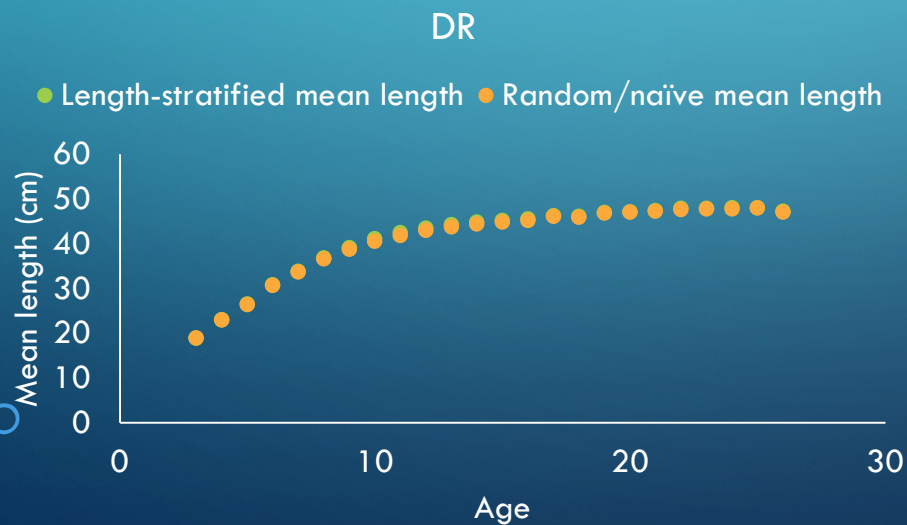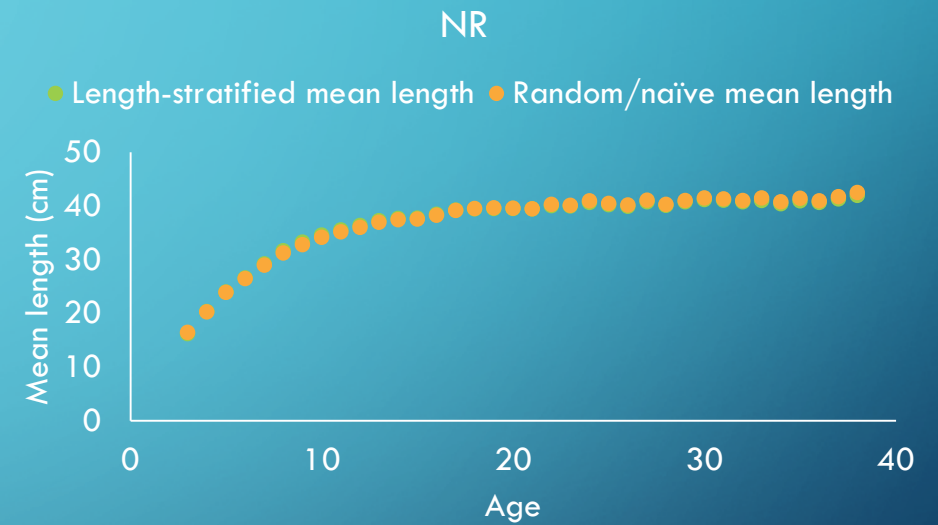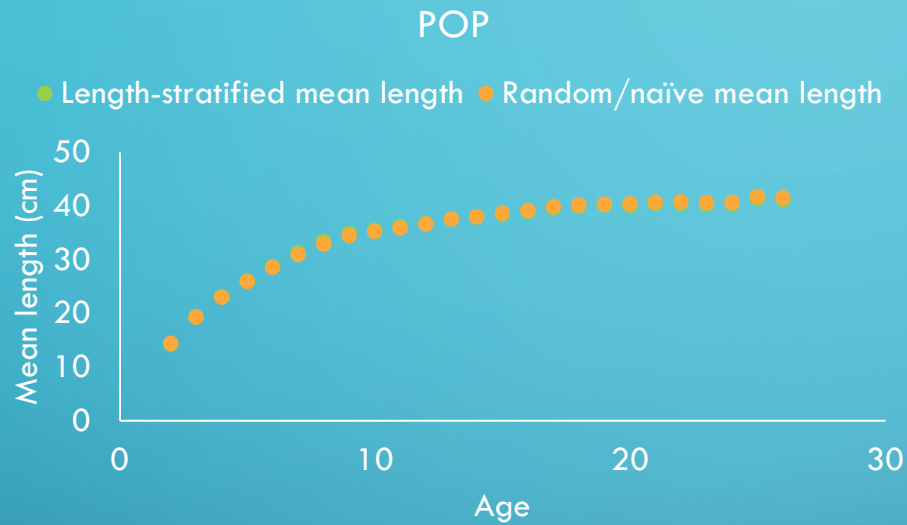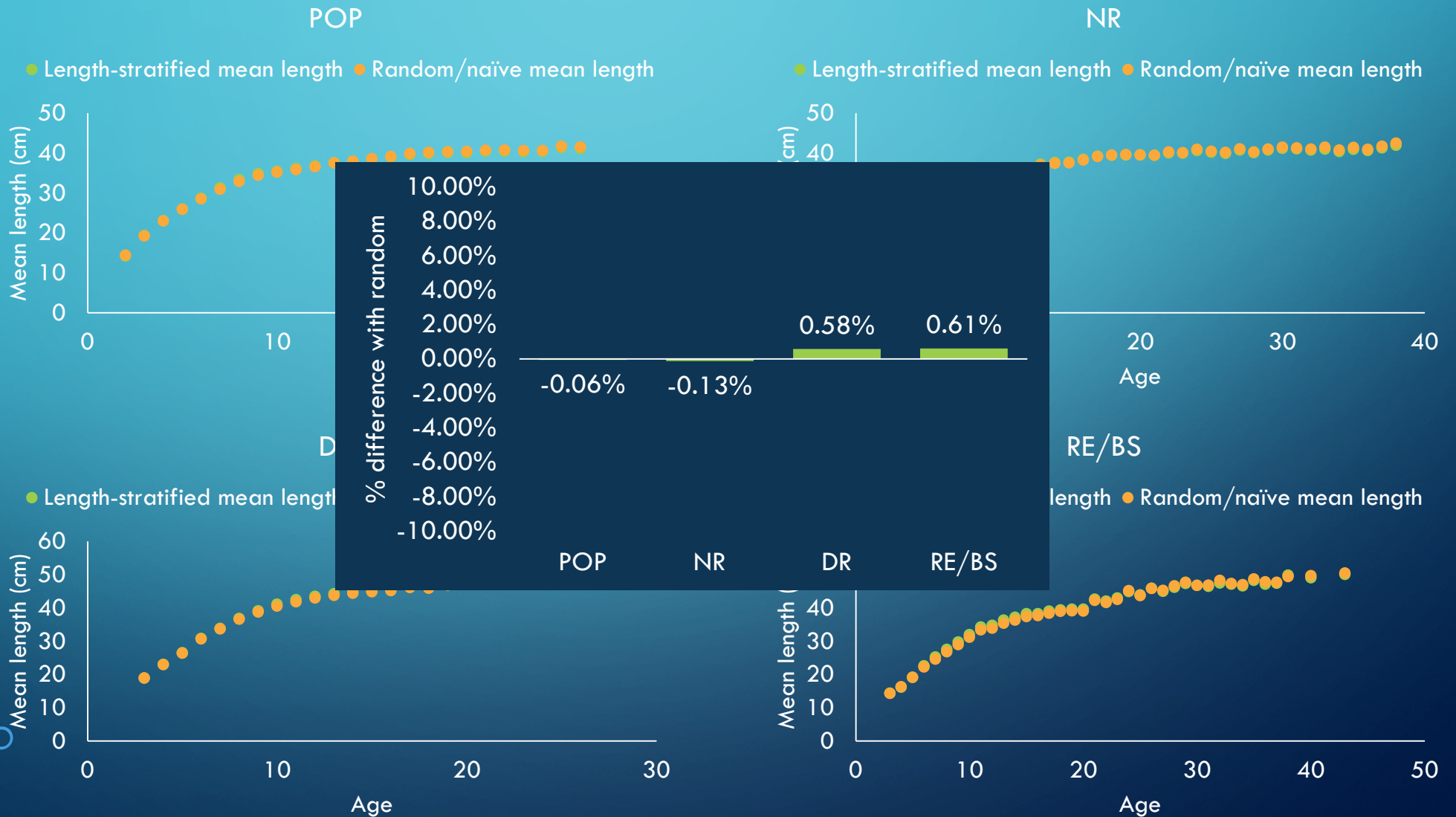# GOA ROCKFISH ASSESSMENT UPDATES

- Length-stratified rather than random growth estimation
- Extension of ageing error matrix
  - Update of ageing error matrix for POP
- Plus age group analysis redo

Length-stratified rather than random growth estimation: mean length
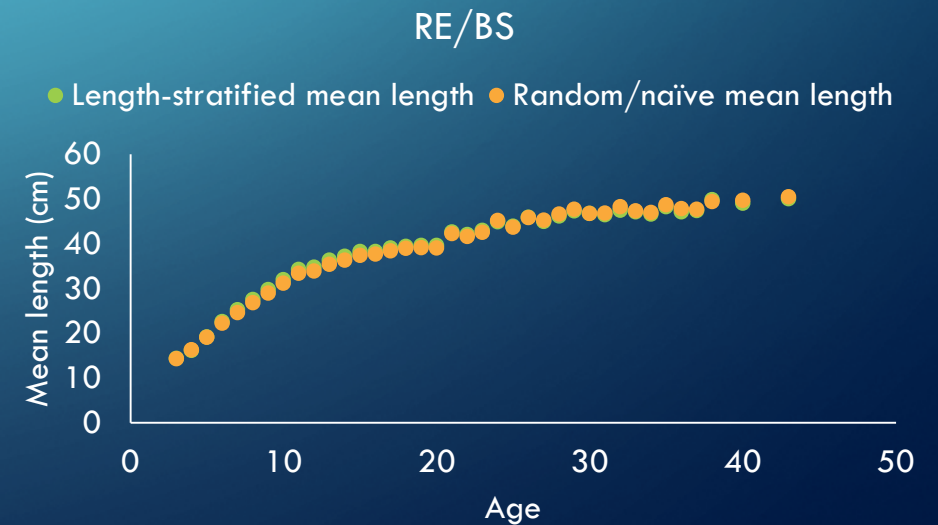
POP

Length-stratified mean length • Random/naïve mean length

NR

Length-stratified mean length • Random/naïve mean length

DR

Length-stratified mean length • Random/naïve mean length

RE/BS

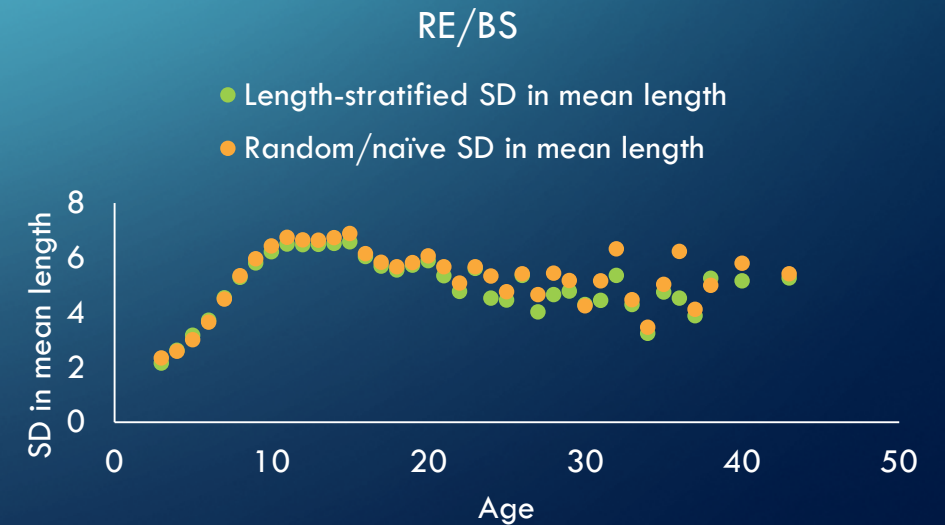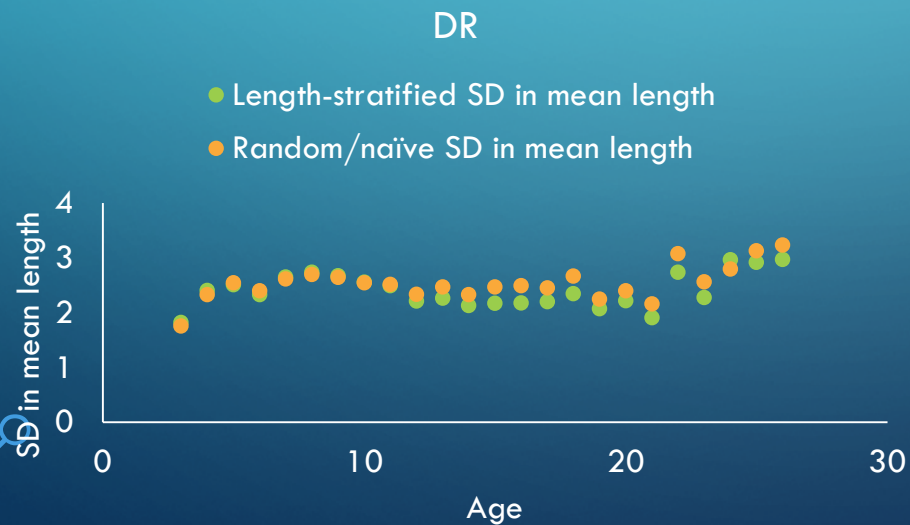Length-stratified mean length • Random/naïve mean length

