




# Adjusting IPHC setline survey WPUE for apportionment

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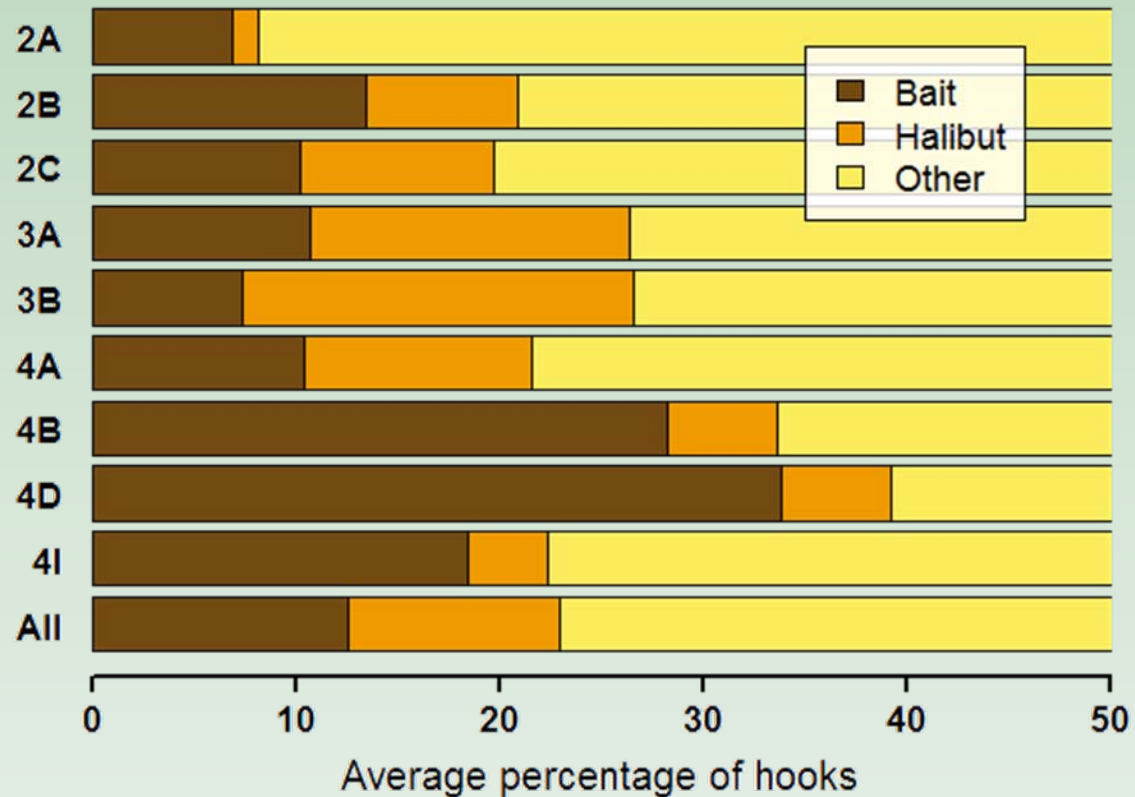
# Potential adjustments to the survey index

-  **Hook competition** – Some areas lose bait more rapidly due to other predators, affecting halibut catchability.
-  **Station depth** – Survey station depth distribution does not match bottom depth distribution exactly in some areas.
-  **Timing of setline survey** – Some areas have a larger fraction of total annual removals taken before the survey.

