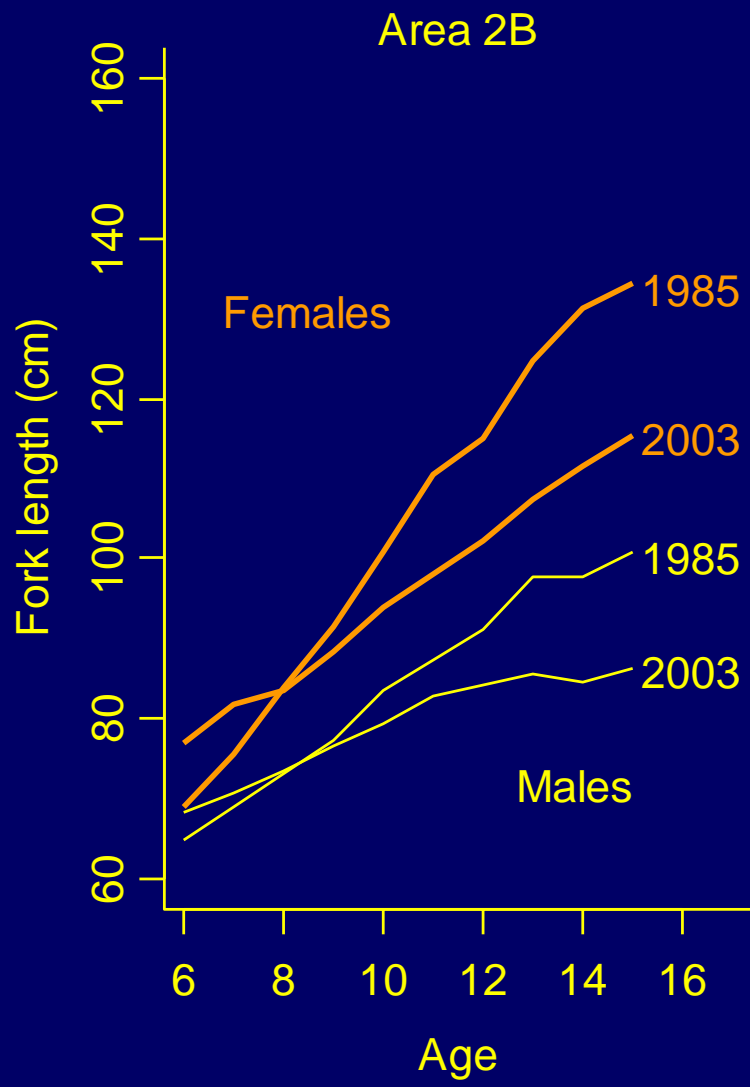


Commercial size at age/sex

- Commercial weight at age/sex is used to estimate catch in number from catch in weight, and to calculate exploitable biomass.

Bycatch size at age/sex

- Bycatch selectivity at age/sex is treated as a function of mean length at age/sex in the bycatch.
- Size at age/sex in the bycatch through age six is estimated from NMFS trawl survey data.
- Bycatch size at age/sex above age six is estimated from setline survey data and regressions of trawl size at age on setline survey size at age.
- Bycatch size at true age is estimated in the surface age years for selectivity predictions.