Length-stratified rather than random growth estimation: mean length

POP

● Length-stratified mean length ● Random/naïve mean length

NR

● Length-stratified mean length ● Random/naïve mean length

● Length-stratified mean length ● Random/naïve mean length

RE/BS

length ● Random/naïve mean length

	POP	NR	DR	RE/BS
% difference with random	-0.06%	-0.13%	0.58%	0.61%

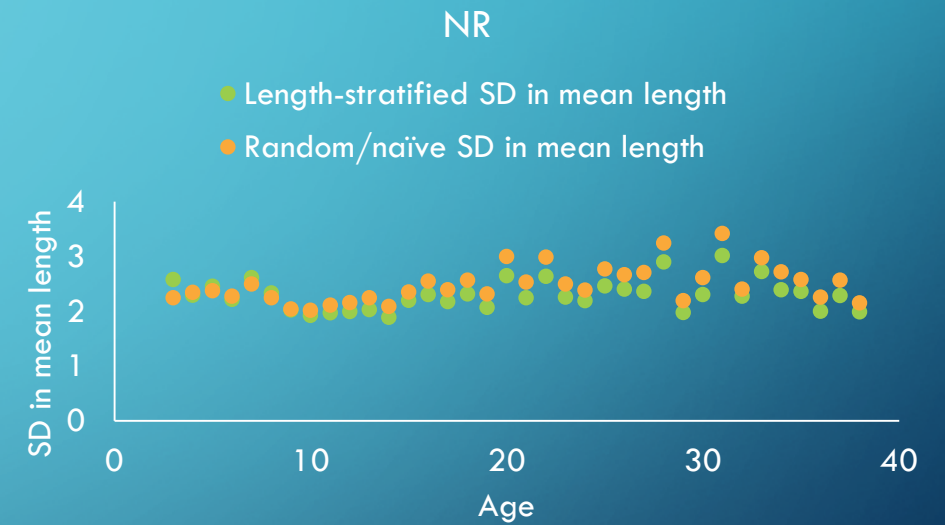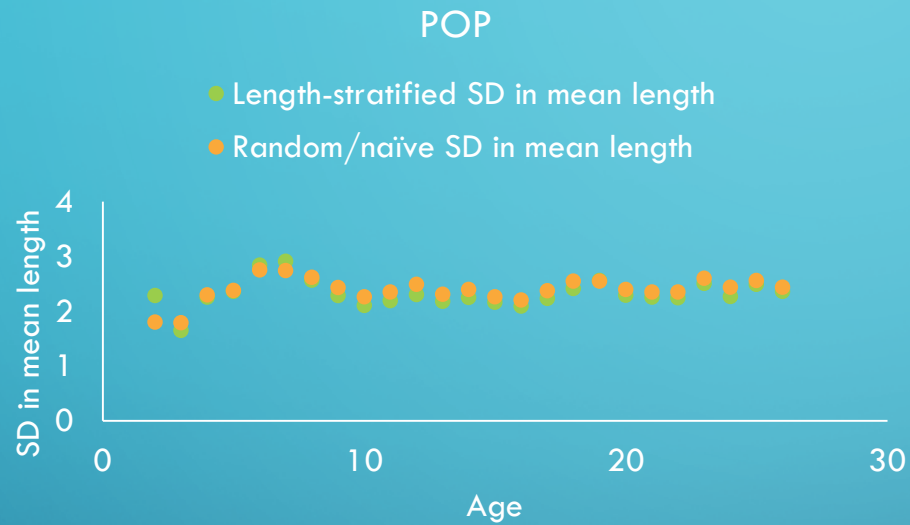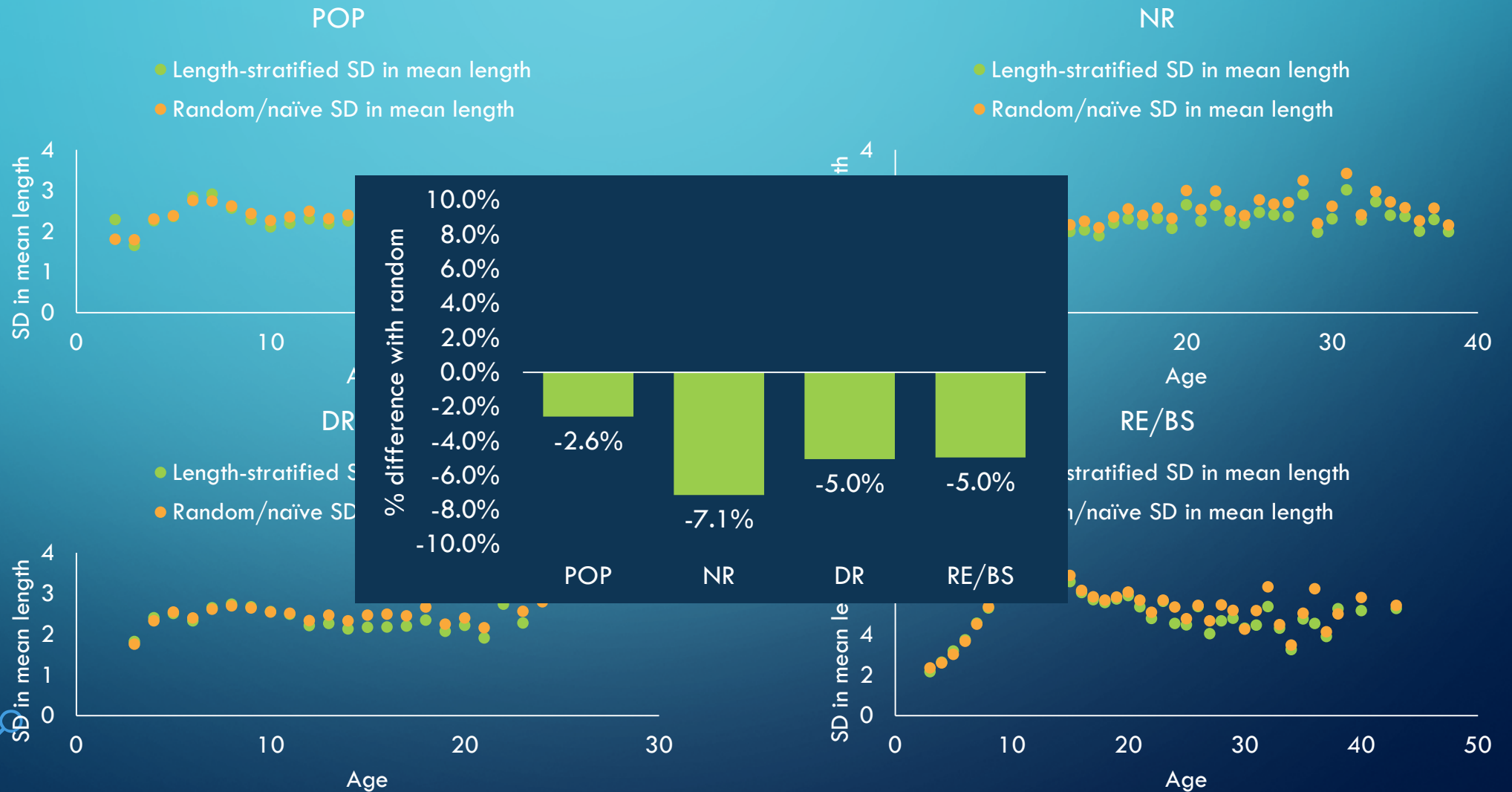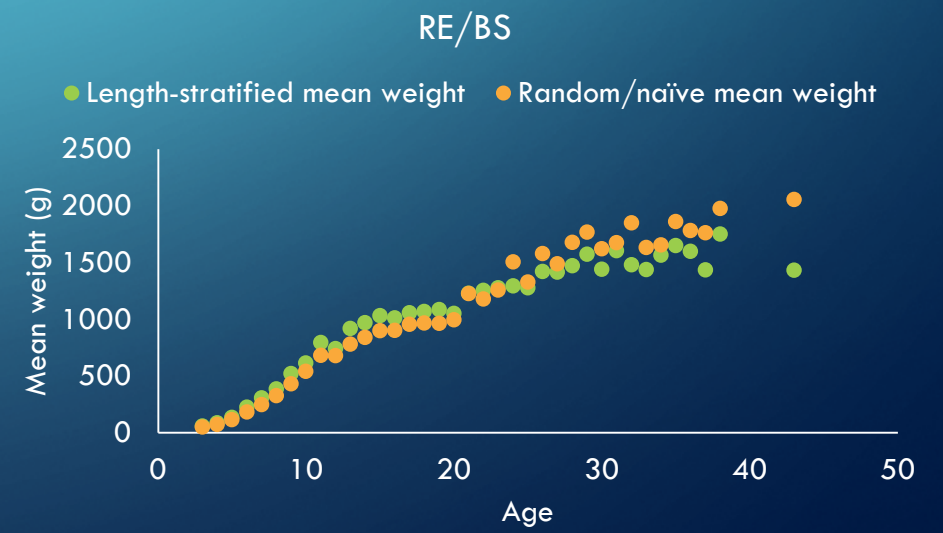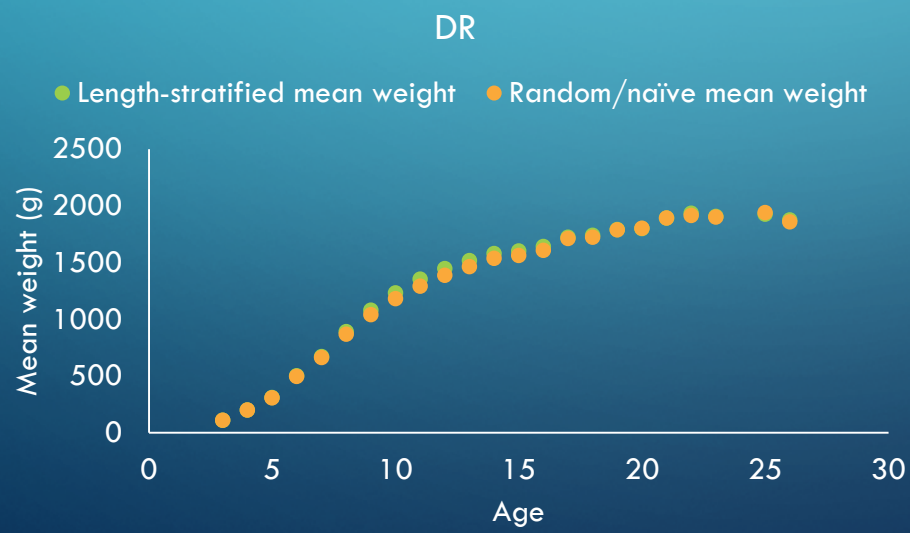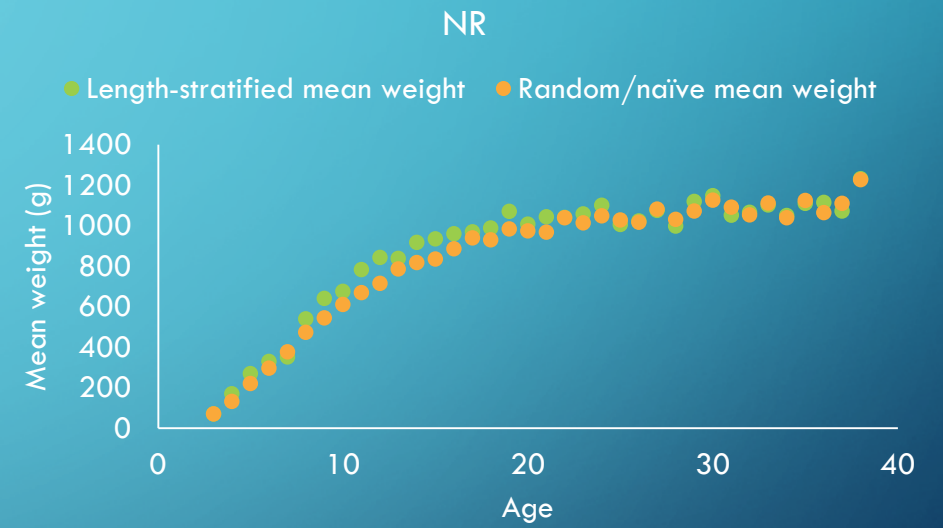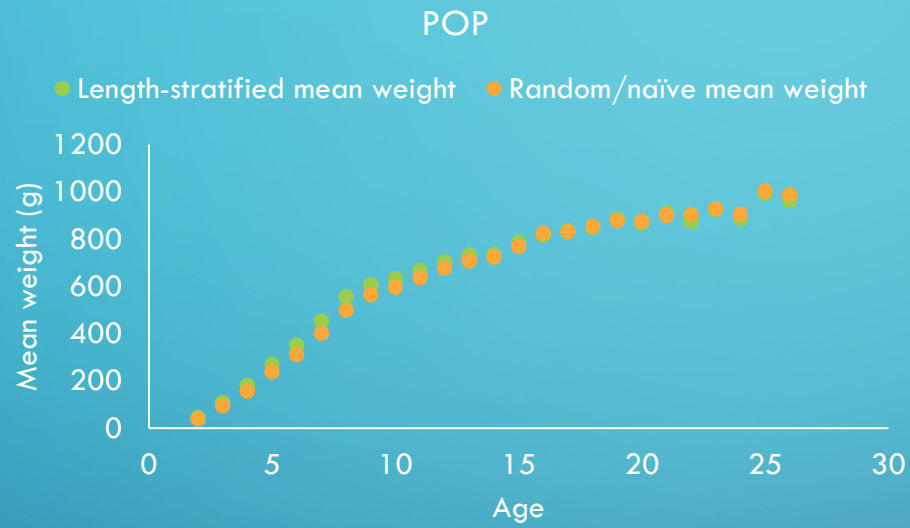# Length-stratified rather than random growth estimation: SD in mean length

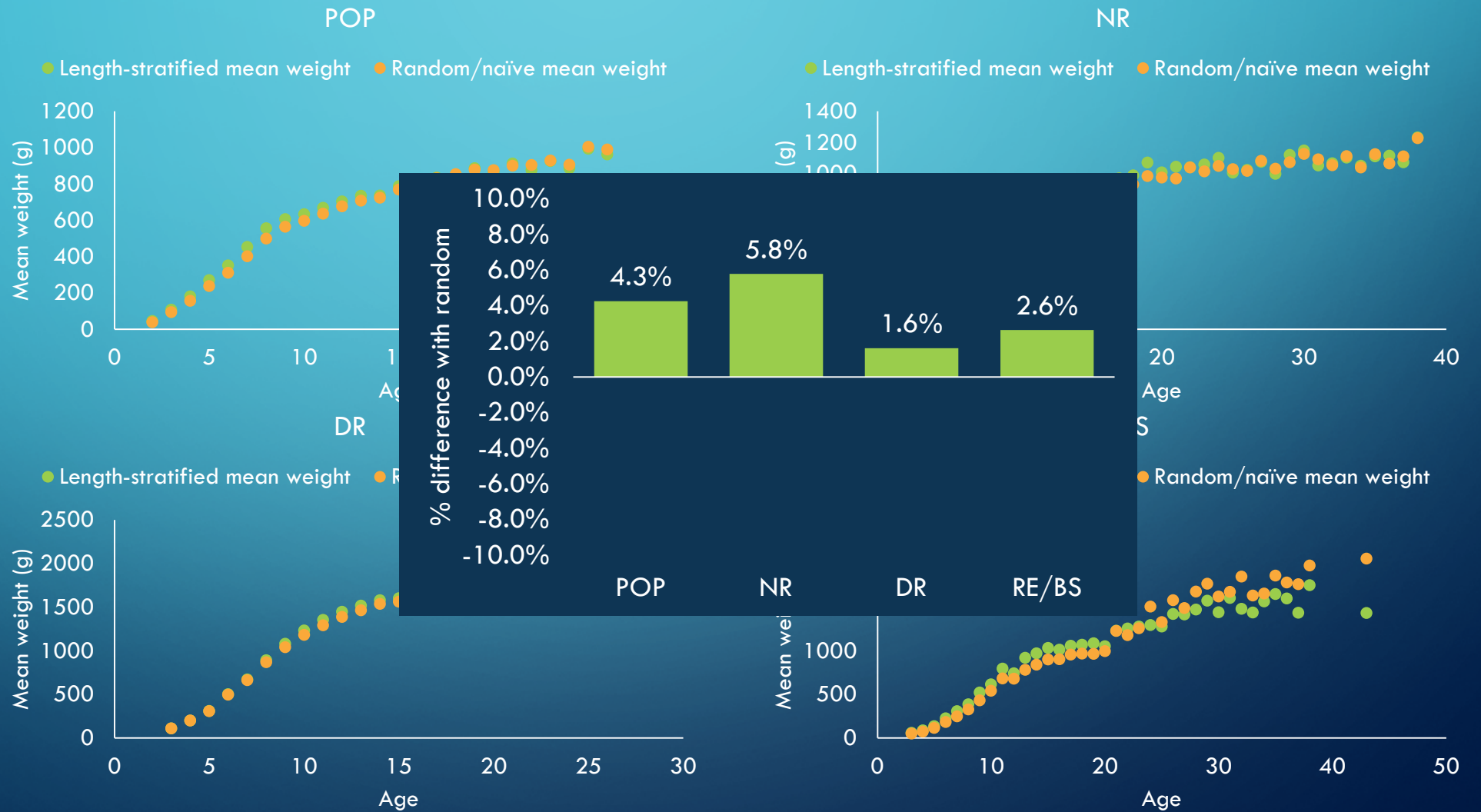# Length-stratified rather than random growth estimation: SD in mean length

Length-stratified rather than random growth estimation: mean weight

POP

NR

DR

RE/BS

Length-stratified rather than random growth estimation: mean weight

GOA ROCKFISH ASSESSMENT UPDATES: AGEING ERROR MATRIX

- Reminder: 2 years ago presented alternative to current construction of ageing error matrix, gist was:
  - We were/are having an issue with overestimating the proportion of fish in the age class adjacent to the plus age group
  - One solution was to extend modeled ages out until >99.9% were in plus age group of data ages (compared a couple other alternatives as well)
  - Had pretty big influence on improving fit to adjacent age to plus age and plus age group itself
  - This year implement into GOA rockfish models