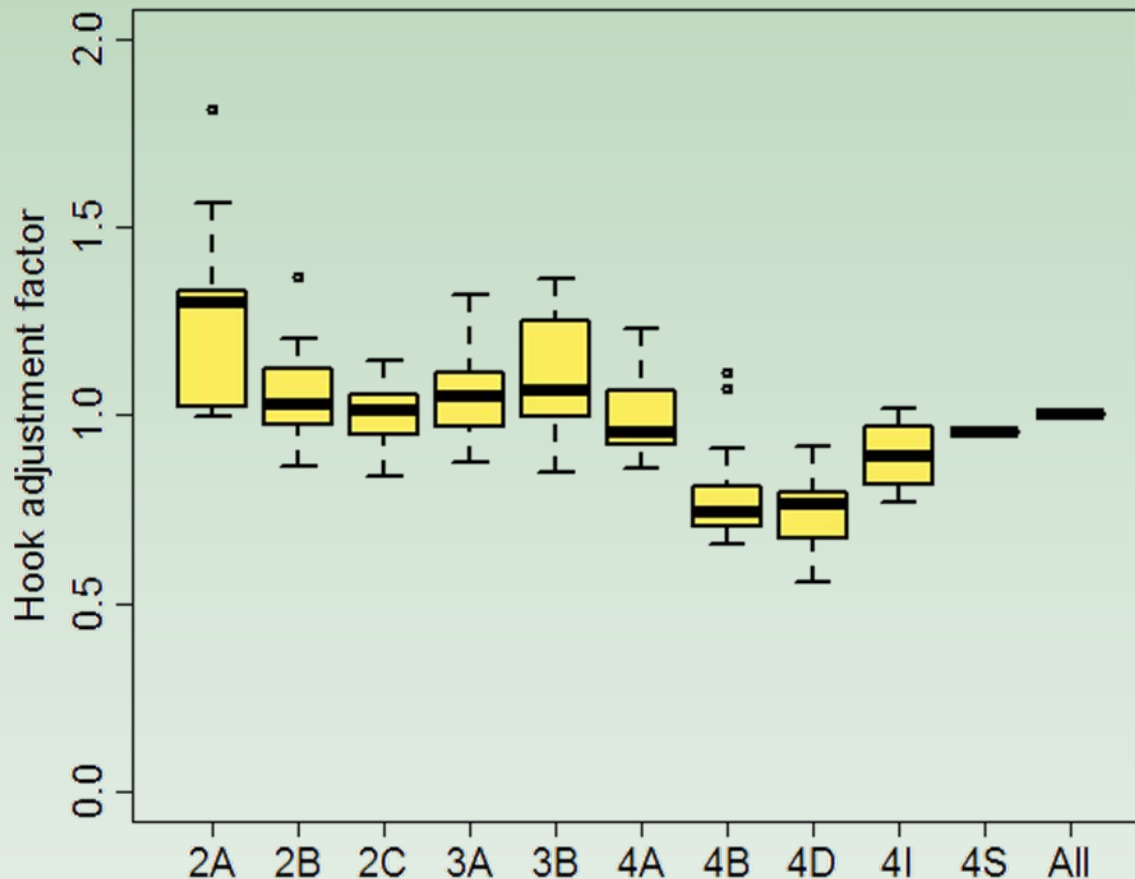
# Basis of hook adjustment to survey index