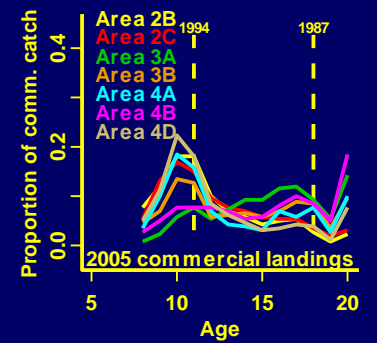
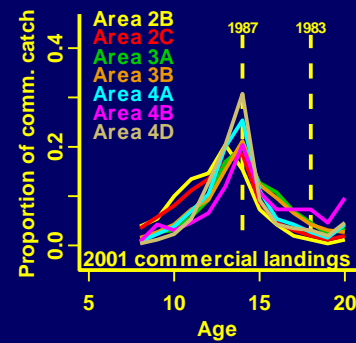
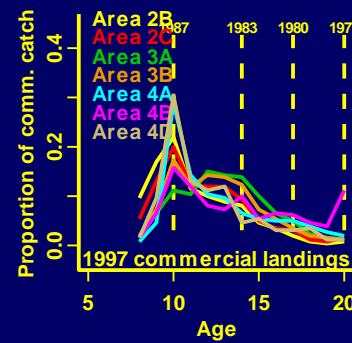
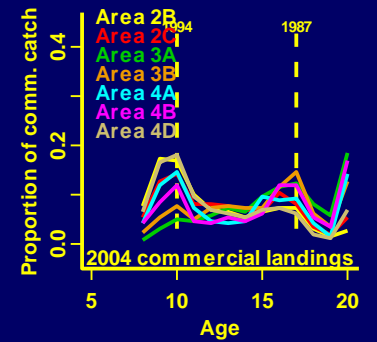
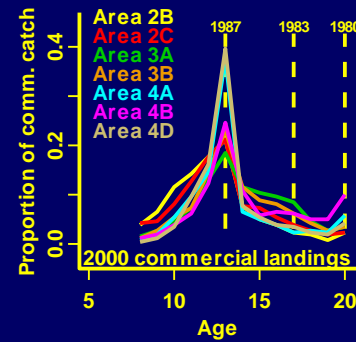
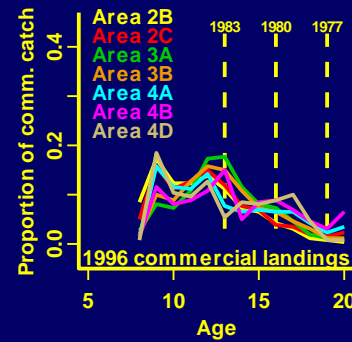
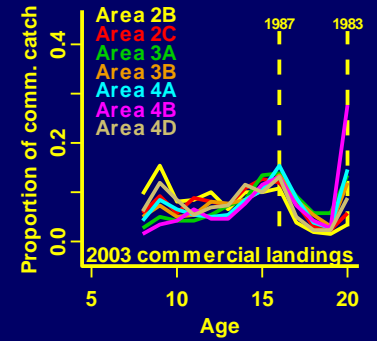
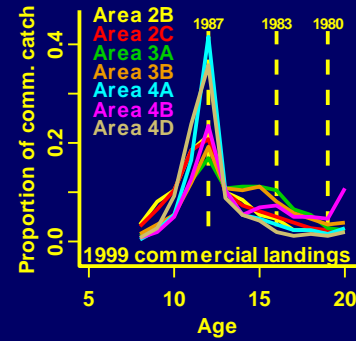
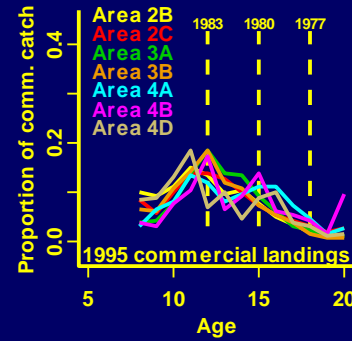
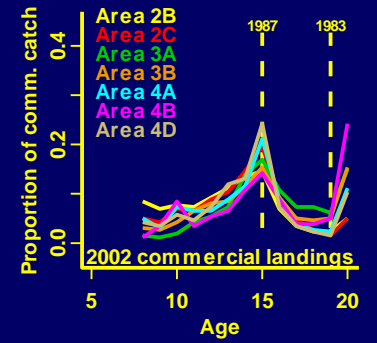
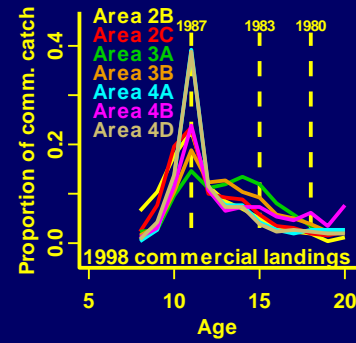
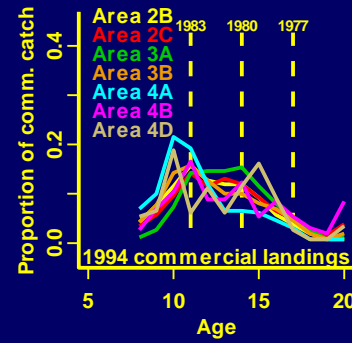


Dramatic decline in halibut growth.