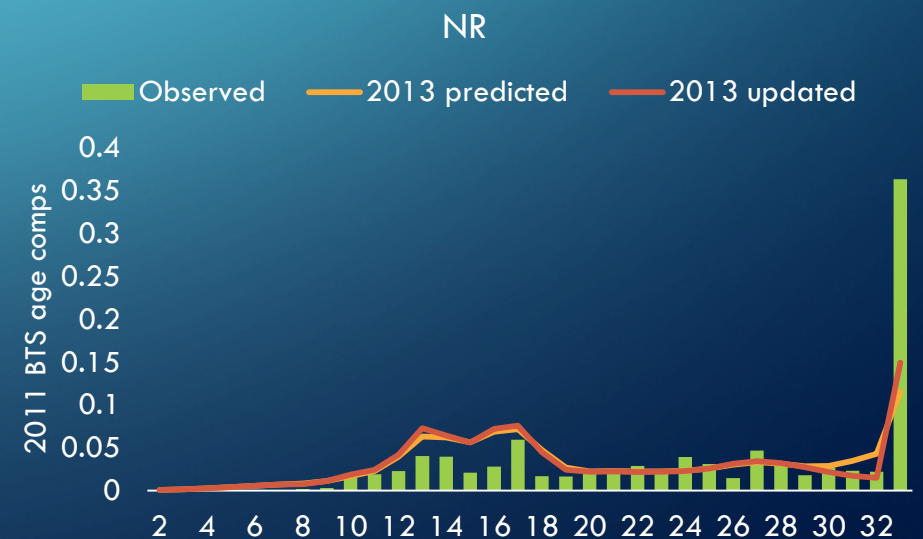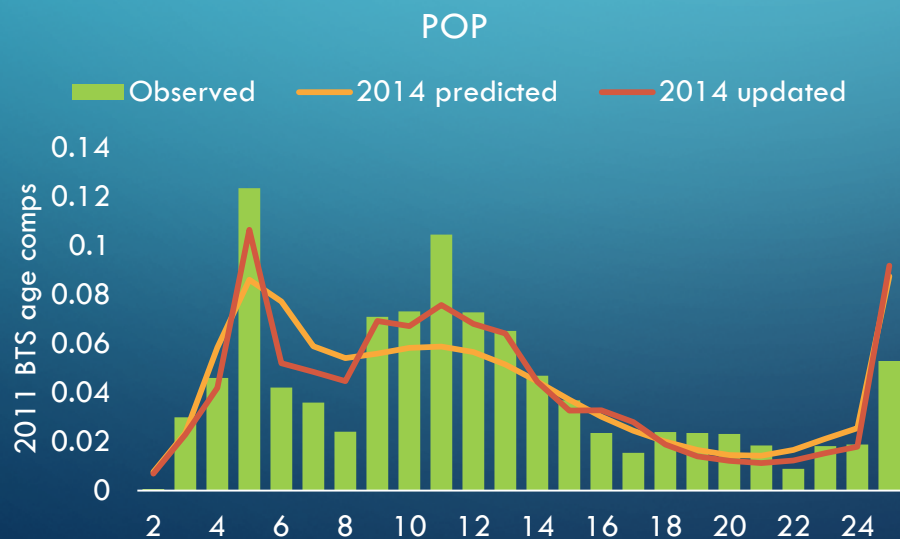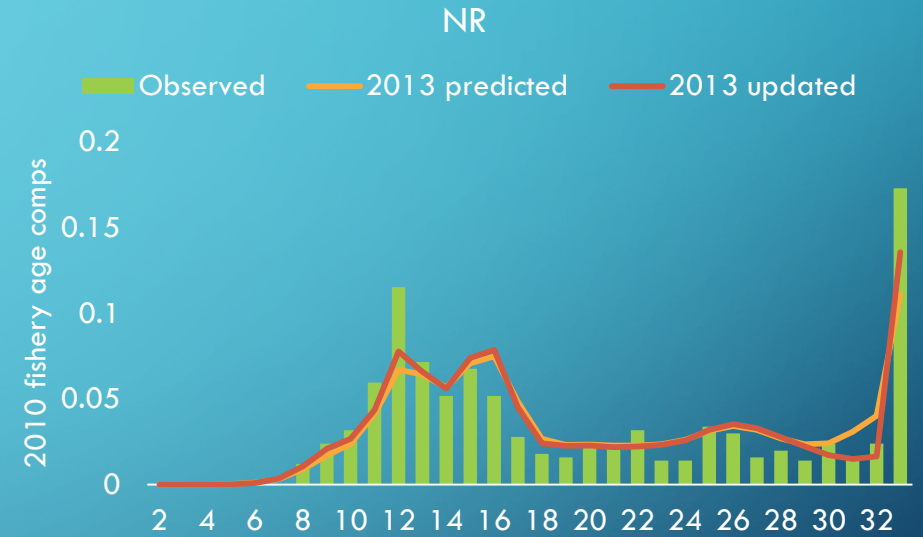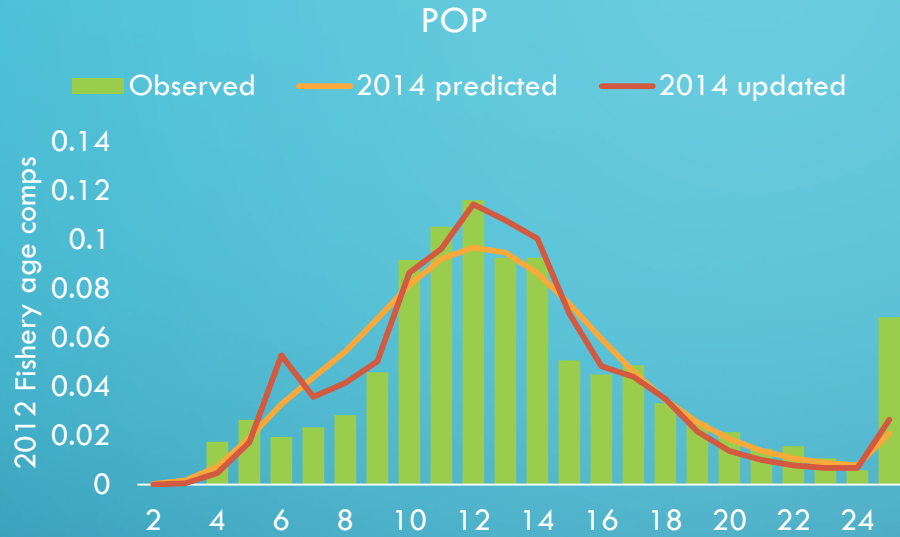# GOA ROCKFISH ASSESSMENT UPDATES: LIKELIHOOD RESULTS

POP

Likelihood	2014 model	Updated 2014 model	% difference
Catch	0.12	0.12	6.62%
BTS biomass	10.26	11.18	8.96%
Fishery age	27.06	18.20	**-32.74%**
BTS age	47.67	30.33	**-36.38%**
Fishery size	54.28	54.52	0.44%

NR

Likelihood	2013 model	Updated 2013 model	% difference
Catch	0.04	0.06	45.40%
BTS biomass	11.10	10.42	**-6.11%**
Fishery age	25.54	21.25	**-16.77%**
BTS age	45.71	42.38	**-7.29%**
Fishery size	41.59	44.47	6.93%

DR

Likelihood	2013 model	Updated 2013 model	% difference
Catch	27.14	28.09	3.50%
BTS biomass	38.84	39.94	2.84%
Fishery age	30.23	18.68	**-38.19%**
BTS age	85.83	79.03	**-7.93%**
Fishery size	49.93	49.69	**-0.49%**

RE/BS

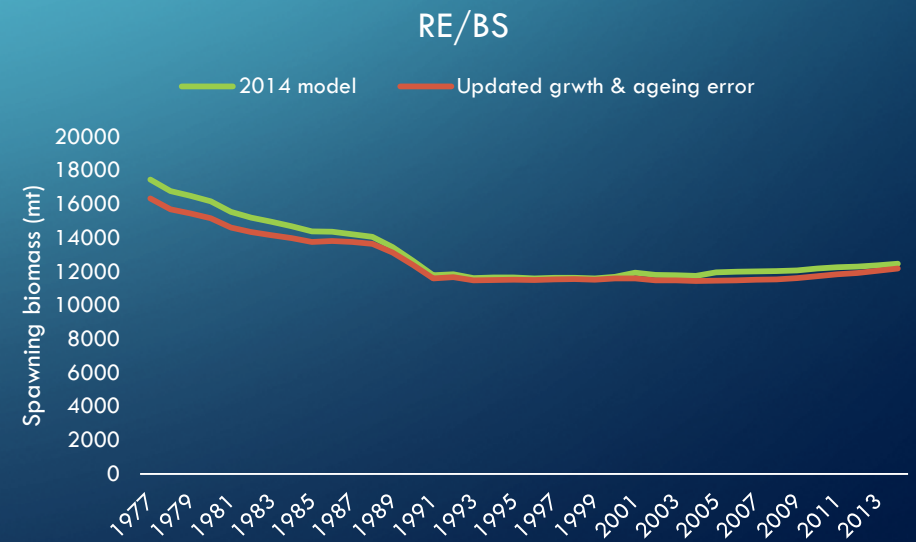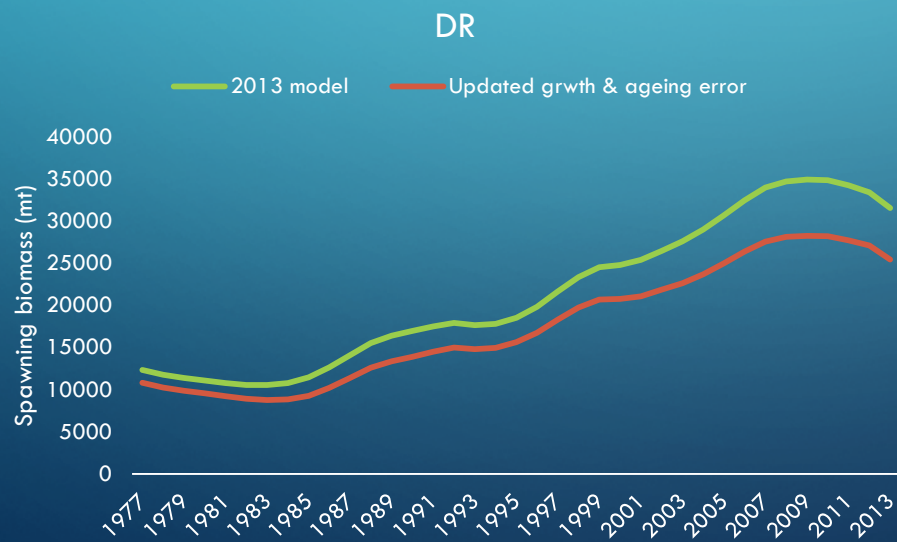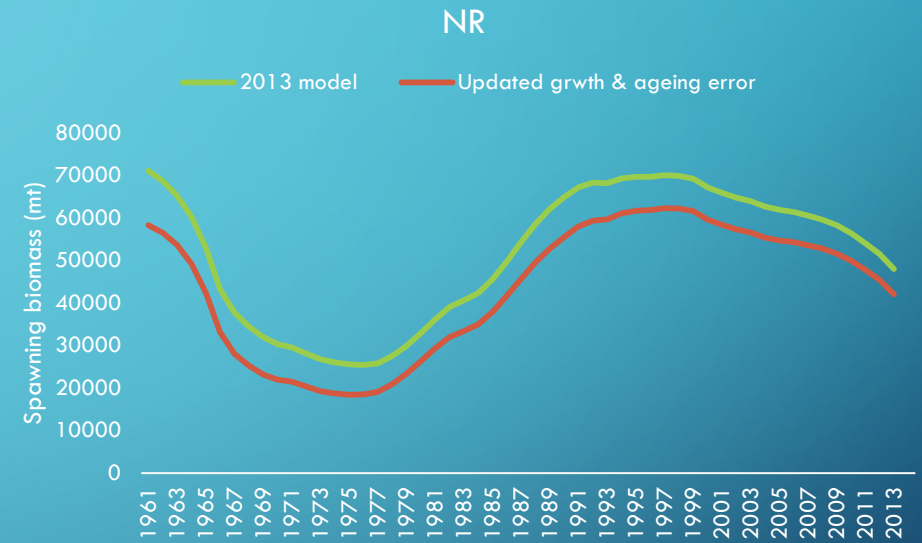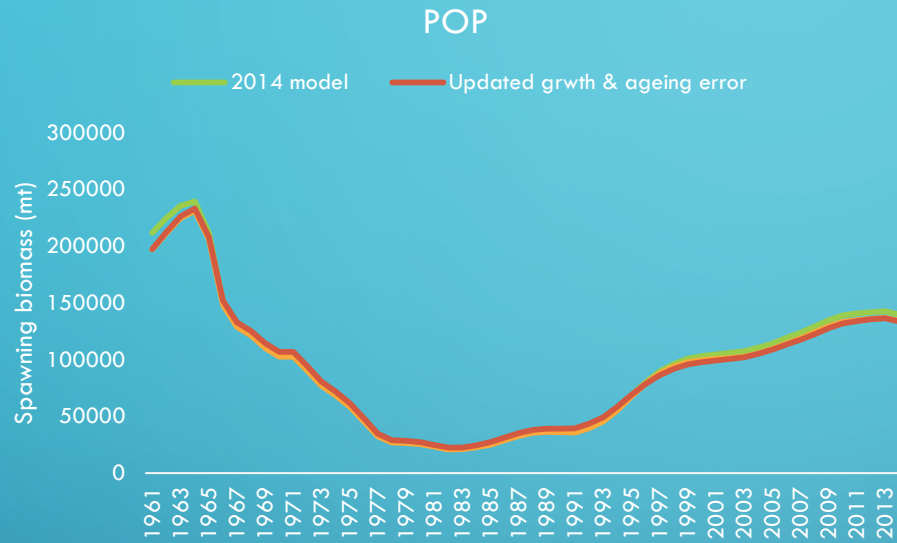| Likelihood	2014 model	Updated 2014 model	% difference
Catch	0.04	0.04	**-1.44%**
BTS biomass	8.93	8.92	**-0.18%**
LL RPN	11.92	11.90	**-0.20%**
Fishery age	37.27	13.52	**-63.74%**
BTS age	39.30	37.44	**-4.73%**
Fishery size	51.36	49.00	**-4.61%**
LL size	97.71	85.62	**-12.37%**

GOA ROCKFISH ASSESSMENT UPDATES: AGEING ERROR

GOA ROCKFISH ASSESSMENT UPDATES: AGEING ERROR
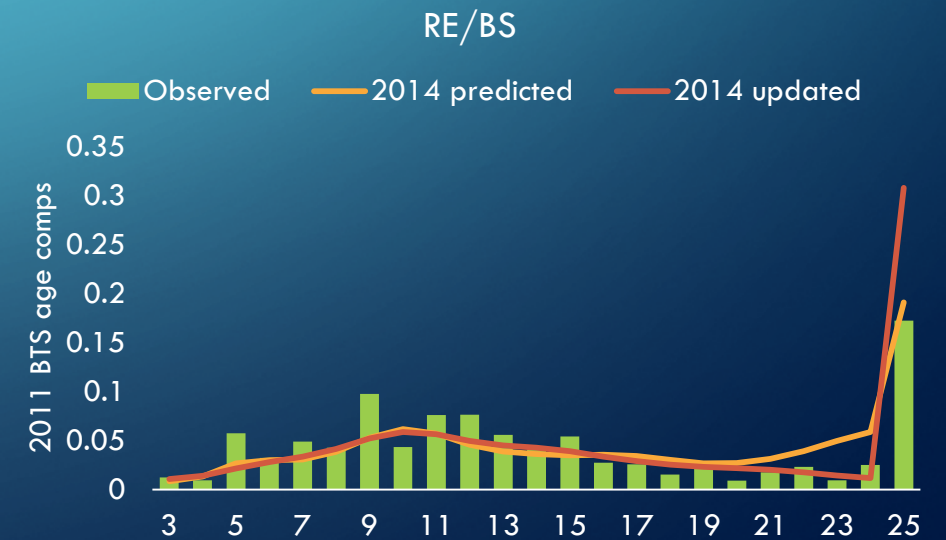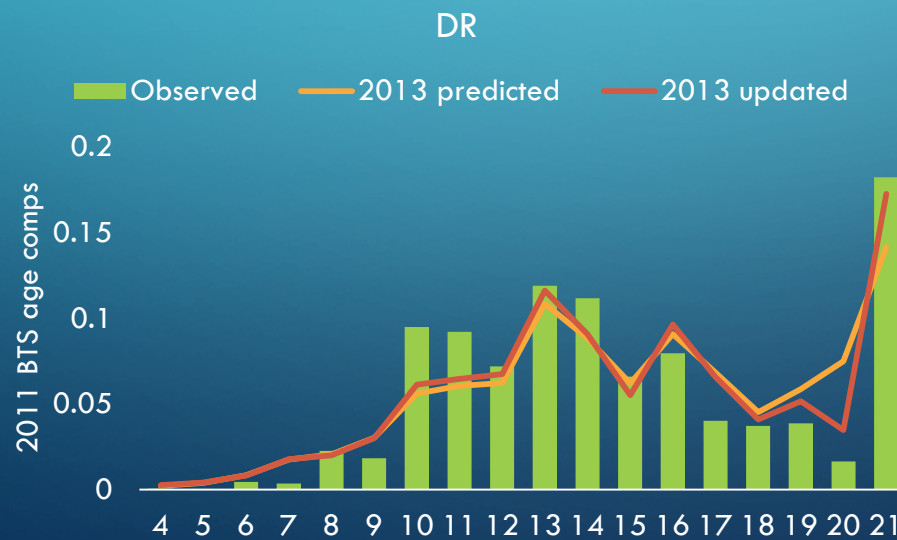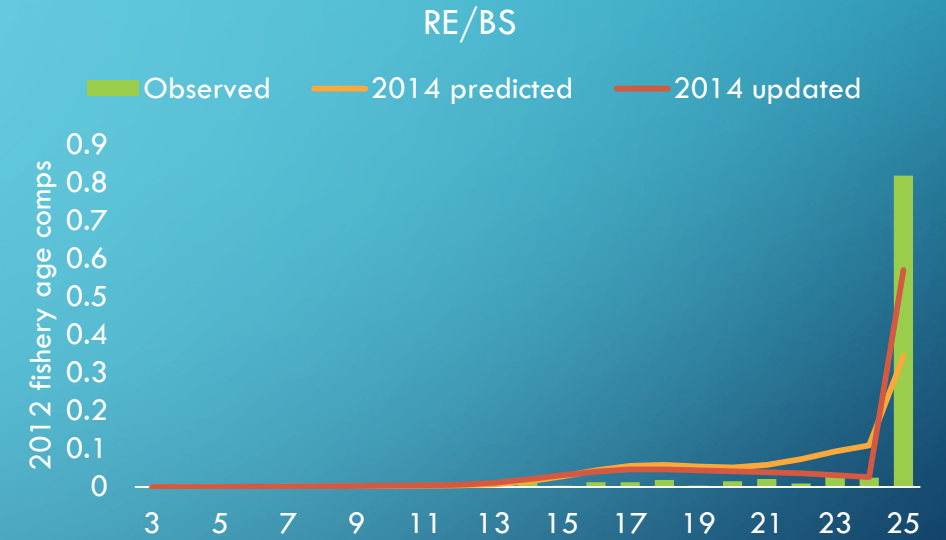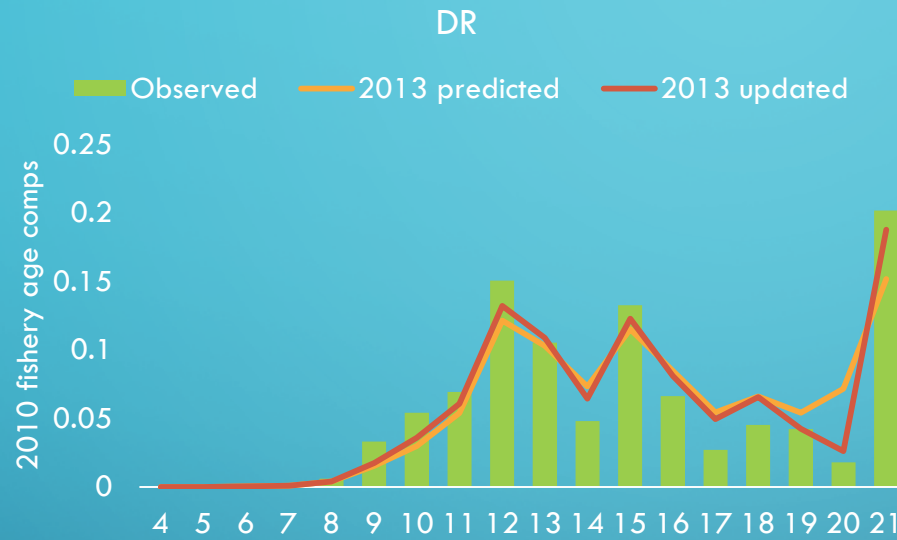
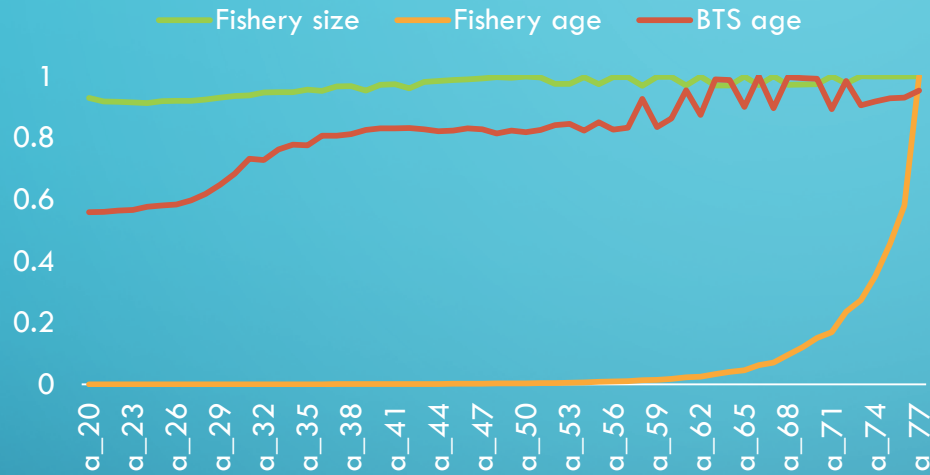# GOA ROCKFISH ASSESSMENT UPDATES: AGEING ERROR