## Returned baits (2007-09)

- from setline survey  
hook return data



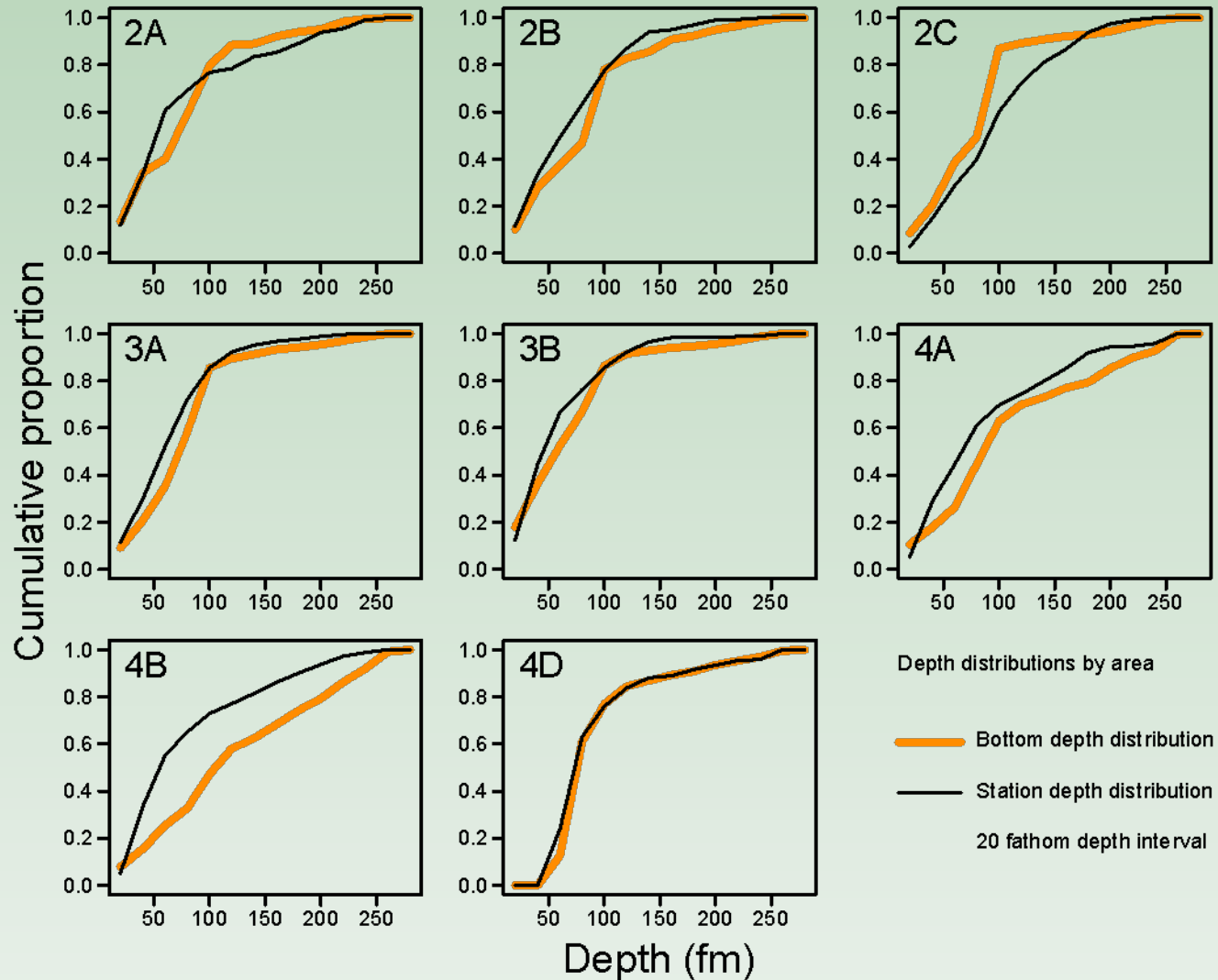
# Distribution of hook AFs (1996-09)



