

UPDATED DISCARD MORTALITY WORK

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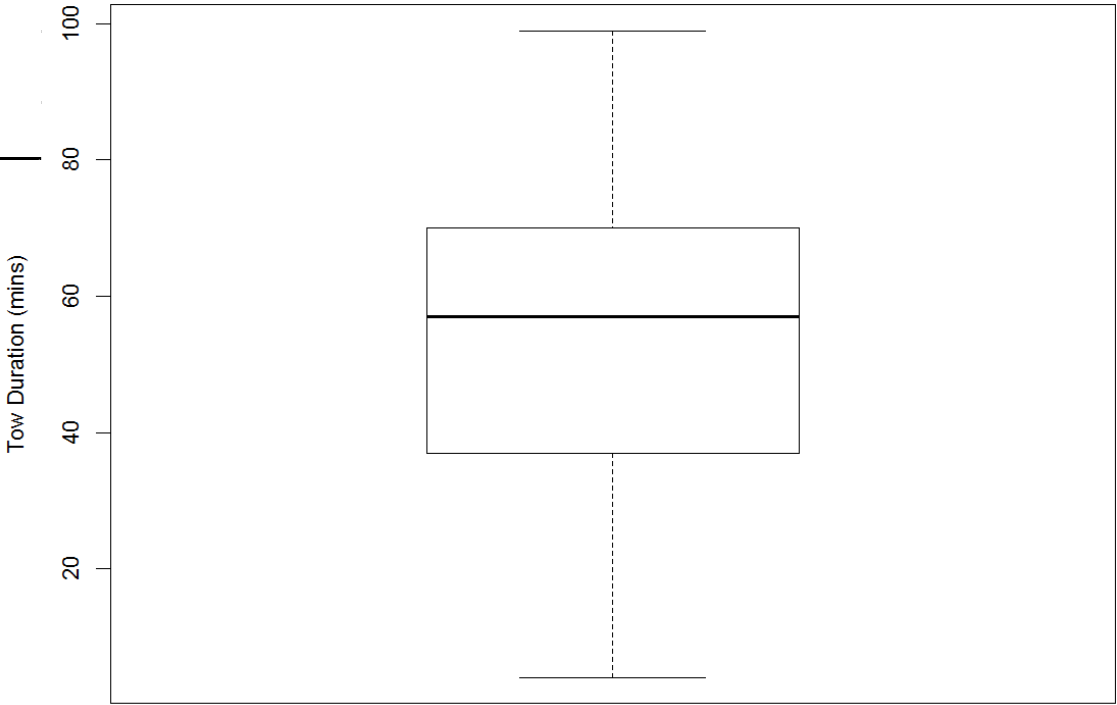
Sea Scallop Benchmark Assessment
Working Group Meeting
March 26-30, 2018
Woods Hole, MA