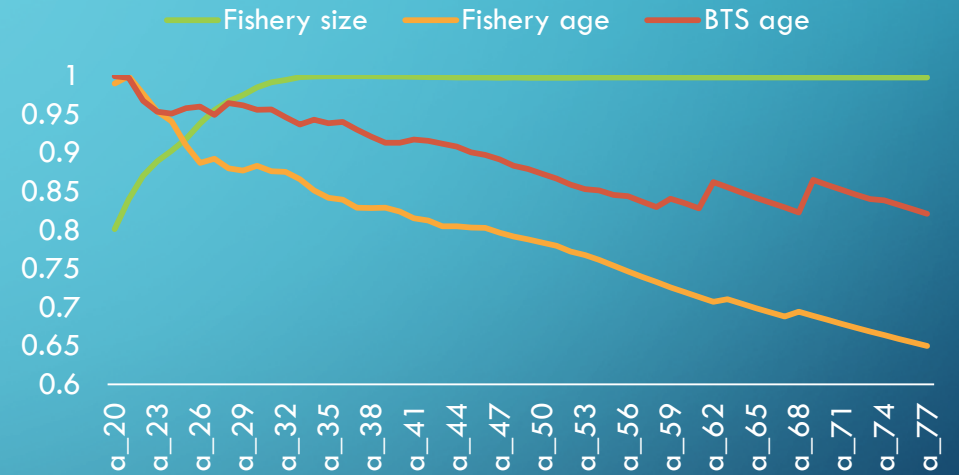# GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS

- With new ageing error matrix, was curious to see how that influenced where we set the data plus age
  - Needed to investigate for RE/BS anyway, ran for others as well
  - Extended data plus age from age 20 to 77
  - Stored SDNR of age comps, likelihoods, etc.
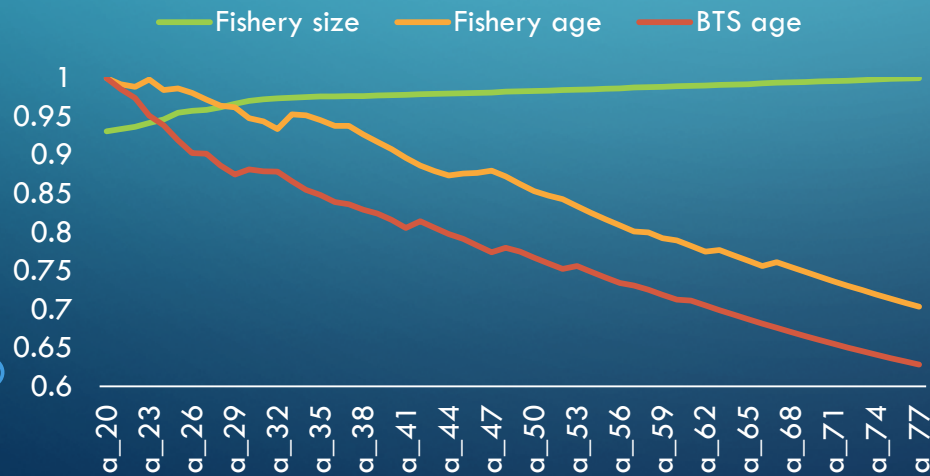
GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS

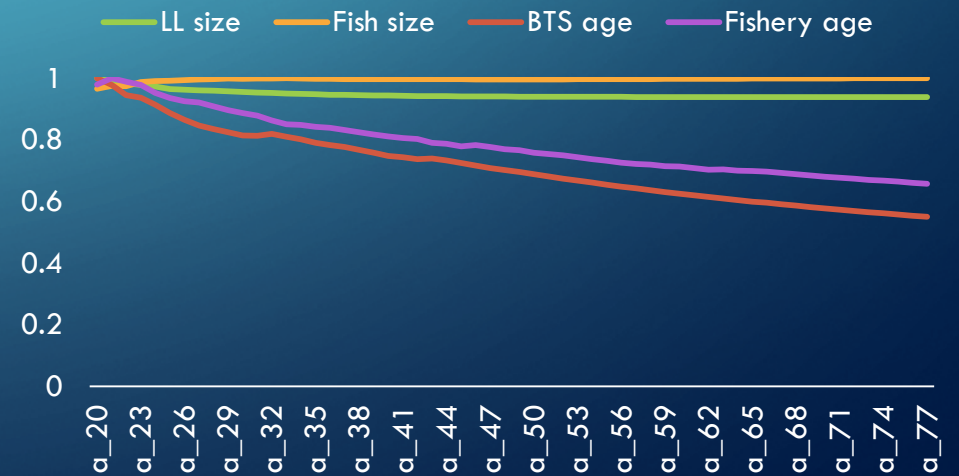# GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS
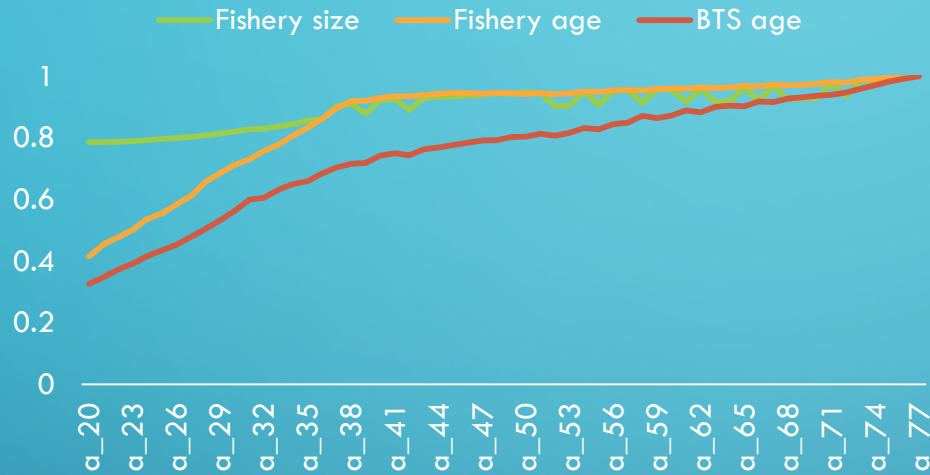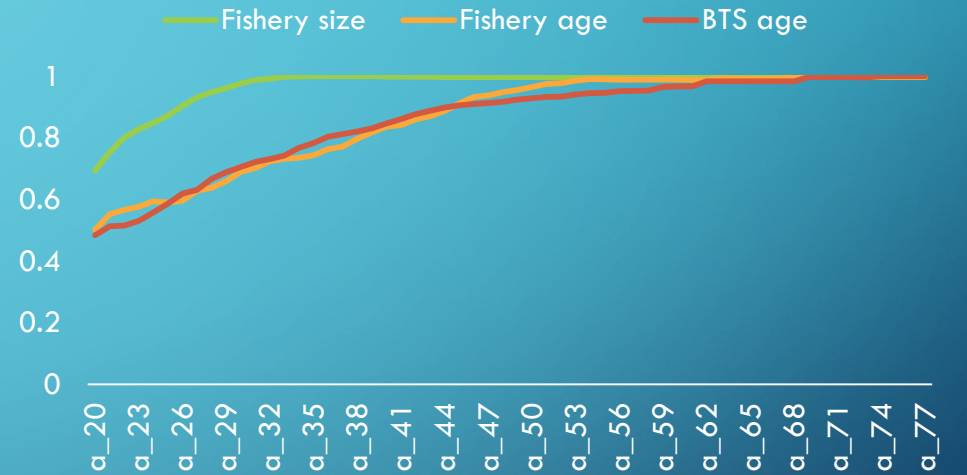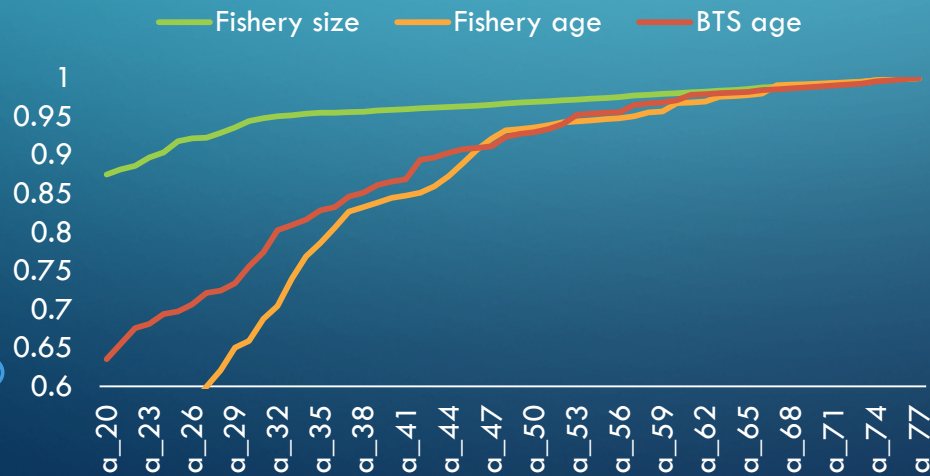
GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS