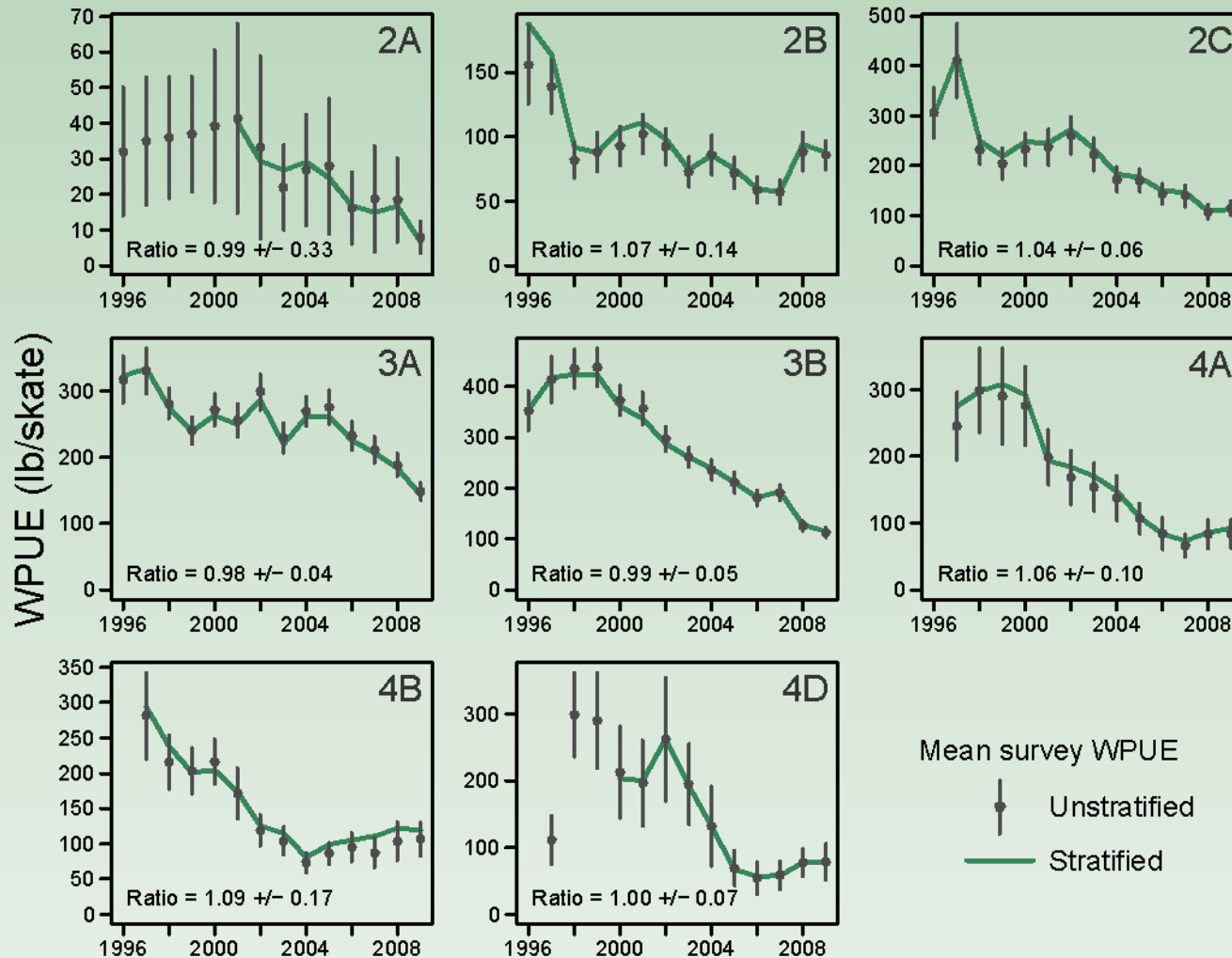
If there were no survey data, no hook adjusted was made, i.e., the Hook AF was set to 1.0.

The Hook AF for 4CDE is the weighted average of the AFs of the component areas.