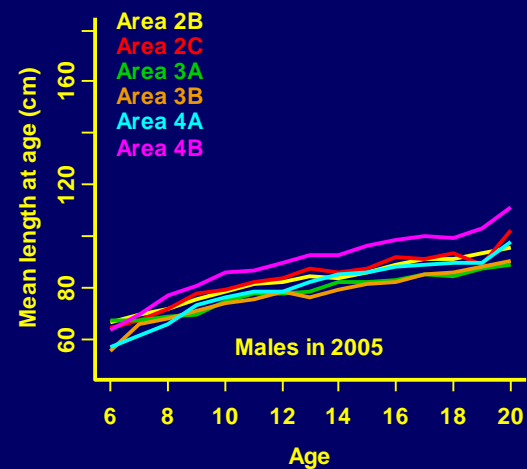
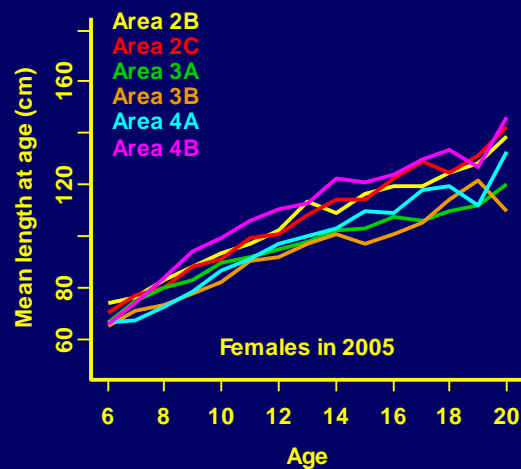
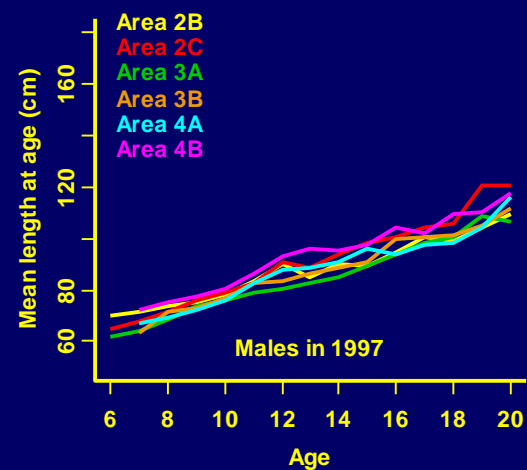
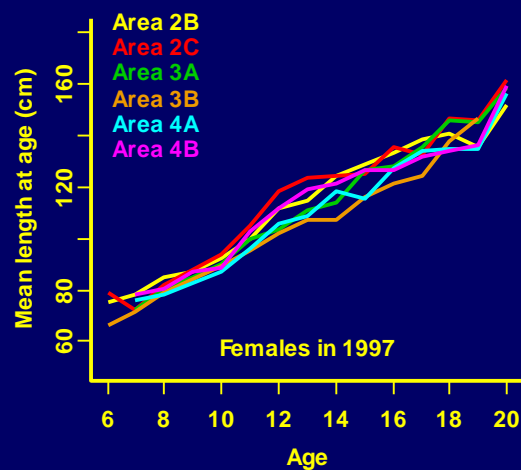
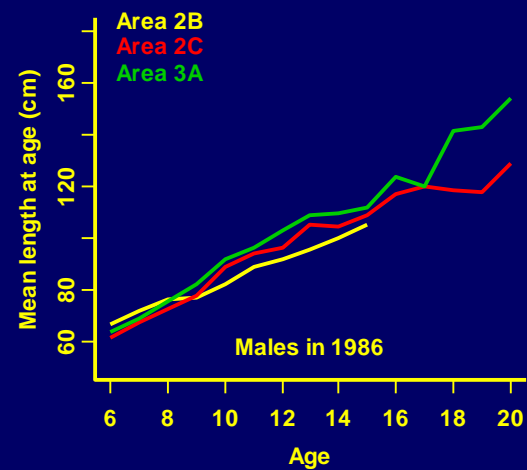
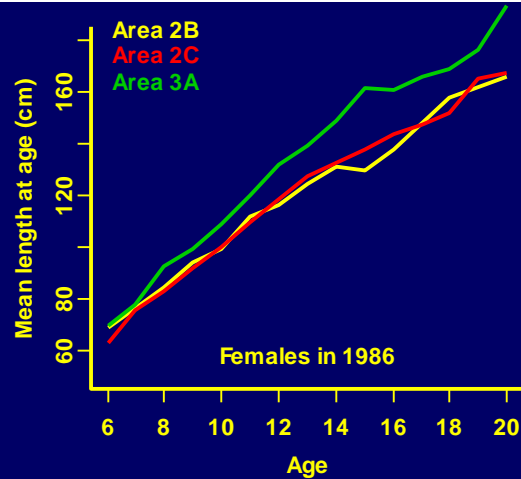
Compilation of coastwide data