Scaled likelihoods: POP

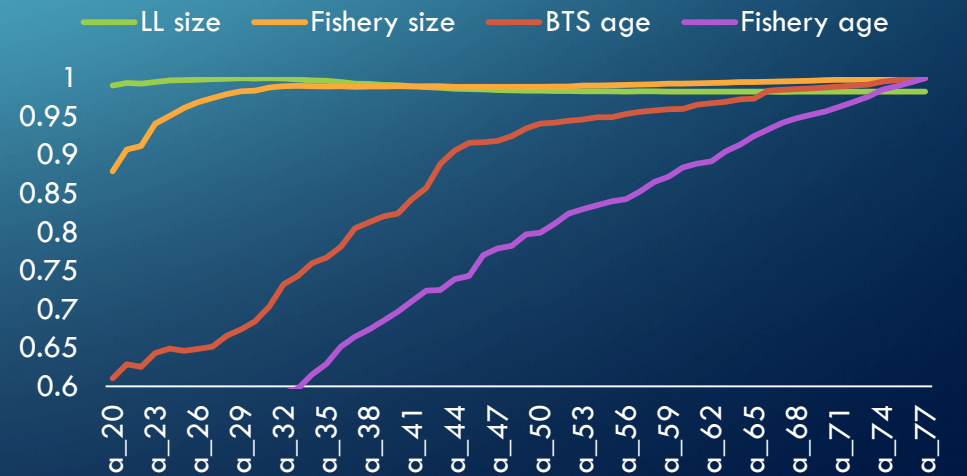Scaled likelihoods: NR

Scaled likelihoods: DR

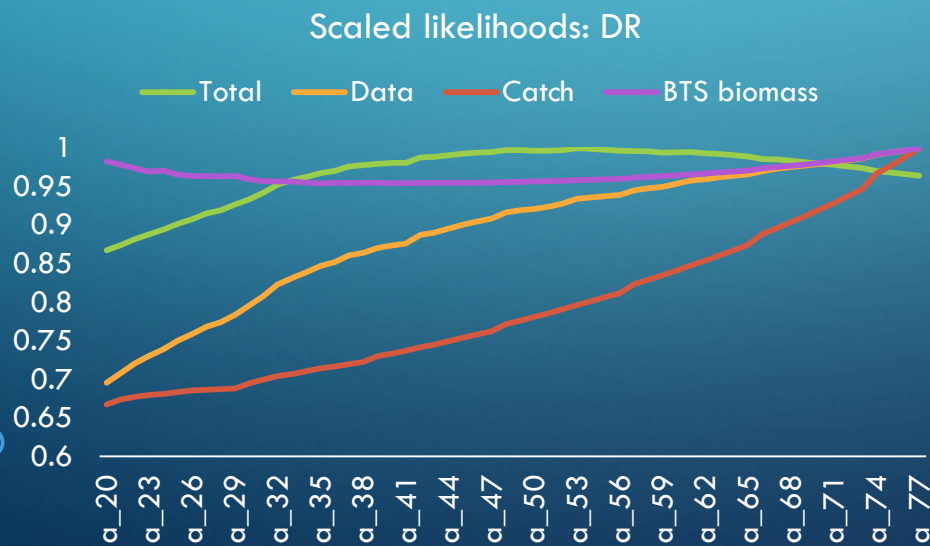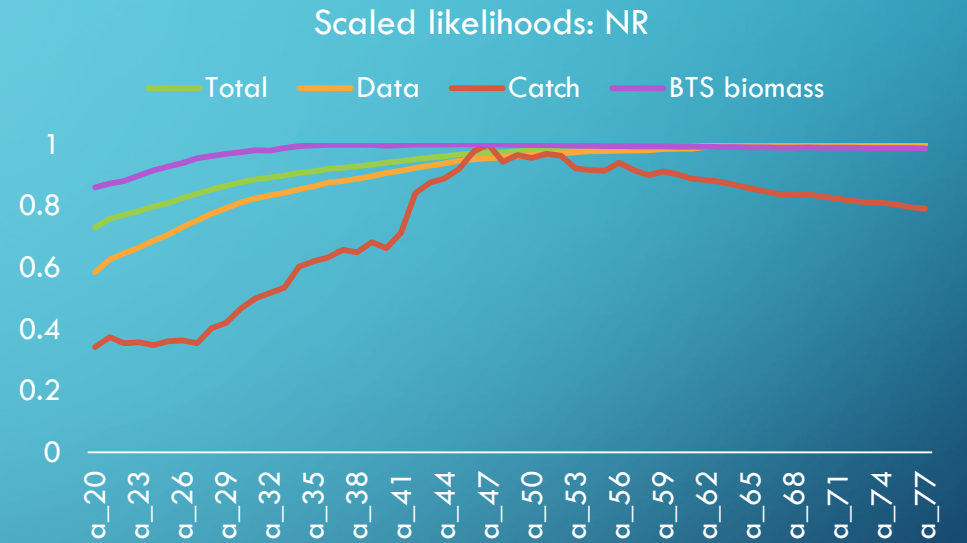Scaled likelihoods: RE/BS
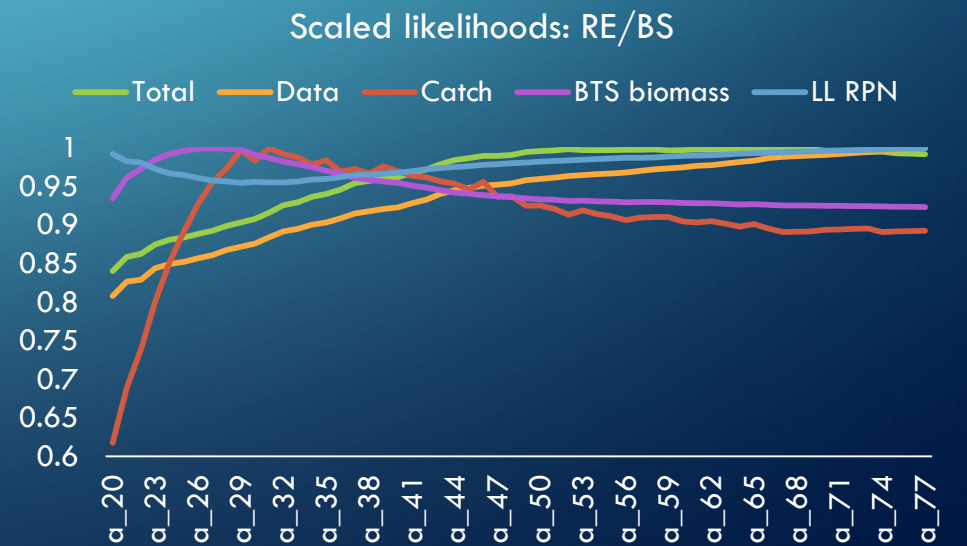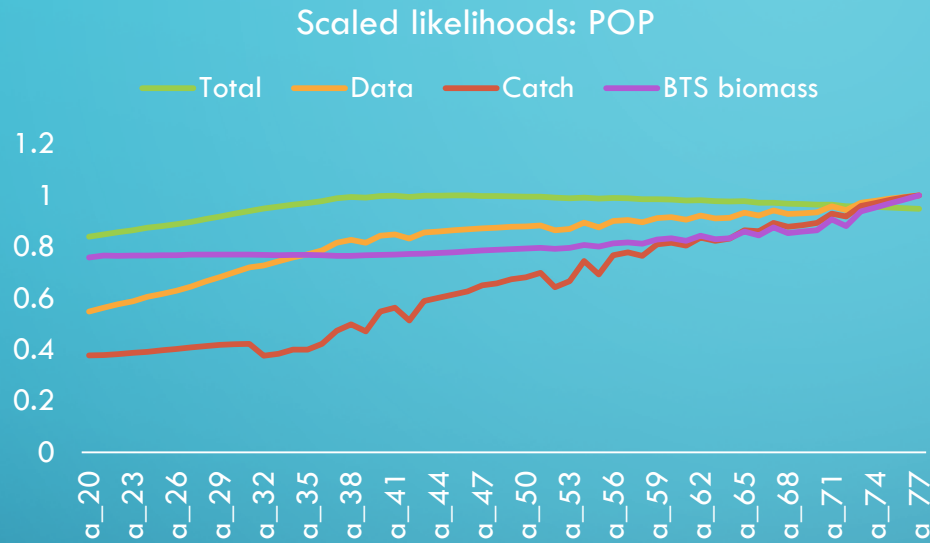
GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS
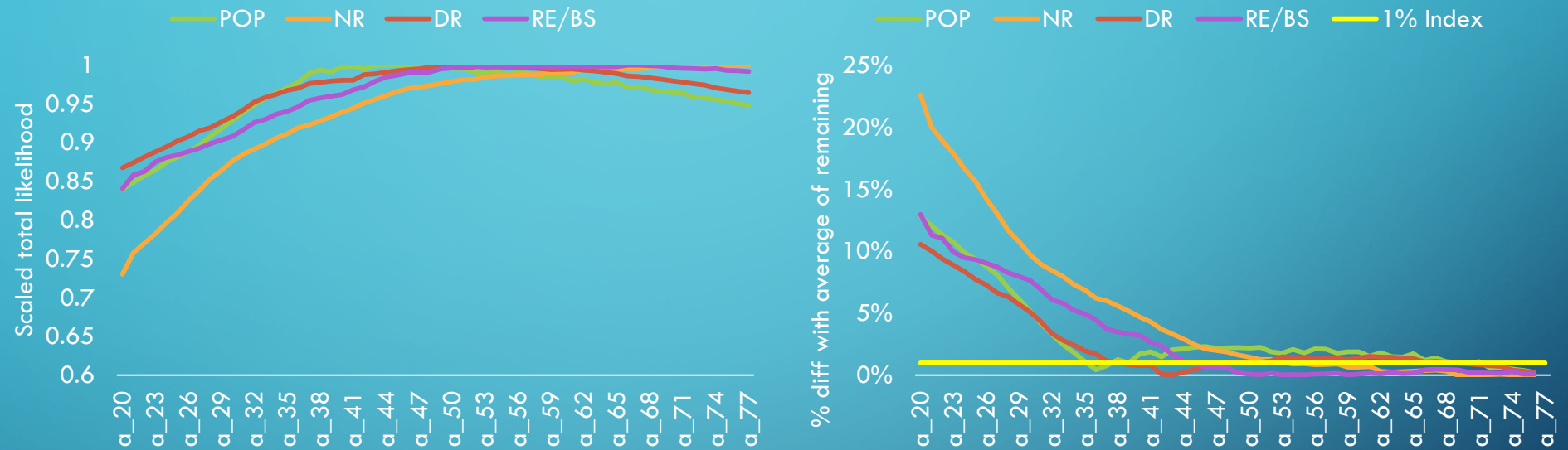
- Total likelihood plateaus/minimizes around:
  - 35-40 for POP, 50-55 for NR, 35-40 for DR, and 45-50 for RE/BS

GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS
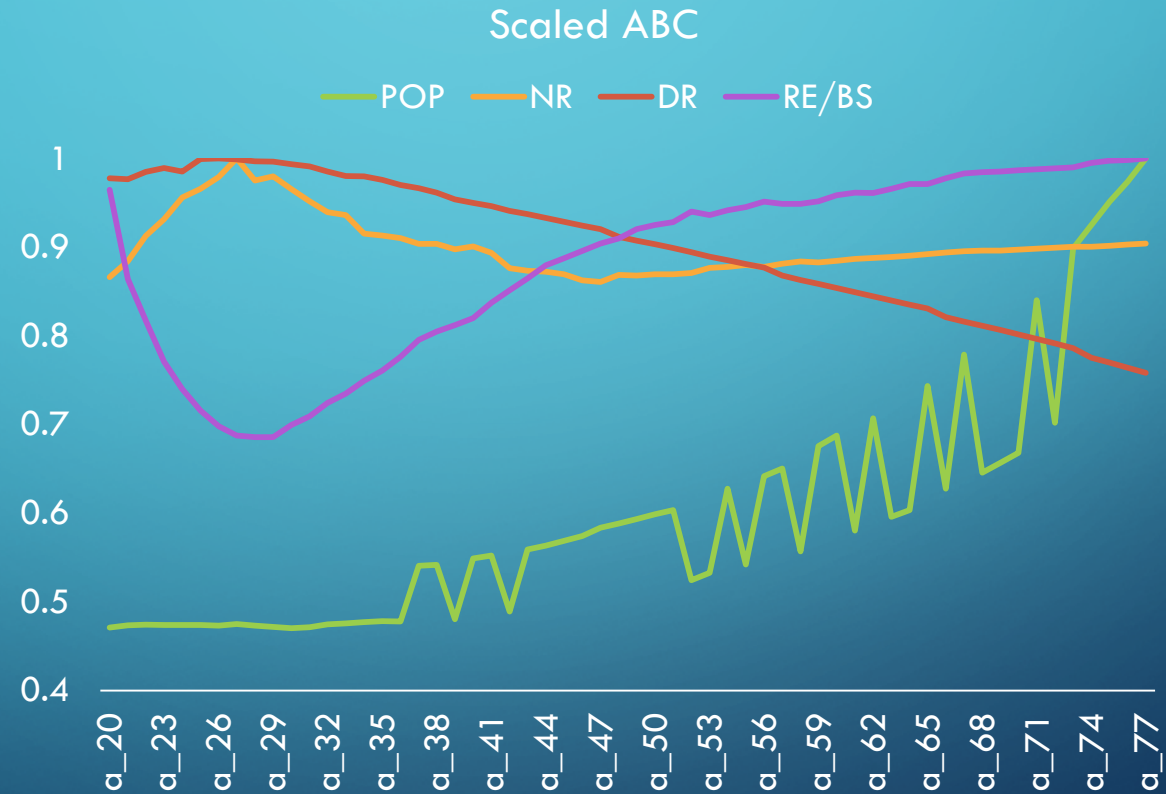
GOA ROCKFISH ASSESSMENT UPDATES: PLUS AGE ANALYSIS

- Overall, hard to pinpoint general recommendations for setting plus age group
- Plateauing of total seemed the only consistent statistic, but could be others
- Plan: rerun with updated 2015 data, see consistency as well as possible recommendations for extending plus age group

GOA Rougheye & Blackspotted Rockfish

Shotwell, Hanselman, Hulson, Heifetz

SSC and Plan Team 2014

*"The assessment authors note that the choice of the plus group age, and the computation of the age error for the plus group, will be addressed in the 2015 assessment. **The Plan Team supports the planned work to address these issues.**"*

*"**The SSC requests that the authors further examine trawl selectivity**, as it seems unusual for age 9-11 rockfish to be selected 20% more than other ages. The SSC supports the authors' intent to reevaluate that age of the plus group…"*

1) RE/BS Selectivity

2) Nonplussed (Trawl)

2) Nonplussed (Fishery)

1990

2004

2006

2008

2009

2012
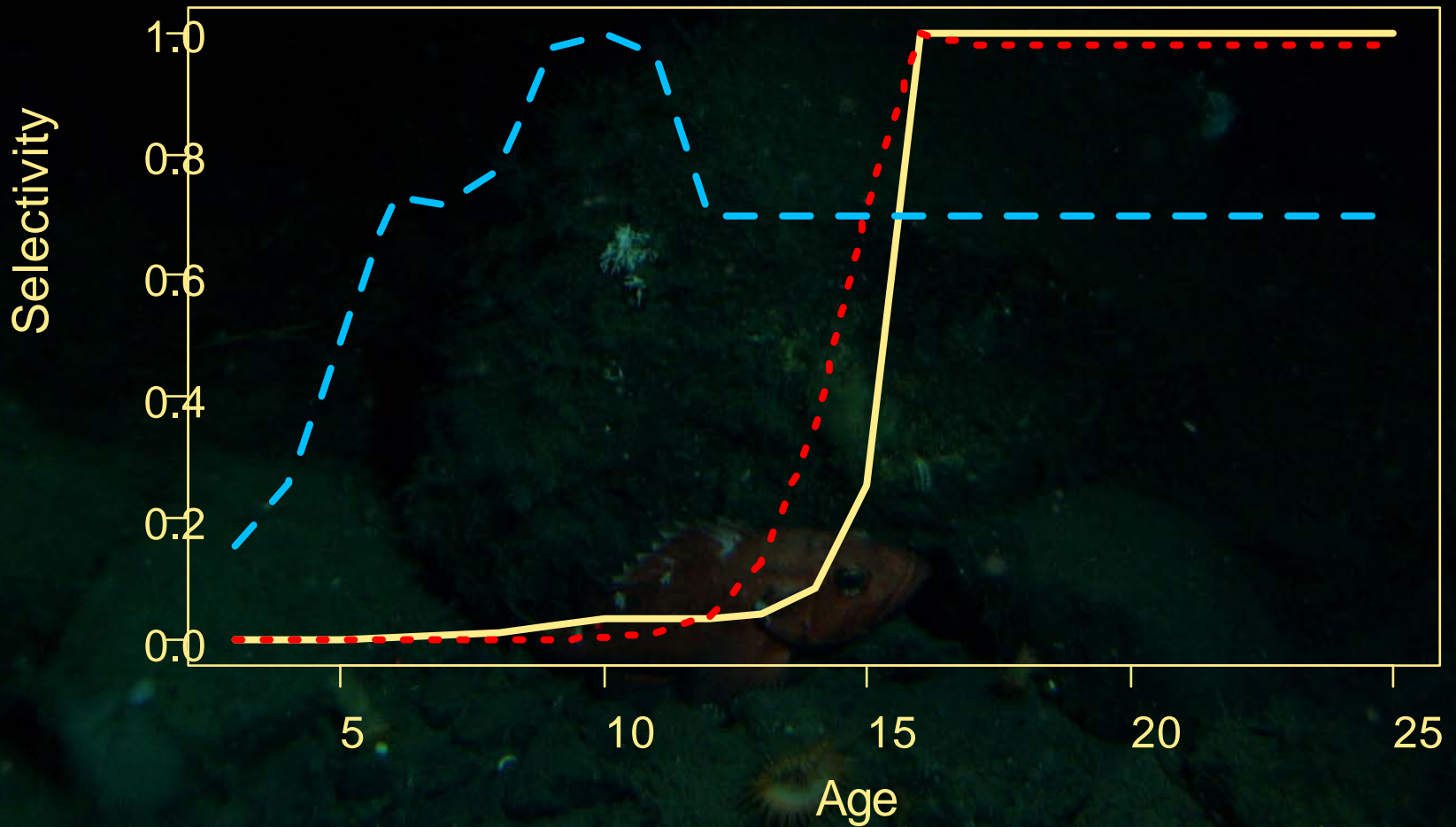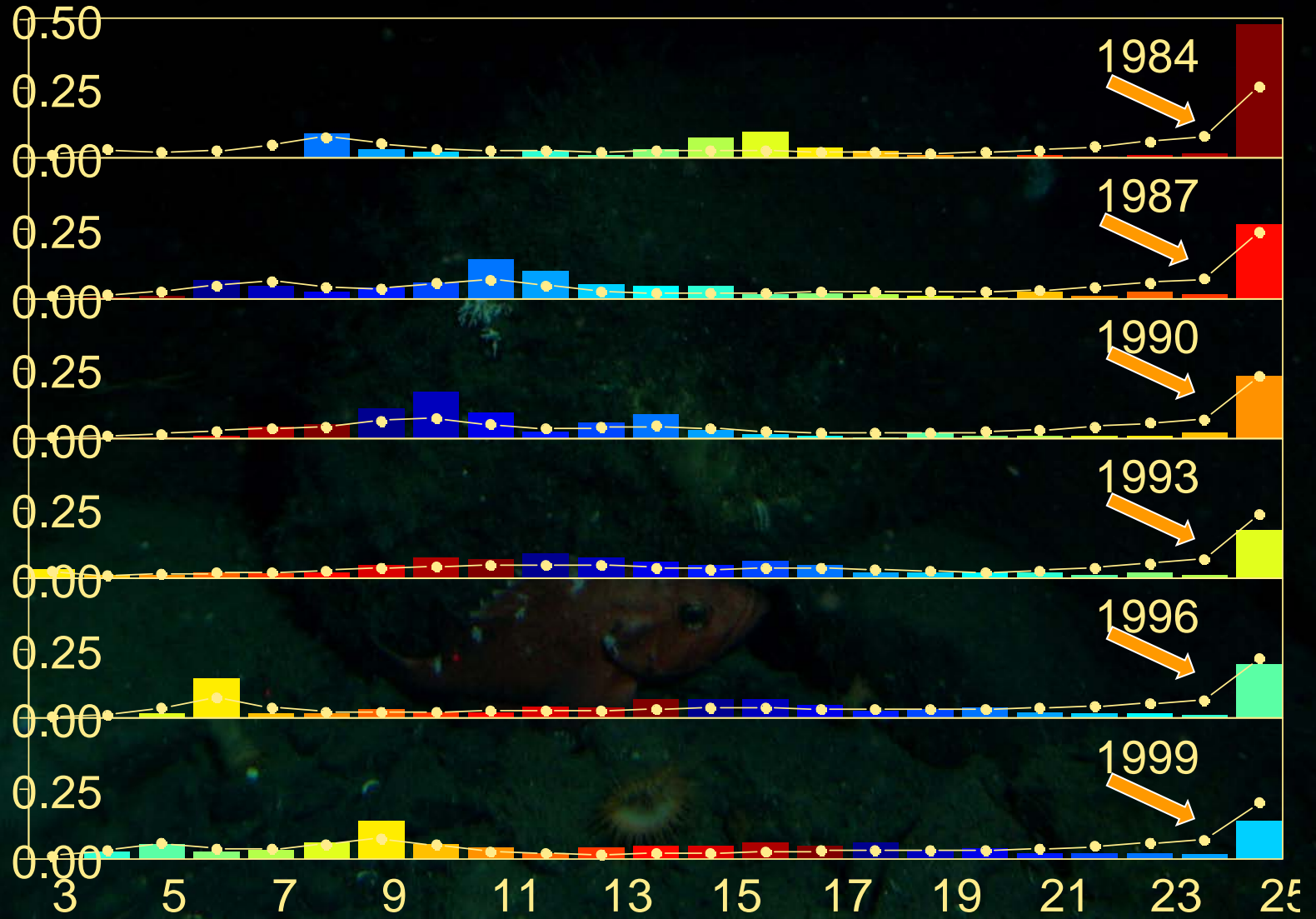
Selectivity Background

- All GOA rockfish models used non-parametric selectivities in the past

- A vector of selectivity coefficients were estimated up to a maximum age and the rest held at that value up to the plus group

- The coefficients are "regularized" by second differences (the differences between the differences)

- A penalty is applied that minimizes these differences

Differences

1	4	6	10	12	15	20

Differences

| 1st | | 3 | | 2 | | 4 | | 2 | | 3 | | 5 | |

9+4+16+4
+9+25=67

| 2nd | | | 1 | | 2 | | 2 | | 1 | | 2 | | |

1+4+4+1
+4   =14

| 3rd | | | | 1 | | 1 | | 1 | | | |

1+1+1=3

| 4th | | | | | 0 | | 0 | | | |

0+0 = 0

Selectivity Options

- RE/BS is only GOA rockfish still using non-parametric, most are logistic now, with one gamma

- The current trawl survey selectivity is very lightly penalized

- Implies a dome-shape

- Impose smoother form?