# Basis of depth adjustment to survey index

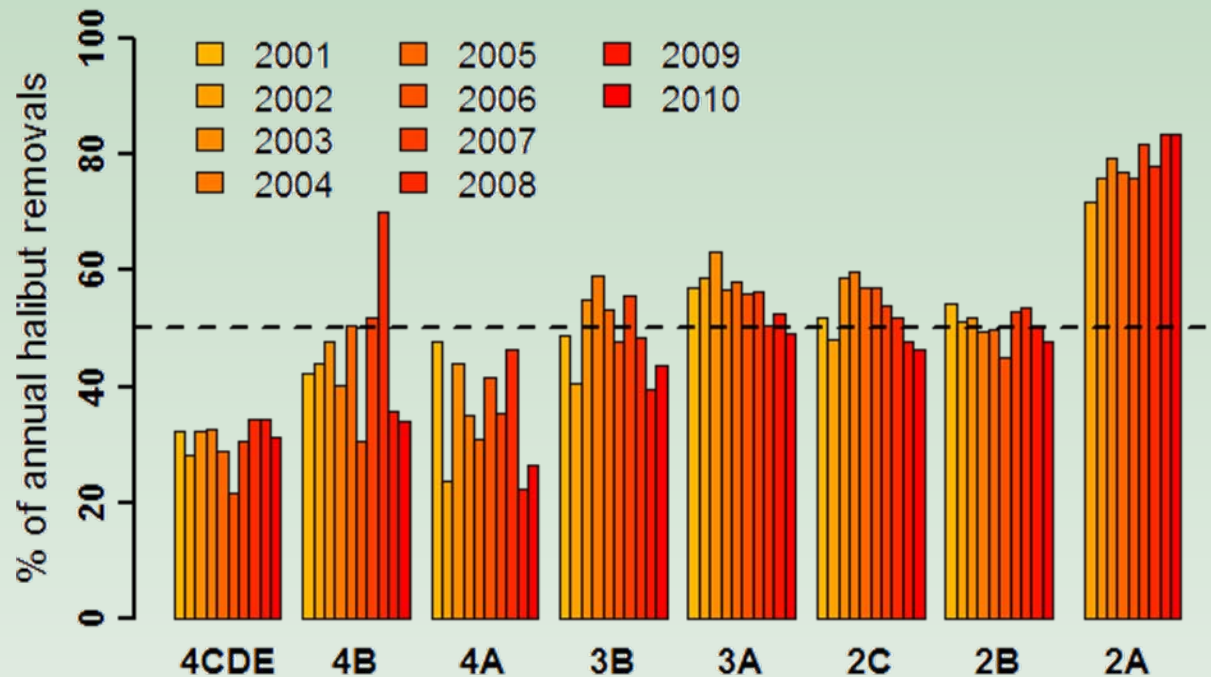


# Comparison of simple and depth-stratified survey indices





# Basis of survey timing adjustment

**% of annual removals taken prior to the mean survey date**






# Basis of survey timing adjustment




-  Removals of Ebio prior to the setline survey differ among areas.
-  It is reasonable to suppose that survey WPUE is affected by how much Ebio is removed prior to the survey.



# Adjusting for removal of EBio prior to survey




-  With some important assumptions (see Bluebook), we can adjust observed setline WPUEs to what they would have been if 50% of removals had been made prior to the survey.
-  For removals greater than 50%, survey WPUE is adjusted upwards.
-  For removals less than 50%, survey WPUE is adjusted downwards.