- Catches (incl. commercial catch at age/sex) are summed across areas.
- Commercial and survey CPUE are area-weighted.
- Survey age/sex compositions are abundance-weighted (survey CPUE in total number \times bottom area).

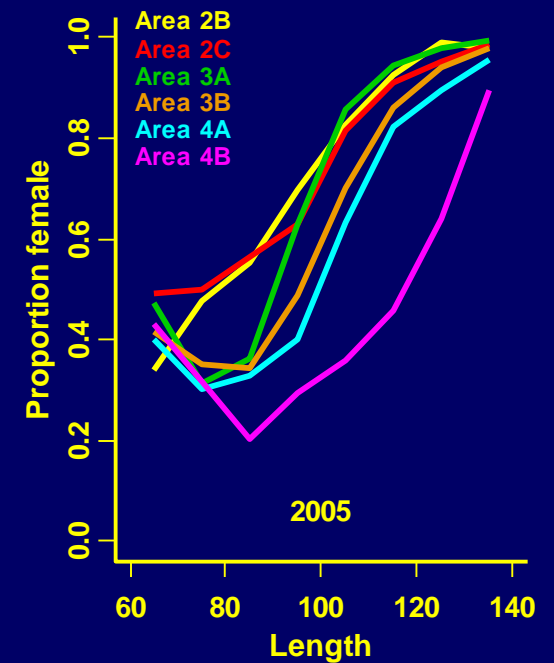
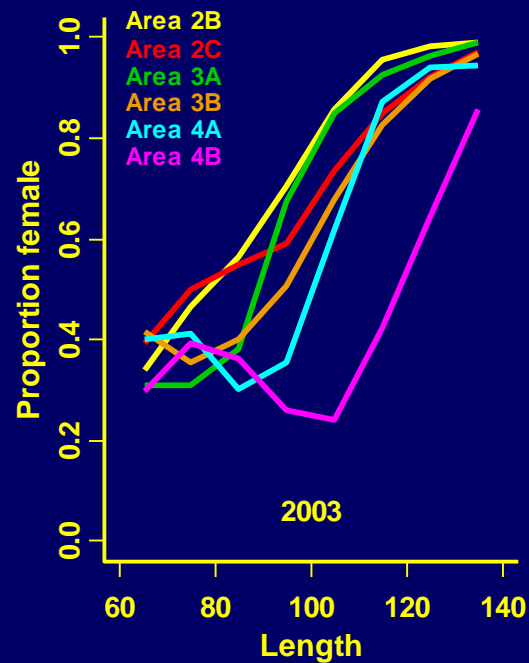
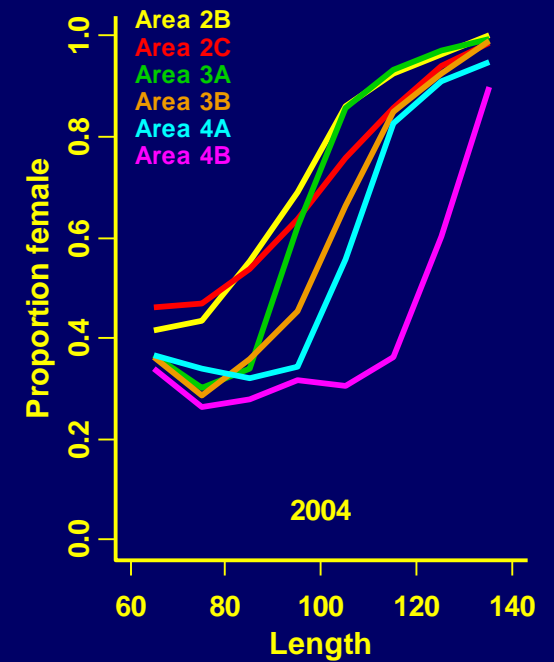
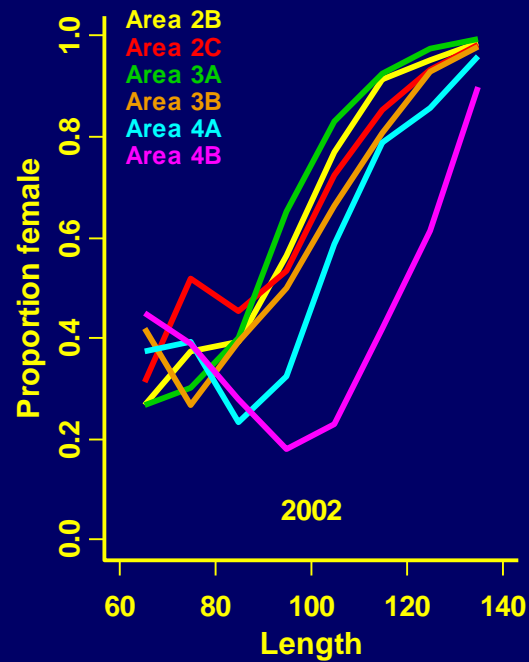
Commercial age compositions by sex, 1994-2005.



Survey length at age by sex, 1986-2005.



Survey sex composition at length, 2002-2004.