Selectivity options

- BASE (very low 2nd difference penalty) implies linear *a priori*
- 3rd Diff_10 (penalty of 100 on 3rd differences), fixed selectivity after age 12 implies dome *a priori*
- 3rd Diff_Hi (penalty of 100 on 3rd differences), fixed selectivity after age 20 implies dome *a priori*
- 3rd Diff_Lo (penalty of 20 on 3rd differences), fixed selectivity after age 20 implies dome *a priori*
- 3rd Diff_max_5 (penalty of 100 on 3rd differences), selectivity is fixed at least 5 ages before maximum age
- Gamma (imposes a dome, though can be slight)
- Logistic (forces asymptotic)

Plus group

- Pete already talked about modeling ages out to aging error matrix p>0.99
- Growth, maturity, etc extended (work on this)
- Simultaneously look at trawl selectivity and plus age group
- Look at likelihood fits to key data components

# Plus age: scaled (value divided by max)
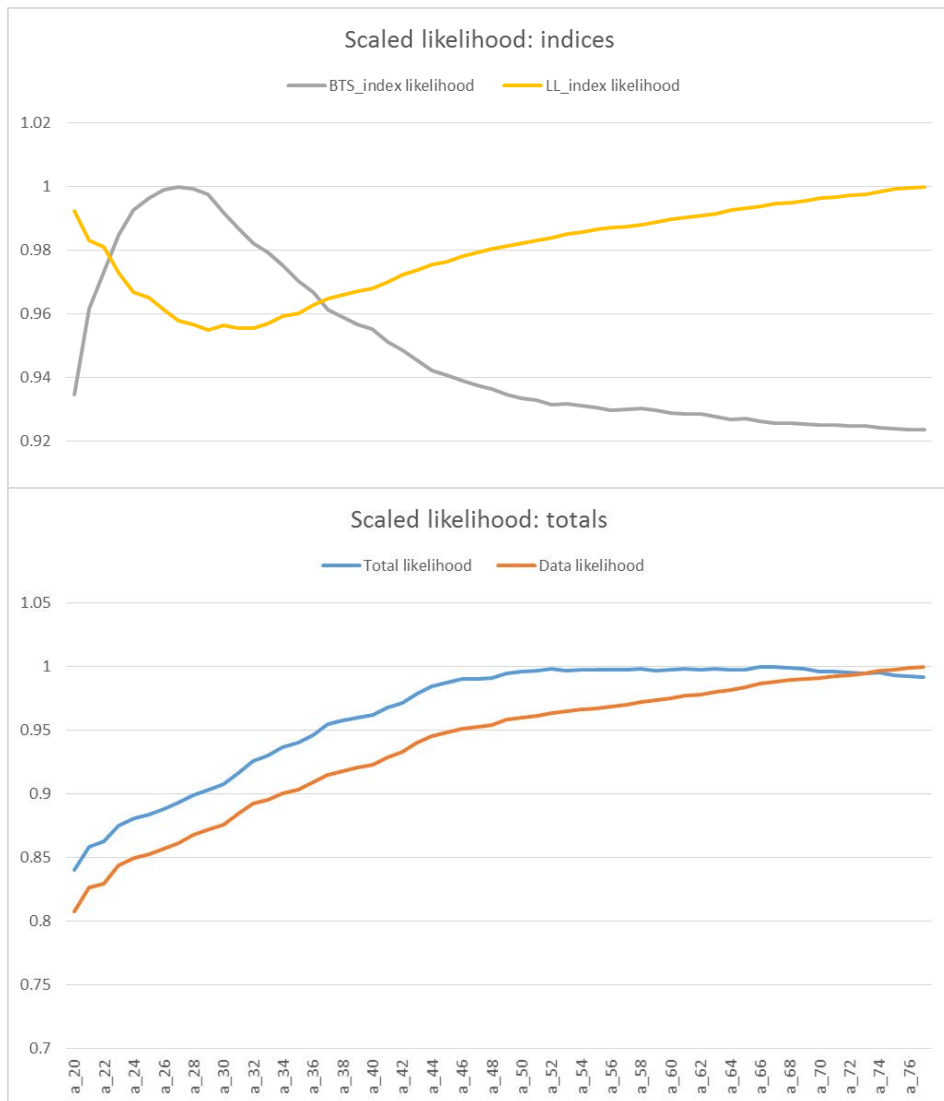
- Scaled likelihood for indices shows tradeoff between BTS and LL. At age 37 is where the scaled values meet...

- For total/data likelihoods, total flattens out around age 45, data likelihood keeps on increasing but seems to bend at 42

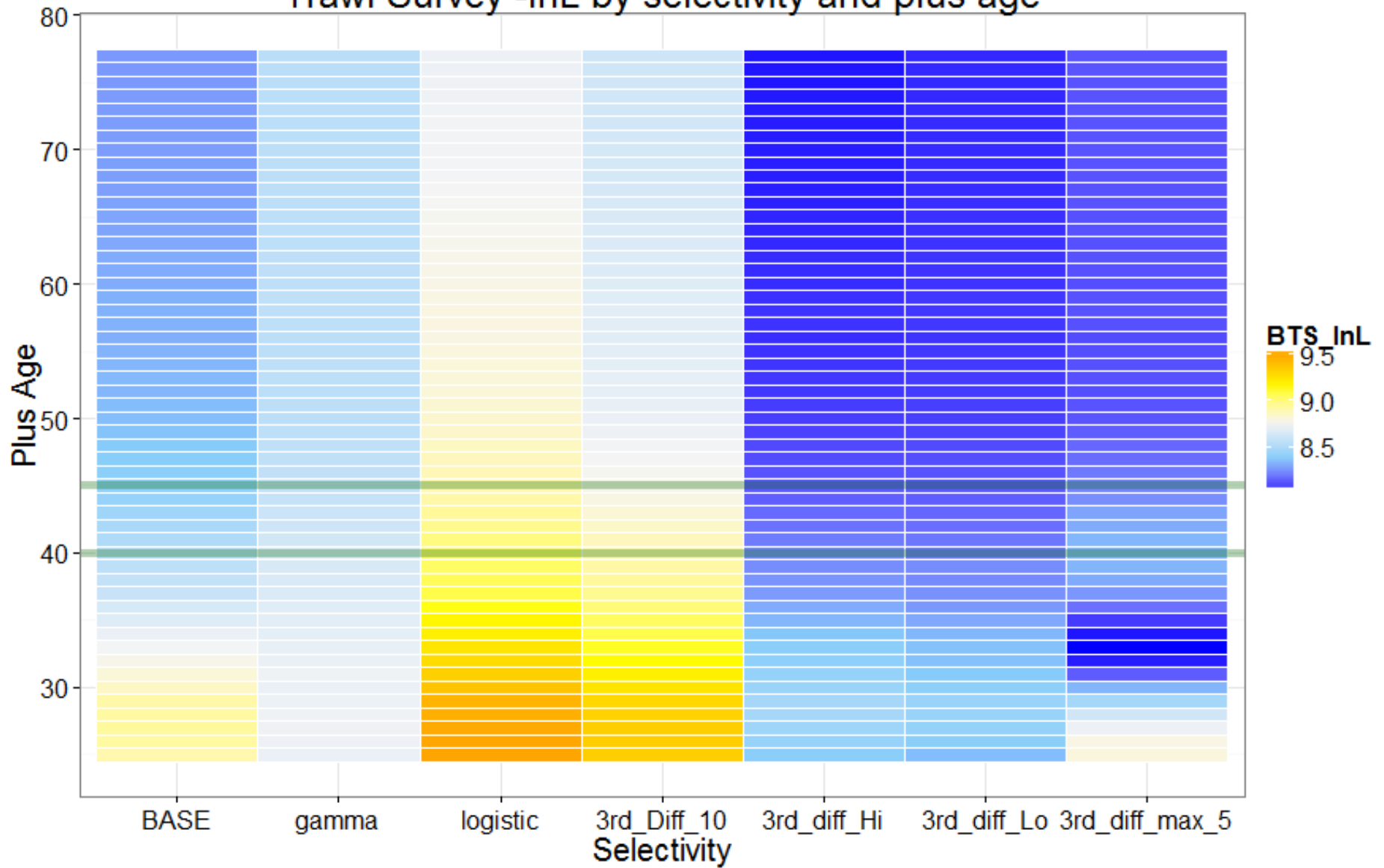- Suggests maybe setting plus age >37 as a starting point
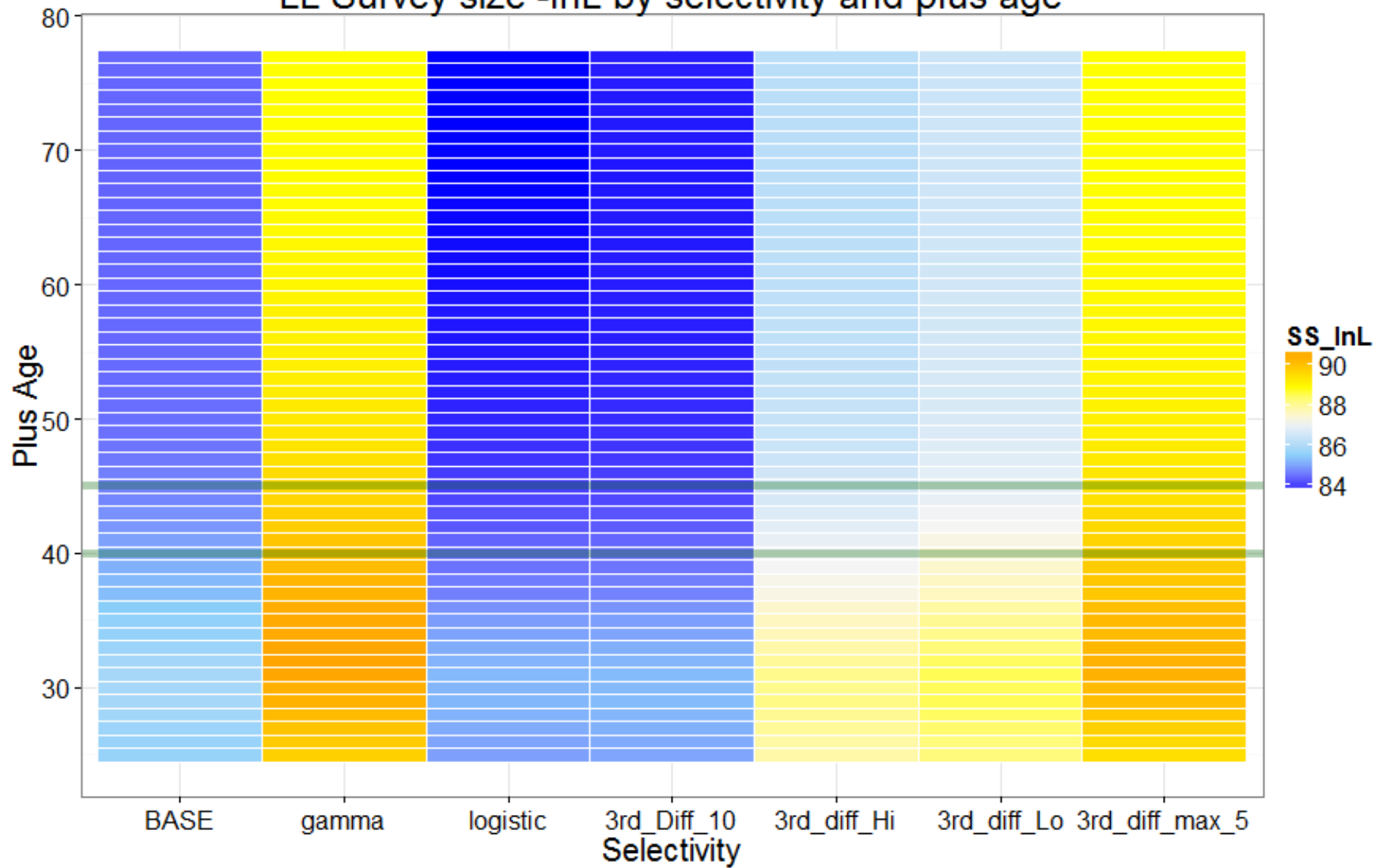
Data -lnL by selectivity and plus age
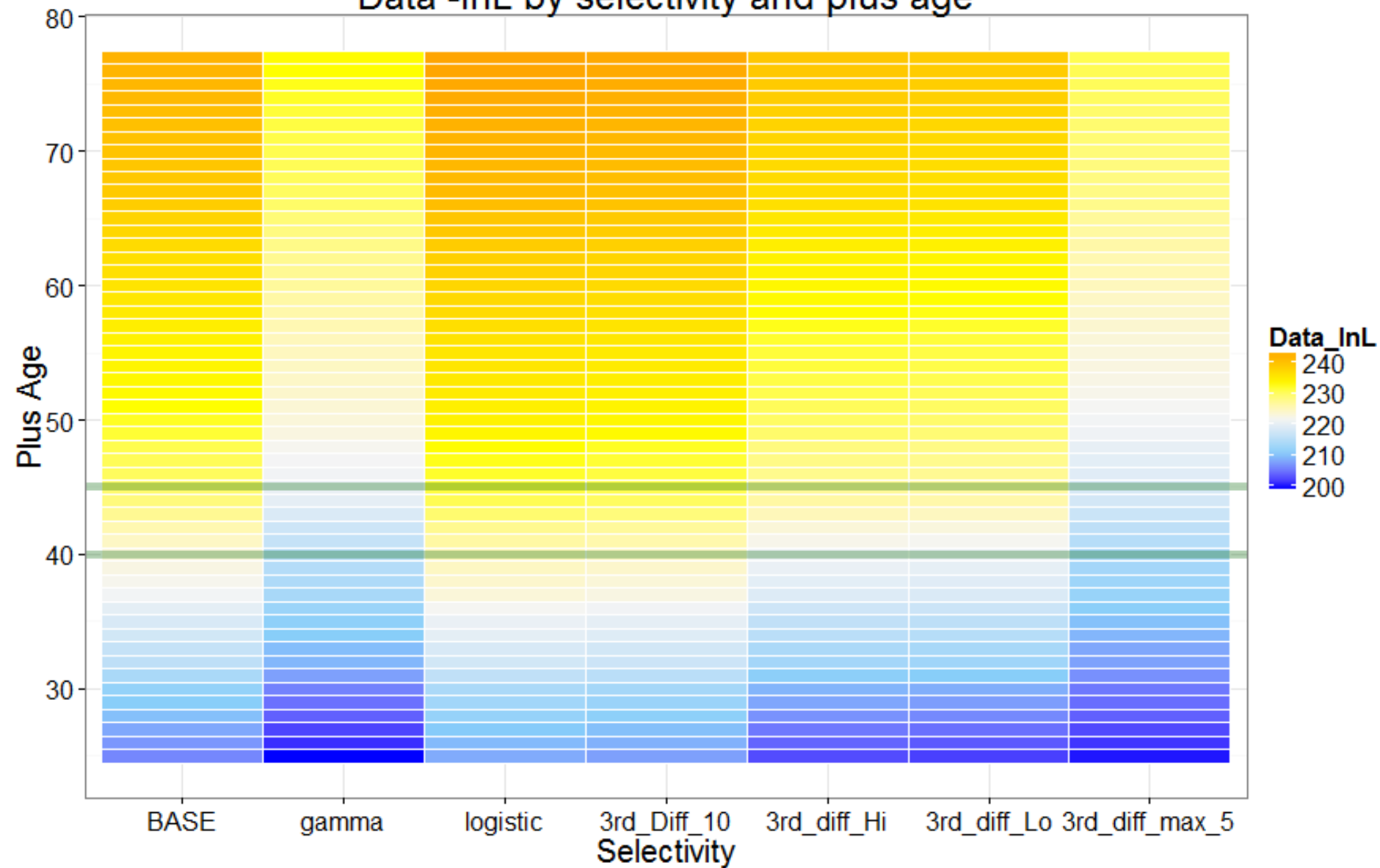
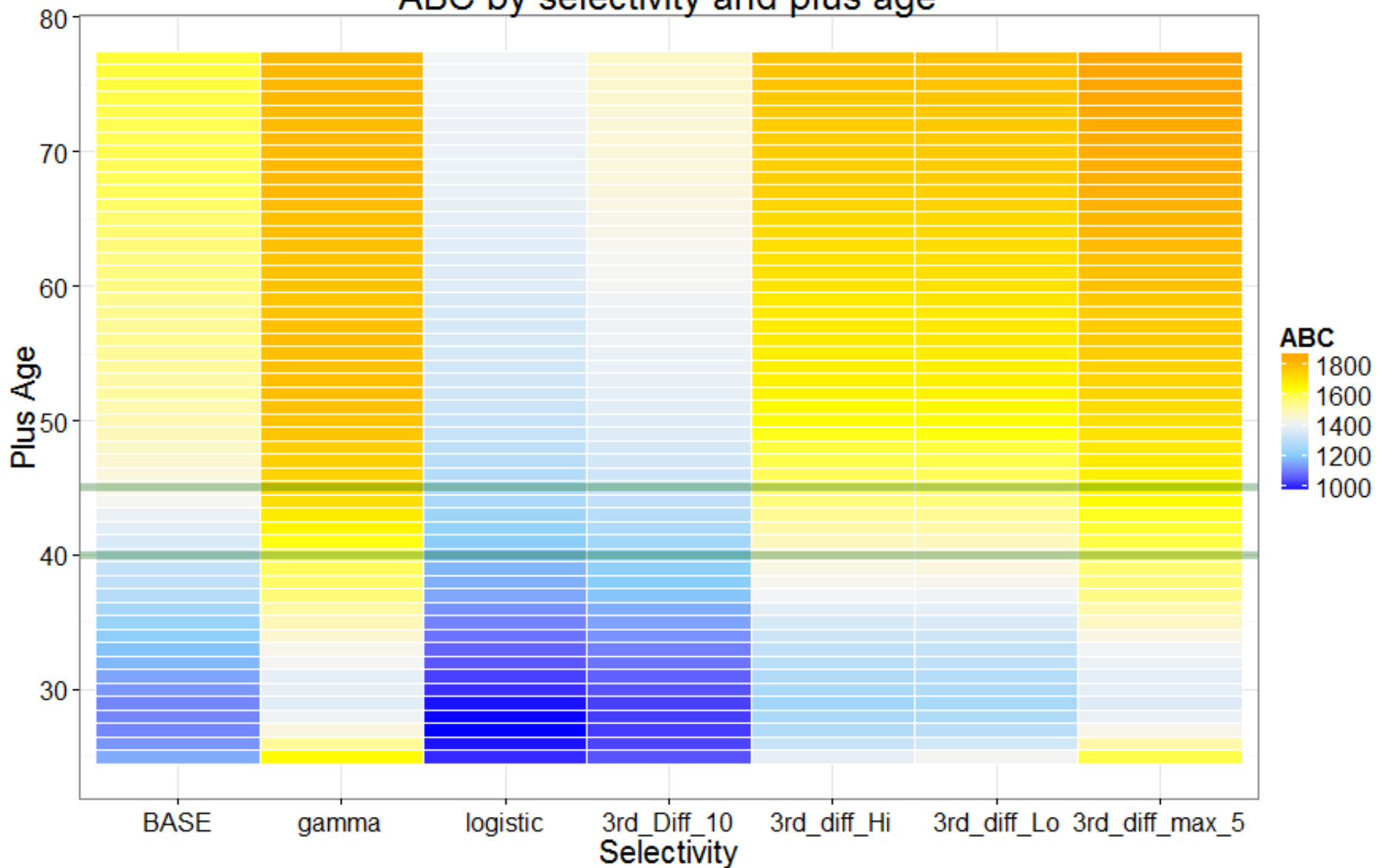Survey Age -lnL by selectivity and plus age