# Dependence of adjustment on harvest rate

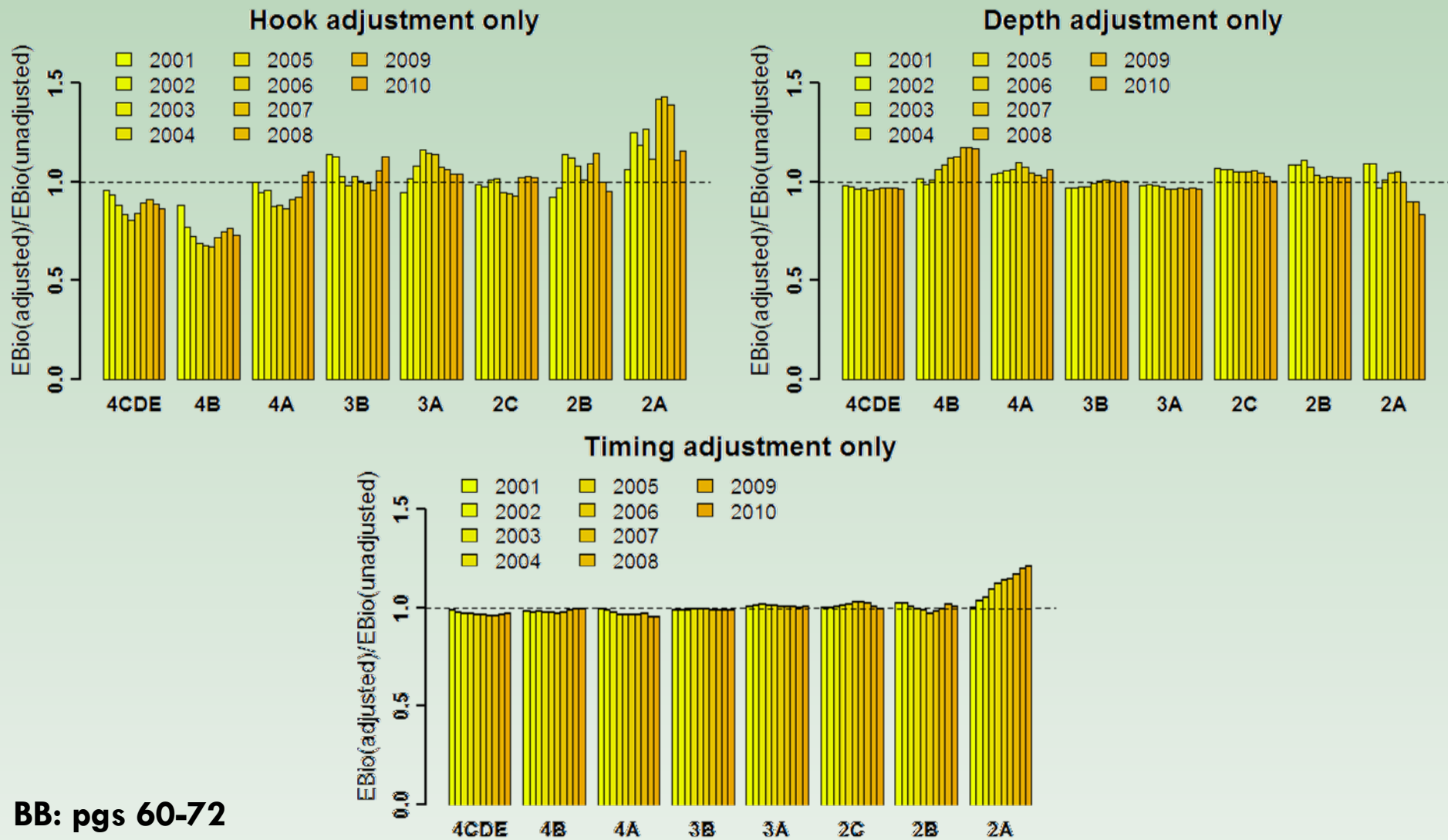
-  As well as removals prior to the survey, the timing adjustment depends on the estimated realised harvest rate.
-  If harvest rates are relatively low (e.g., Area 4) the adjustment will be small, whatever the timing of removals.
-  If we estimate high harvest rates (e.g., Area 2) the adjustment will be greater.



# Combining adjustments and apportionment

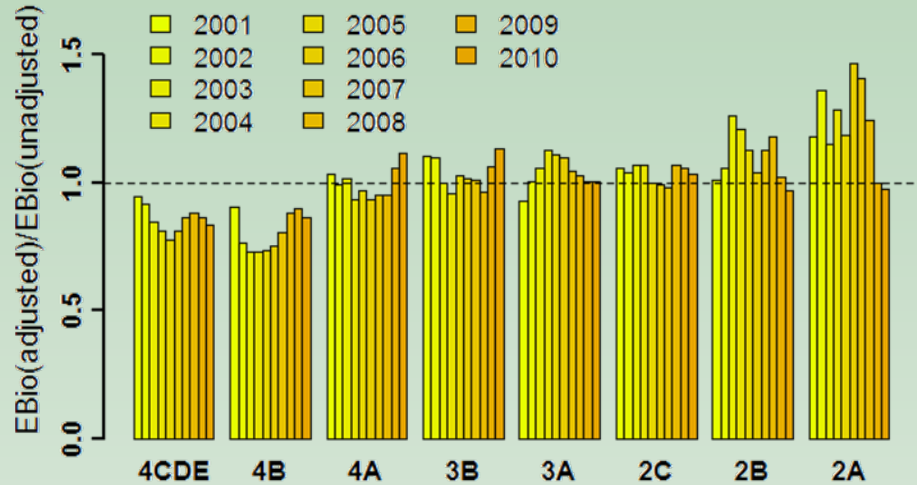
-  We can consider any combination of the three adjustments.
-  Once adjustments are combined, apportionment of biomass is based on a weighted average of the three most recent years' adjusted WPUEs.
-  We do this averaging after the adjustments are made – no averaging is done during the calculation of the adjustments.