Updates

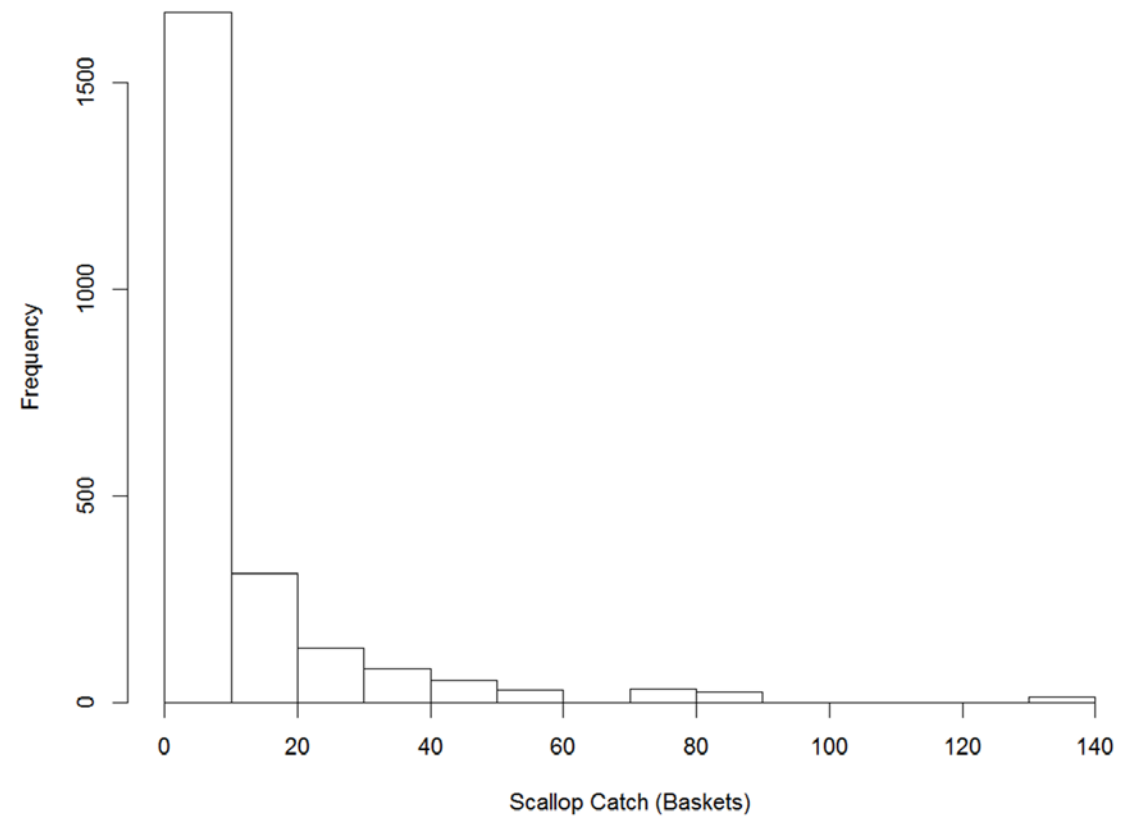
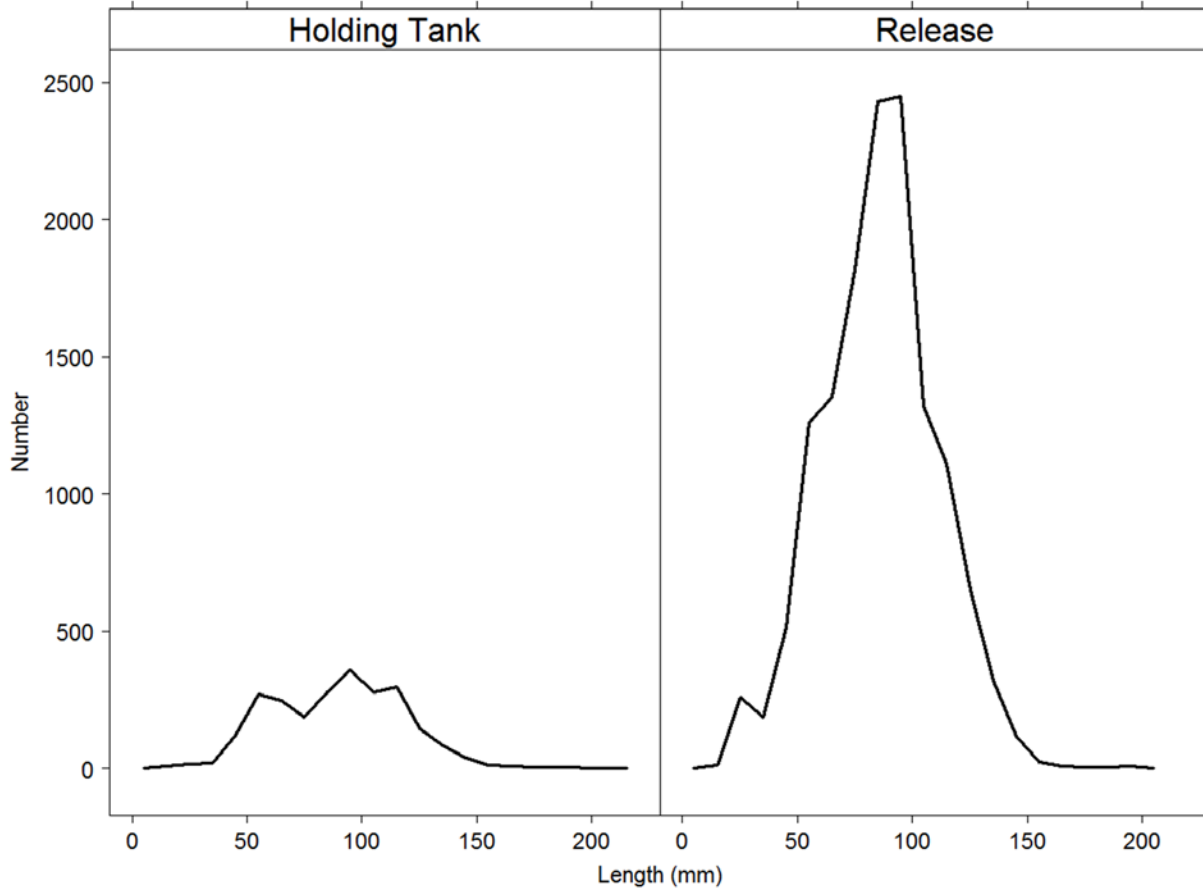
- Summary of data for comparison to commercial effort
- Used multinomial proportional odds model to understand what variables impact shell damage (Benoît et al., 2010; Capizzano et al., 2016, Knotek et al., 2017)
- Survival Analysis
 - Length cut off increased to 90 mm
 - Used air temperature as explanatory variable instead of thermal gradient
 - Used survival mixture model and GAM