Trawl Survey -lnL by selectivity and plus age
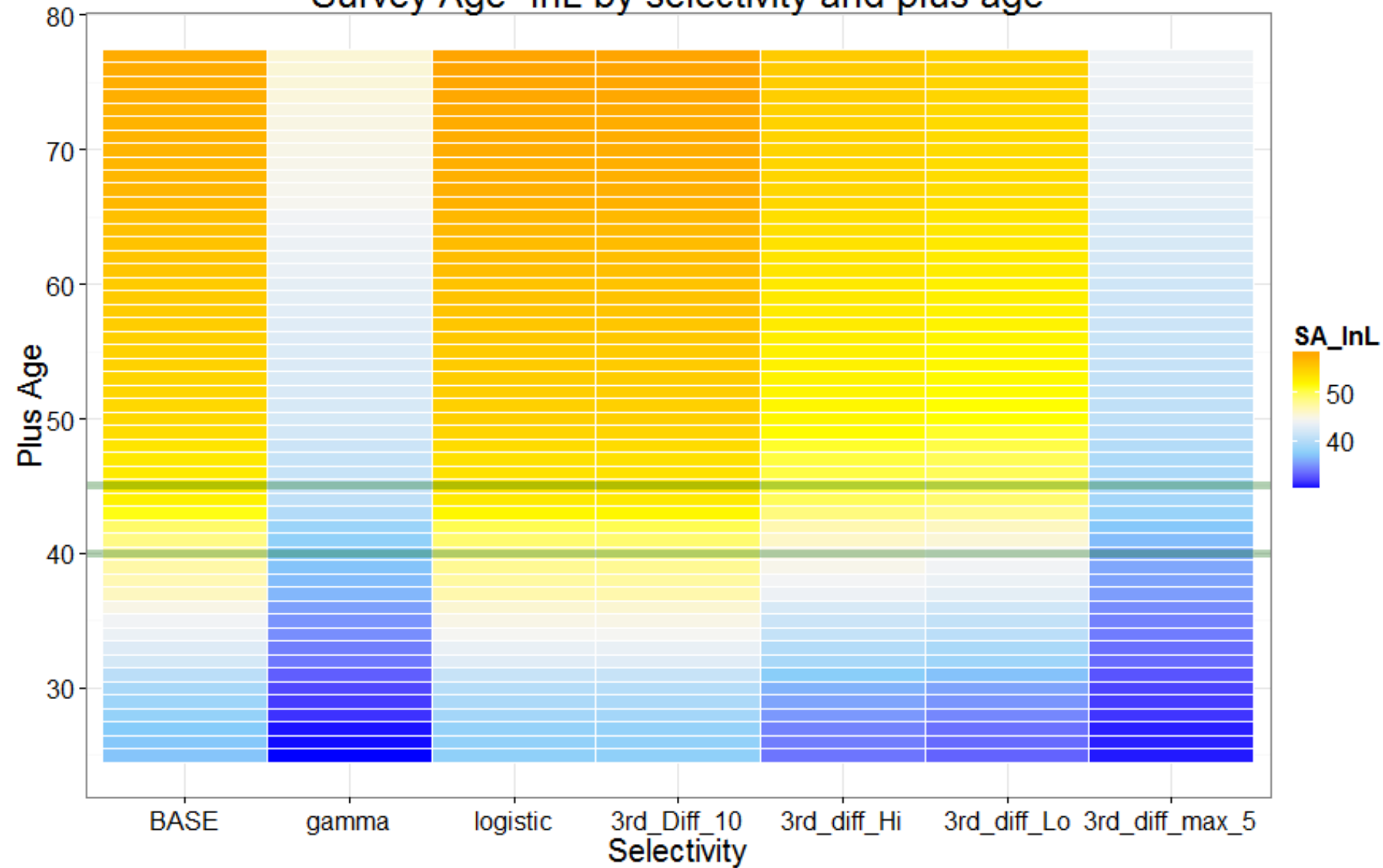
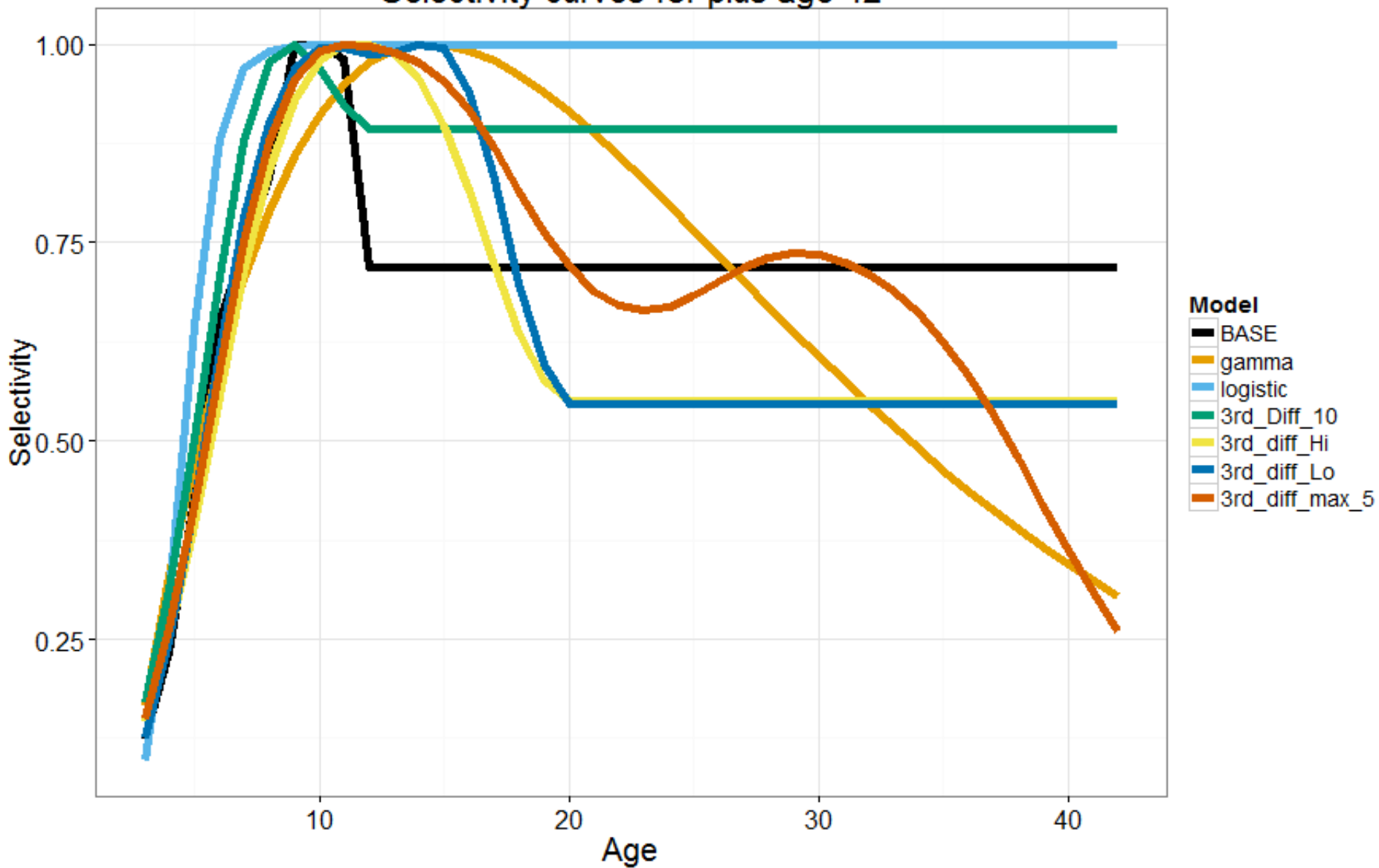Longline survey -lnL by selectivity and plus age

LL Survey size -lnL by selectivity and plus age
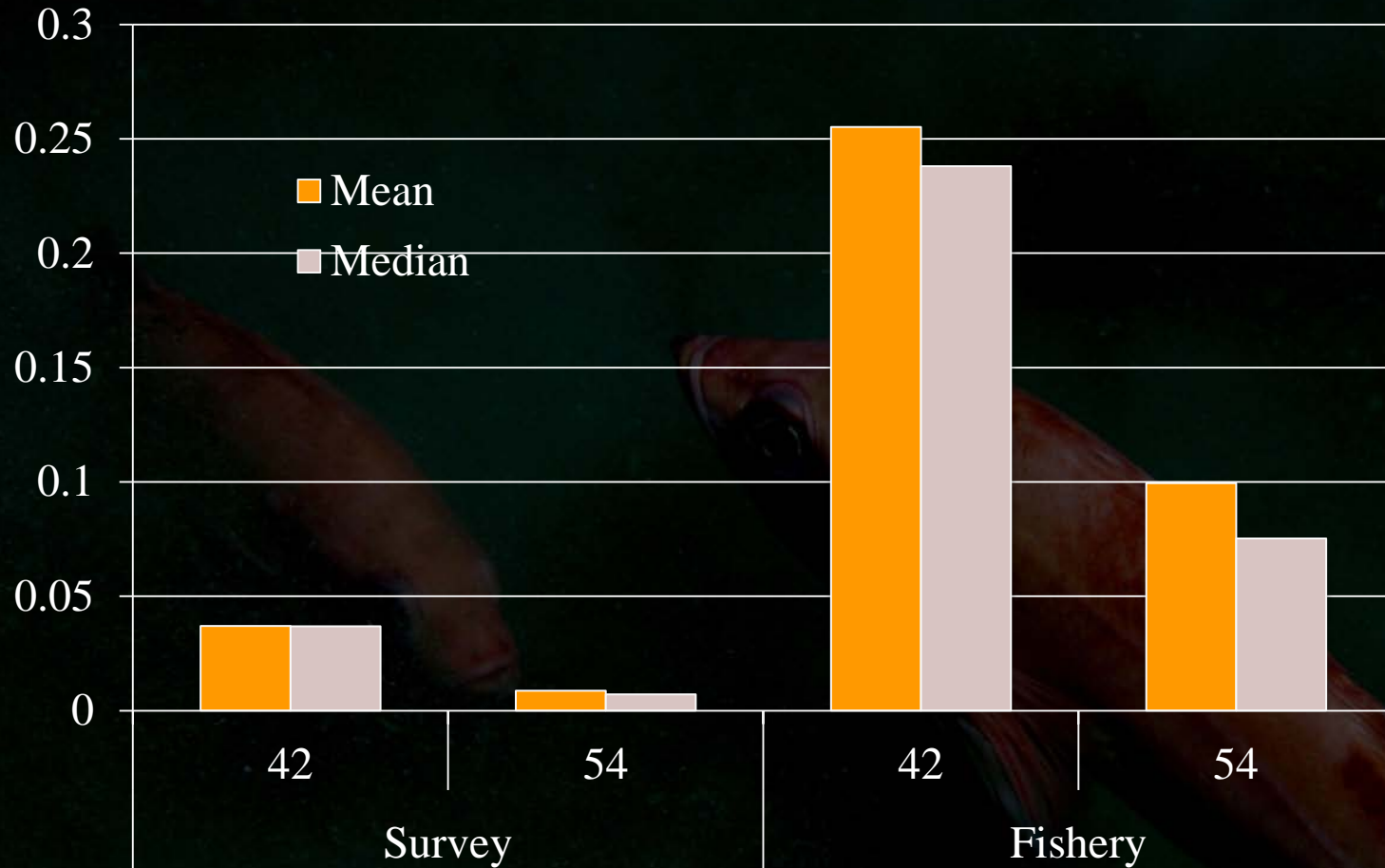
ABC by selectivity and plus age
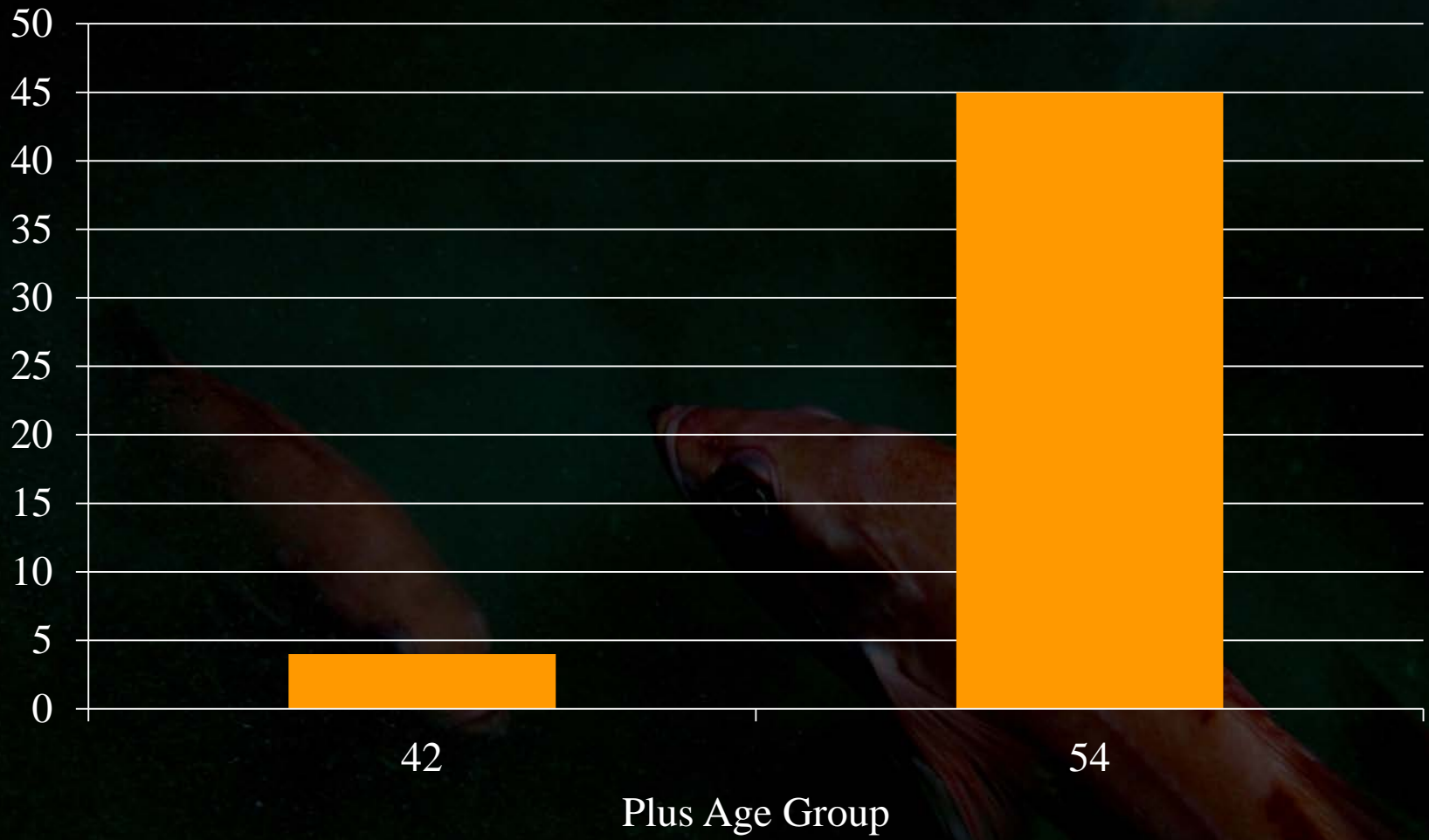
Selectivity curves for plus age 42