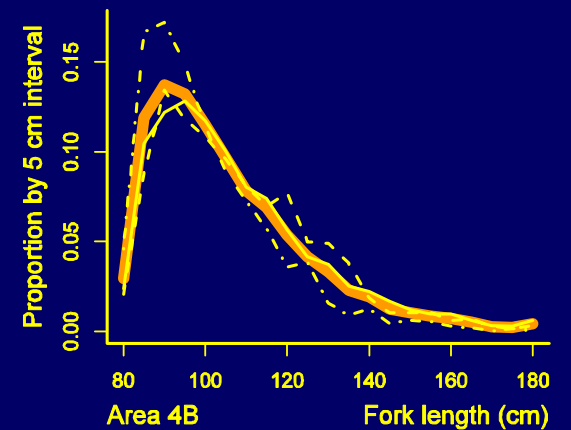
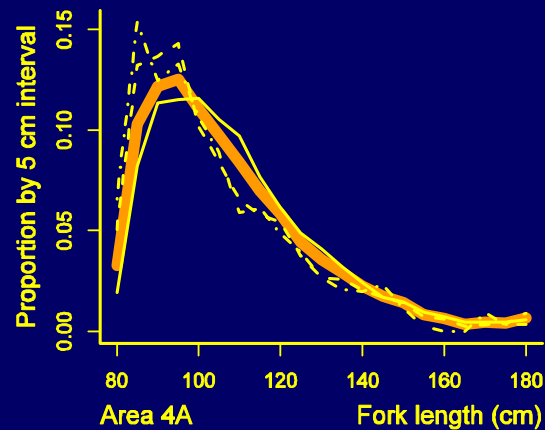
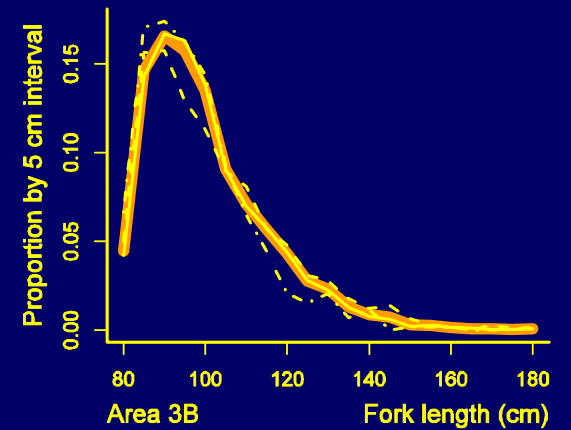
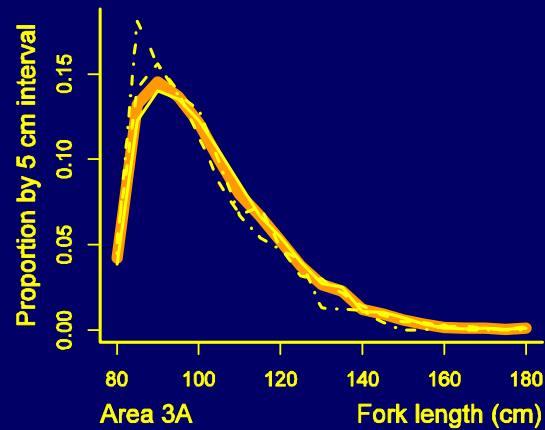
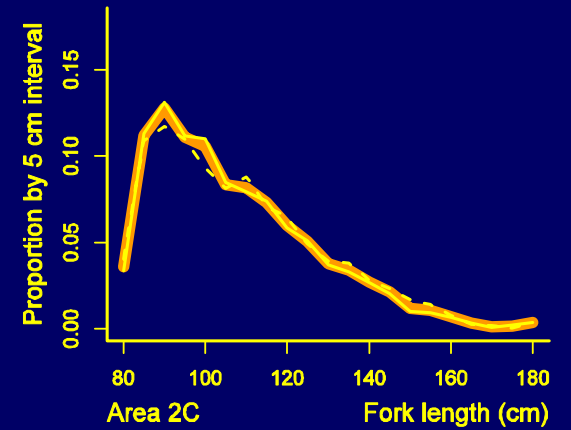
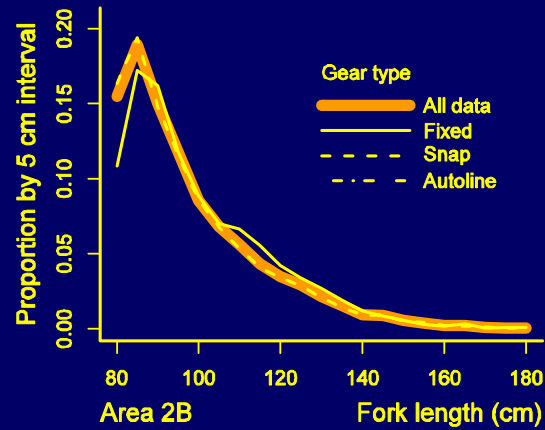


Estimation of sampling variances

- Age compositions are treated as multinomials with the stated sample sizes.
- Setline survey CPUE is treated as a random sample of stations from each area/year.
- Commercial CPUE is assigned a CV of 0.05 based on the dispersion of points around smoothers.

Stop here.

Length frequencies of commercial landings by gear type and area.



Depth distribution of female and male survey catches in Area 3B, 1996-2001.