Data Summary

Variable	Mean	SE	Range
Tow Duration (minutes)	54.2	0.44	4 - 99
Scallop Catch (number of baskets)	12.99	0.37	0 - 133
Thermal Gradient (°C)	8.48	0.16	-6.4 - 21.1
Air Temperature	18.2	0.12	7.7 - 28.3
Depth (m)	62.54	0.17	36.6 - 89.6
Shell Height (cm)	8.83	0.06	0.8 - 19.6
Exposure Time (minutes)	22.05	0.29	1 - 93.02



Data Summary



Proportional Odds Model

- Variables considered: Tow duration, shell height, scallop catch and bottom type
- Final model indicated all four variables significantly effected shell damage

Variable	Coefficient	Odds Ratio
Shell Height	0.391	1.48
Bottom_Typesoft	-0.065	0.94
Tow_Duration	-0.003	1.00
Bushels_Scallops	0.008	1.01

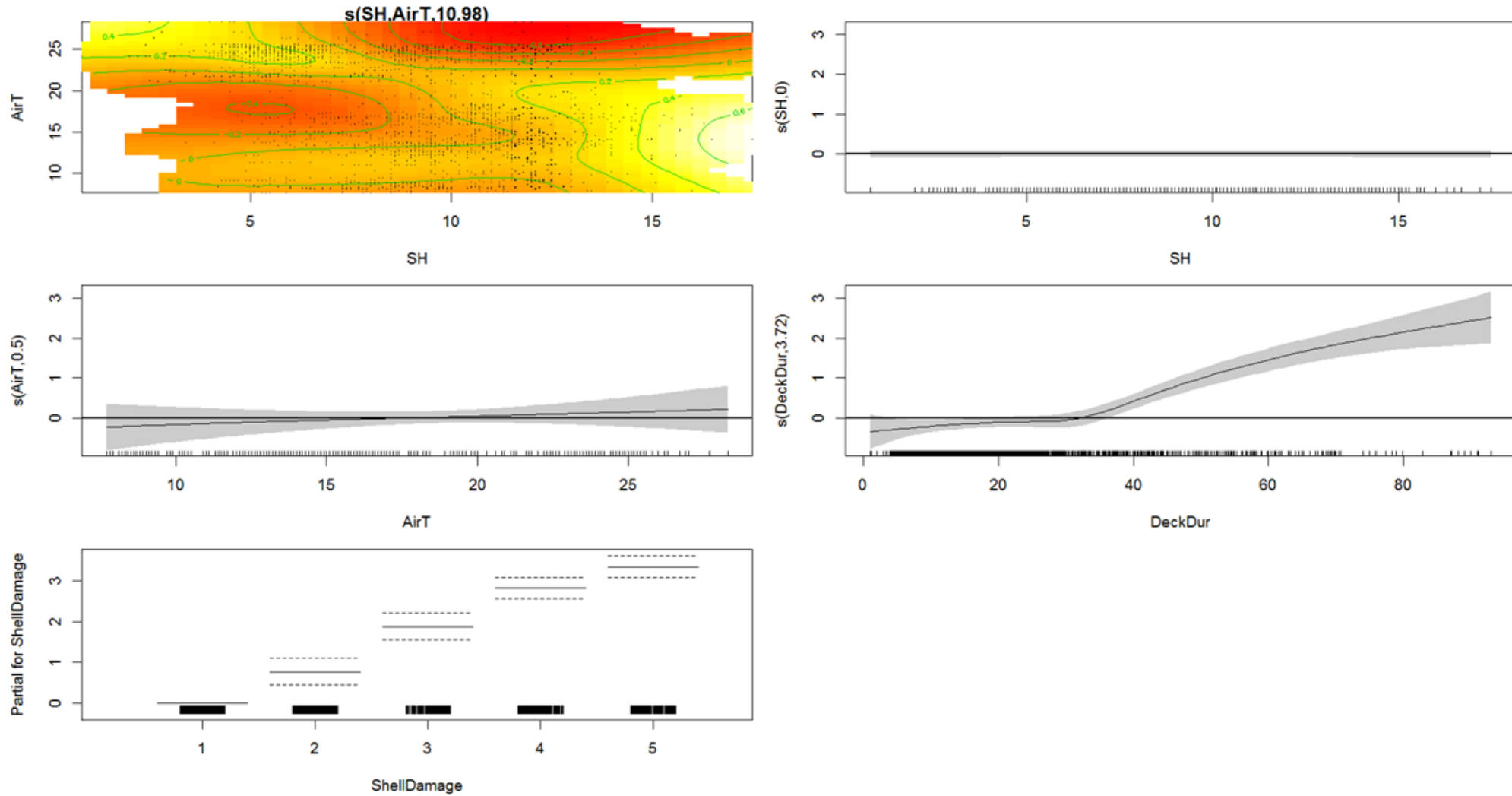
- Interpretation:
 - The odds of increased shell damage is 1.48 times greater for every unit increase in shell height
 - The odds of increasing shell damage decrease on soft bottom by 0.94

Survival Analysis - GAM

- GAM with cox proportional hazards family
- Variables: Air temperature, shell height, scallop catch, shell damage, bottom type, exposure time and interaction of air temperature and shell height
- Forward selection, optimal model based on AIC and deviance explained
- Final model:
Shell damage, interaction term, shell height, air temperature and exposure time
Deviance explained: 29.5%
All variables were significant
- Same model without shell damage explained 7.61 of the deviance