Other diagnostics

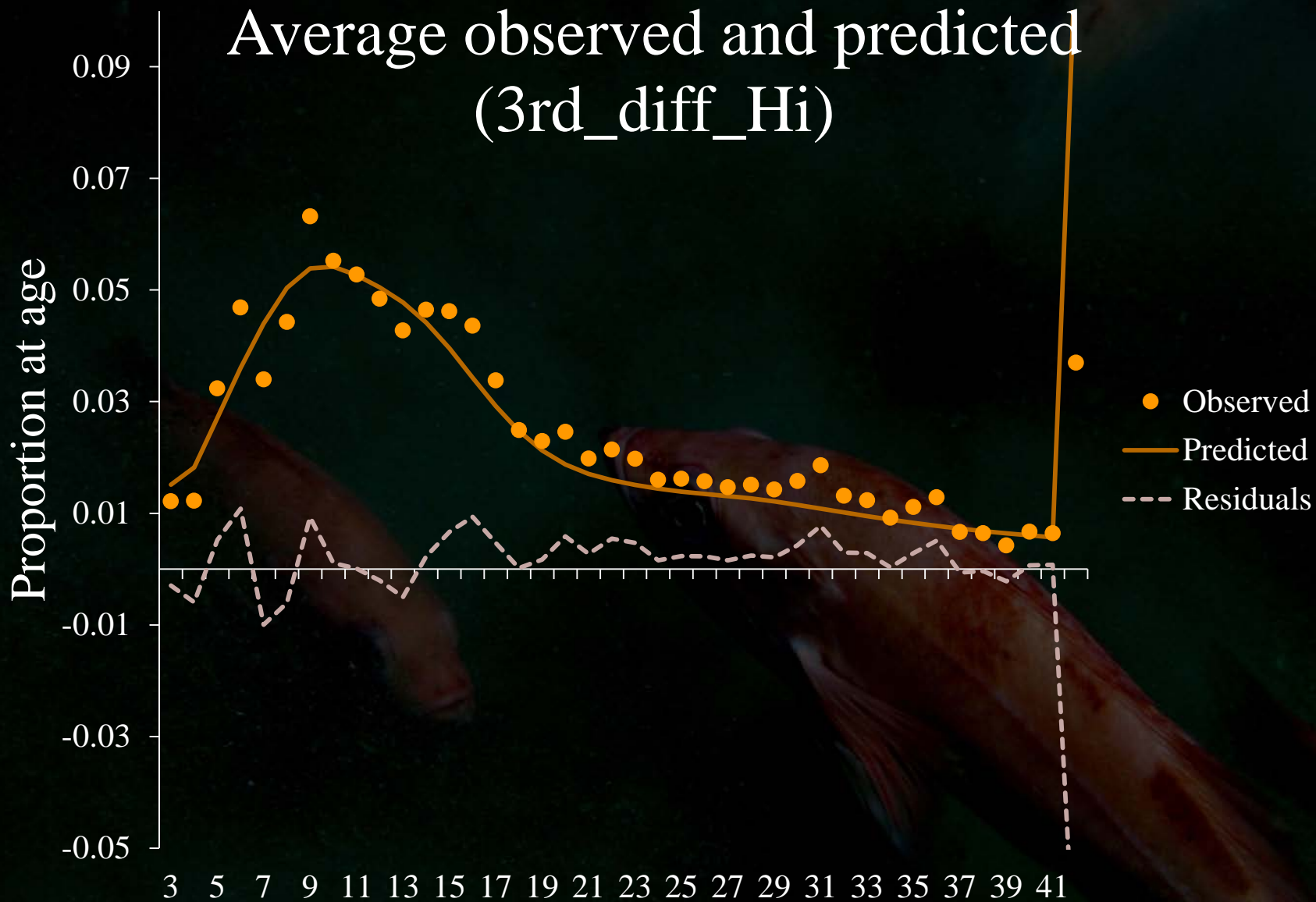- Number of zeros in age comps
- Graphs of plus group size by fish/survey
- Graphs of average age fit to predicted
- Looked at SDNR, not shown here
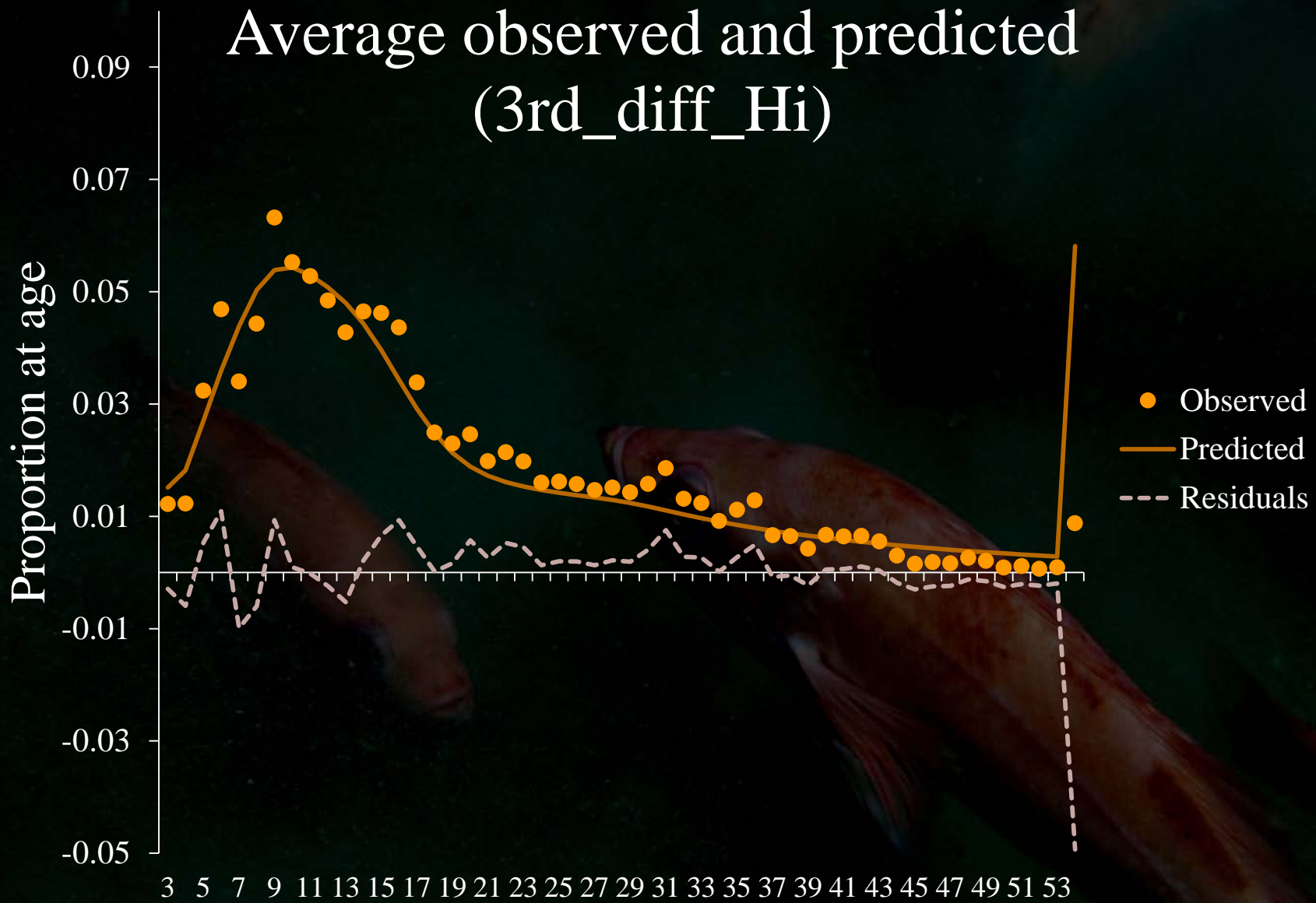
Proportion in Plus Group

Number of Zeros in Trawl Age comp after age 25

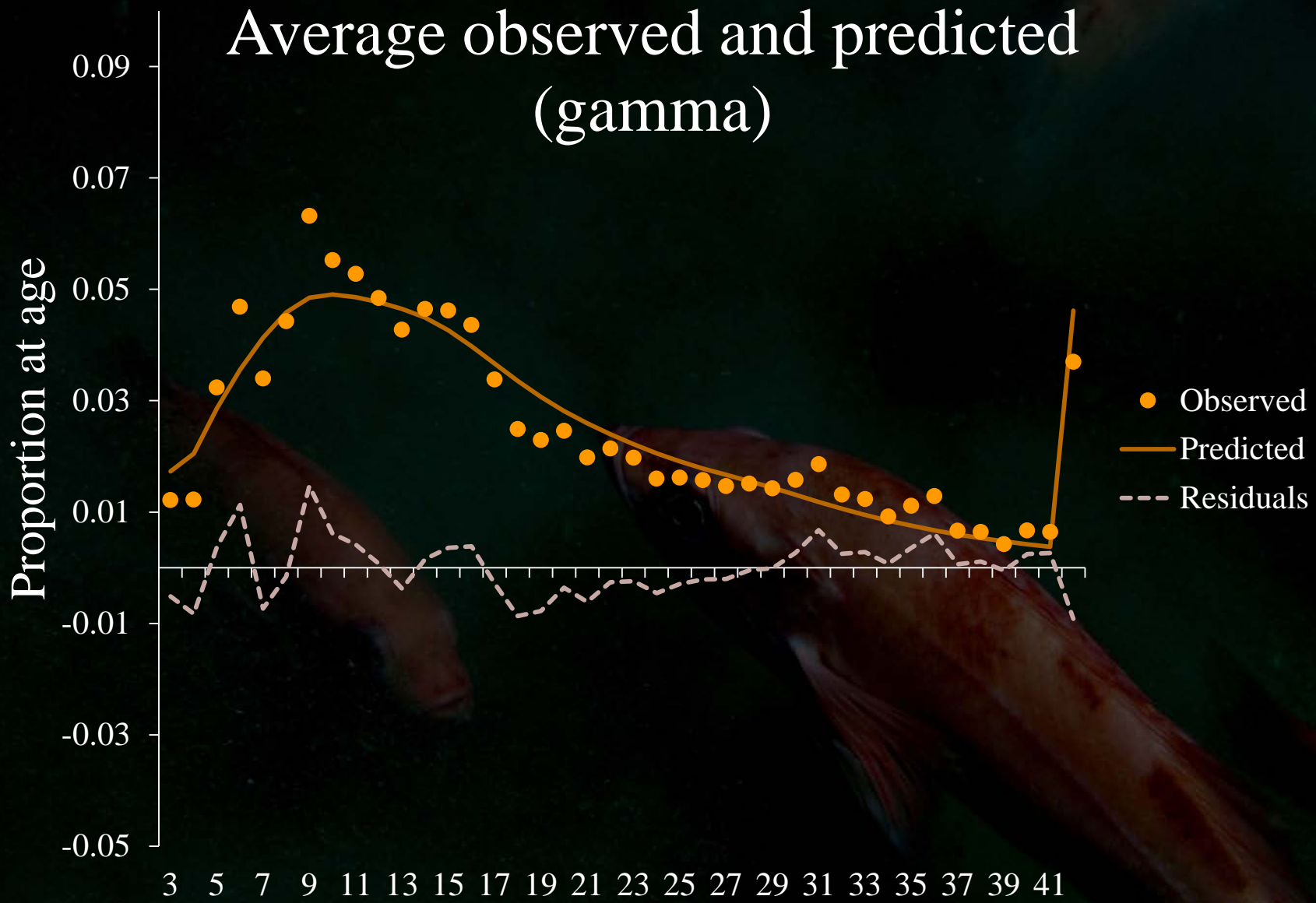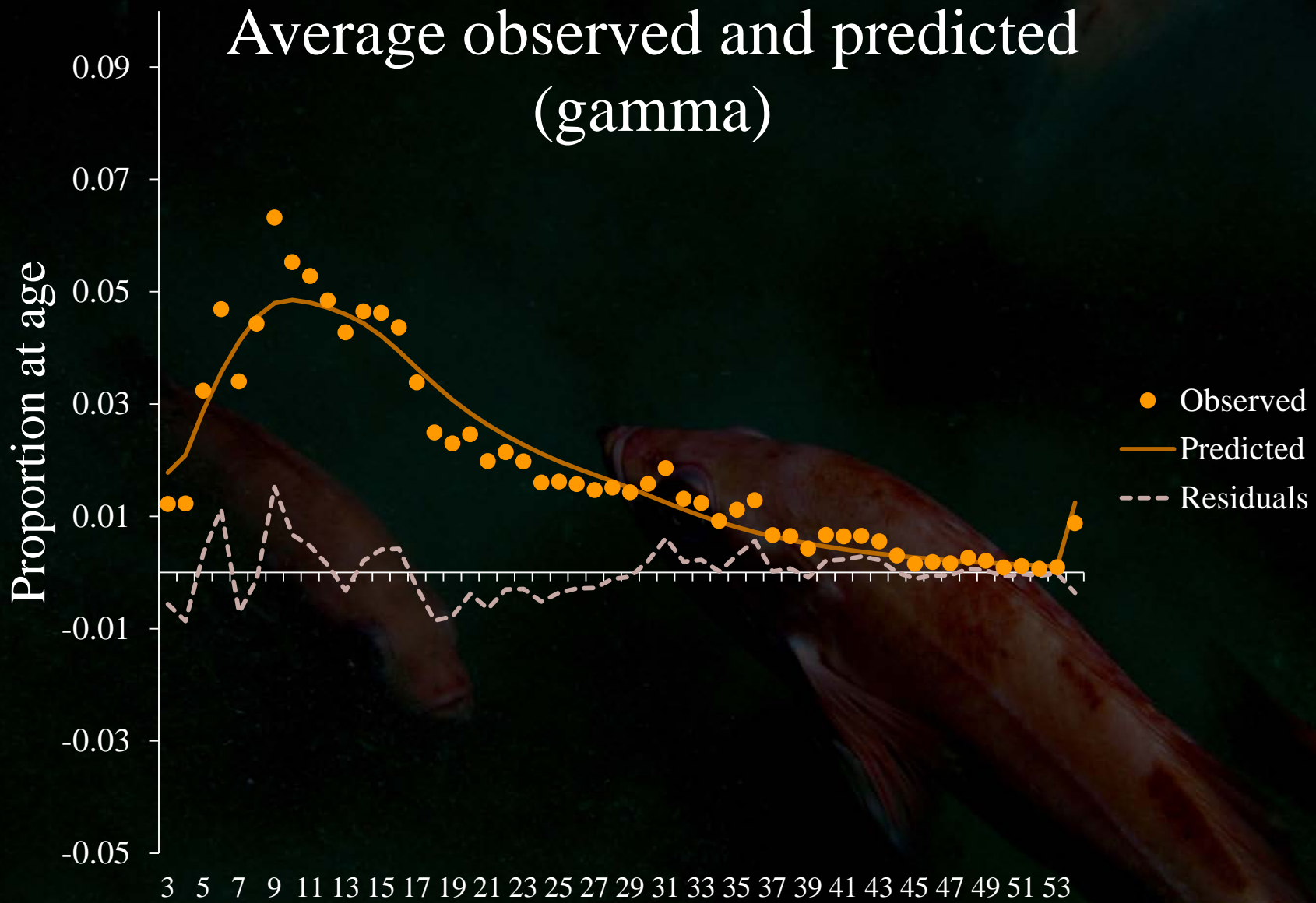Average observed and predicted (3rd_diff_Hi)

Average observed and predicted
(3rd_diff_Hi)

Average observed and predicted (gamma)

Average observed and predicted (gamma)

RE/BS Recommendation

- Fishery selects fish way older than the survey
- Trawl survey selectivity needs to be dome-shaped to some extent
- Gamma or more flexible 3rd differences
- Plus group at about 42 or greater