# Effect on apportionment: equal 3-year weighting

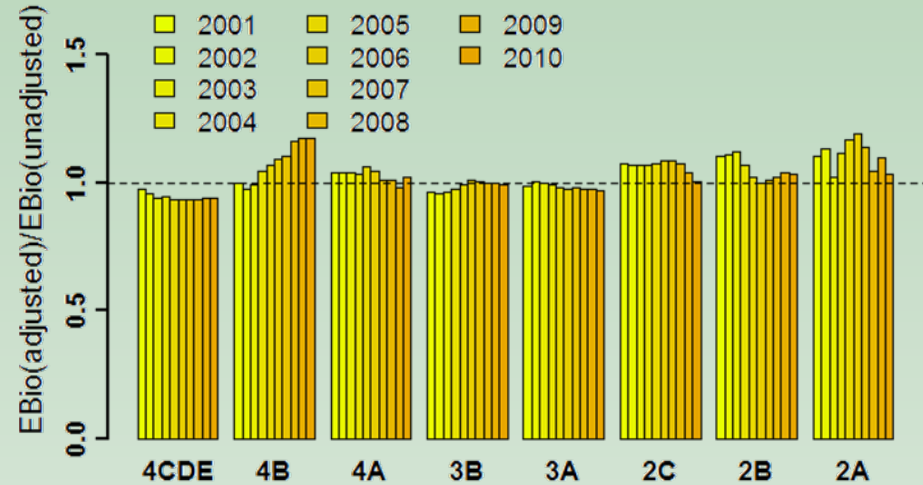


# Effect on apportionment: equal 3-year weighting

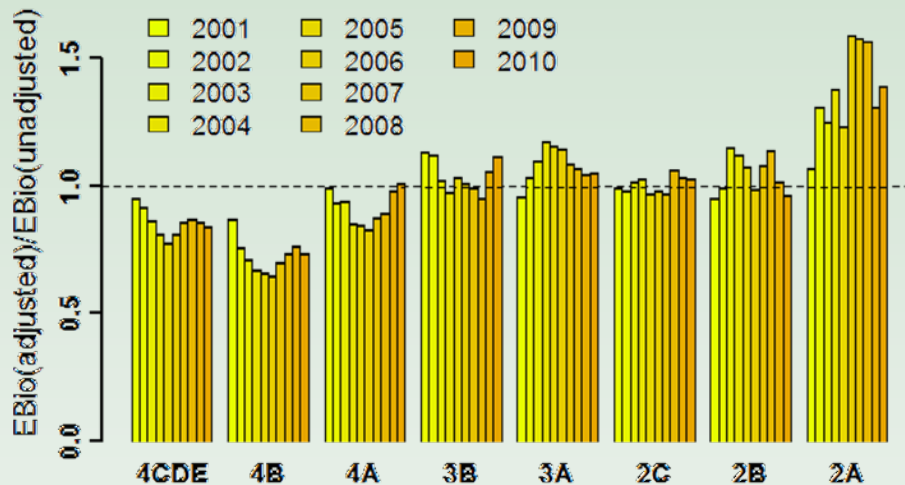
### Hook + depth adjustments



### Timing + depth adjustments



### Timing + hook adjustments



# Effect on apportionment: equal 3-year weighting