Survival Analysis - GAM

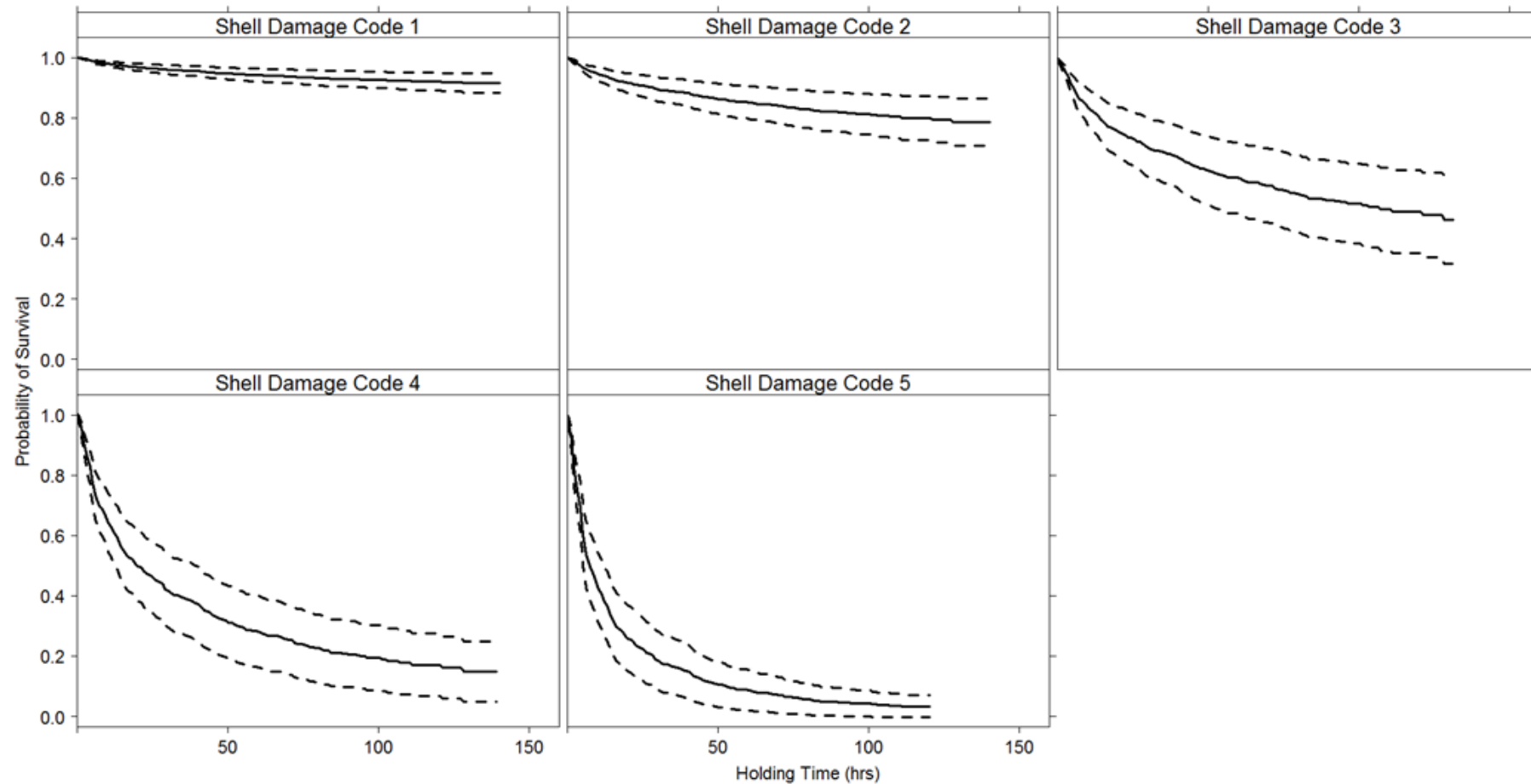
Partial effect plots for optimal model



Survival Analysis - GAM

Predicted survival:

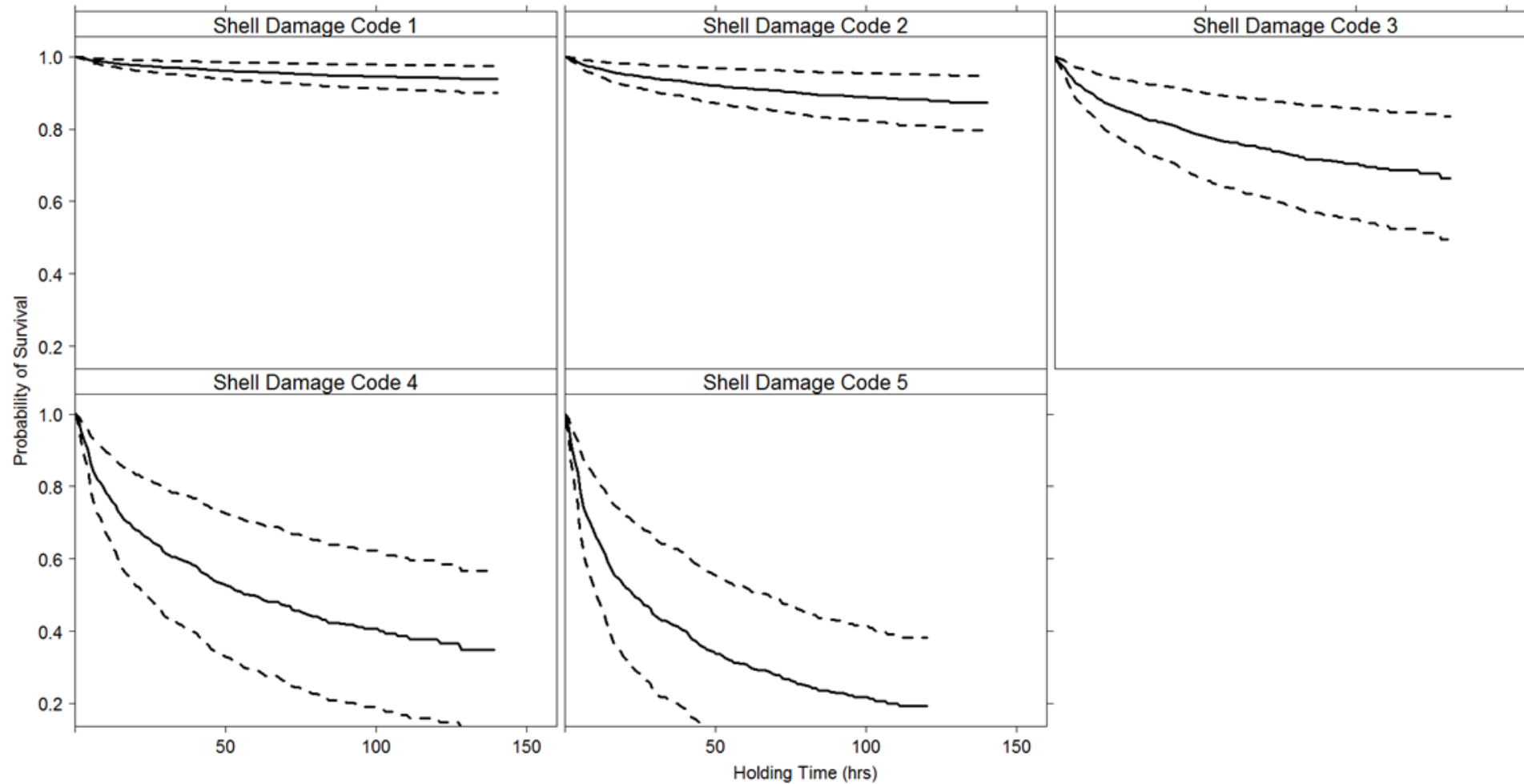
Mean shell height by shell damage code, mean air temperature (18.13) and mean exposure time (22.05 mins)



Survival Analysis - GAM

Predicted survival:

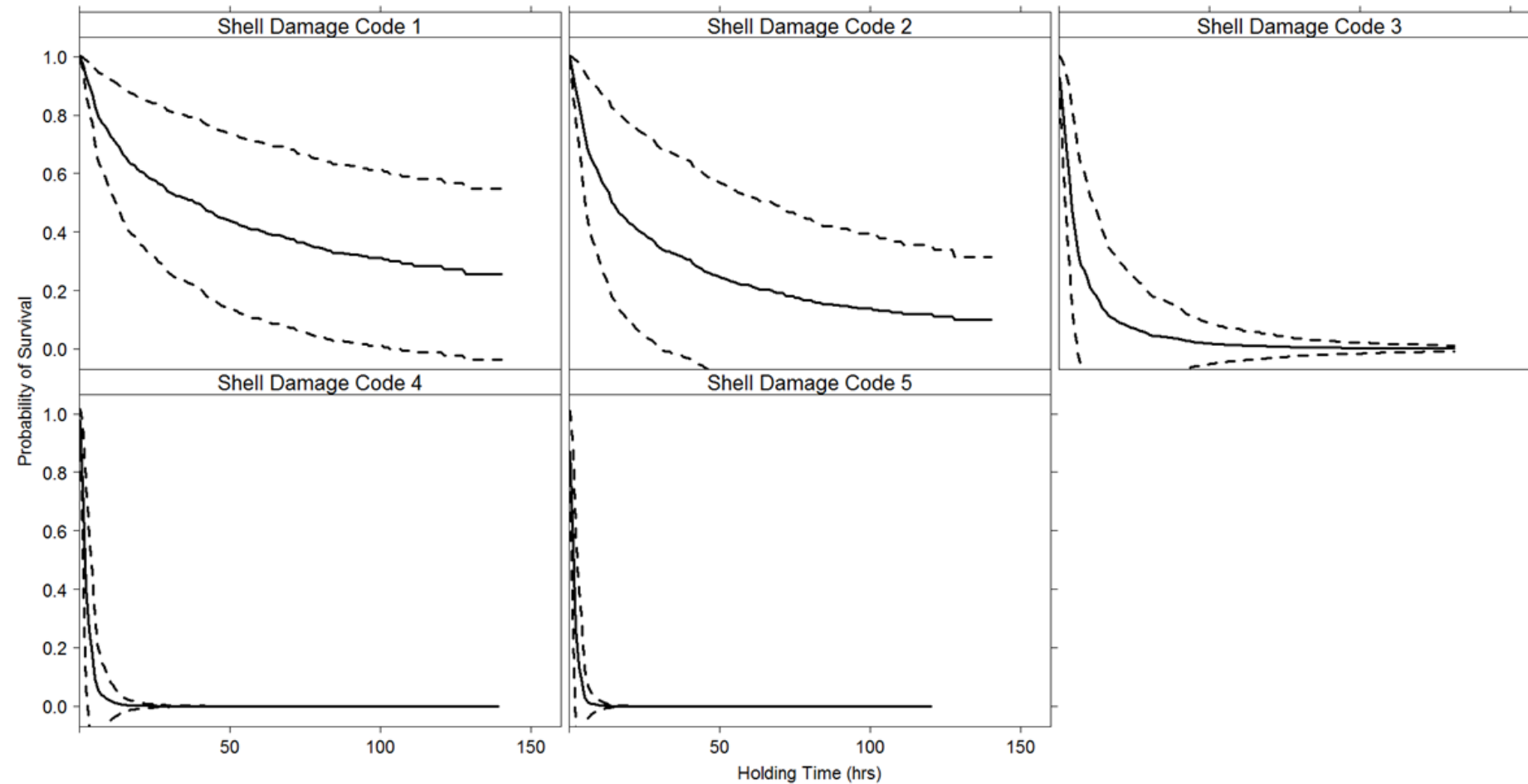
Mean shell height by shell damage code, min air temperature (7.7)
and min exposure time (1 min)



Survival Analysis - GAM

Predicted survival:

Mean shell height by shell damage code, min air temperature (28.3)
and min exposure time (93 min)



Survival Analysis – Mixture Model

- Scallop length bin cut off 9 cm
- Variables: Air temperature, shell height, shell damage, bottom type, exposure time and interaction of air temperature and shell height
- Forward selection, optimal model based on AIC
- Final model:
Shell damage, shell height and exposure time on alpha and phi
Air temperature on phi
Model fit was poor

