

# Operating Models to Evaluate Black-, Grey- and White-Box Controllers

Operation Model

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## **Operating model to simulate 3 contrasting stocks**

- Atlantic bigeye tuna
- North East Atlantic Skate
- Irish Sea sprat
- Plaice

## Life history parameters

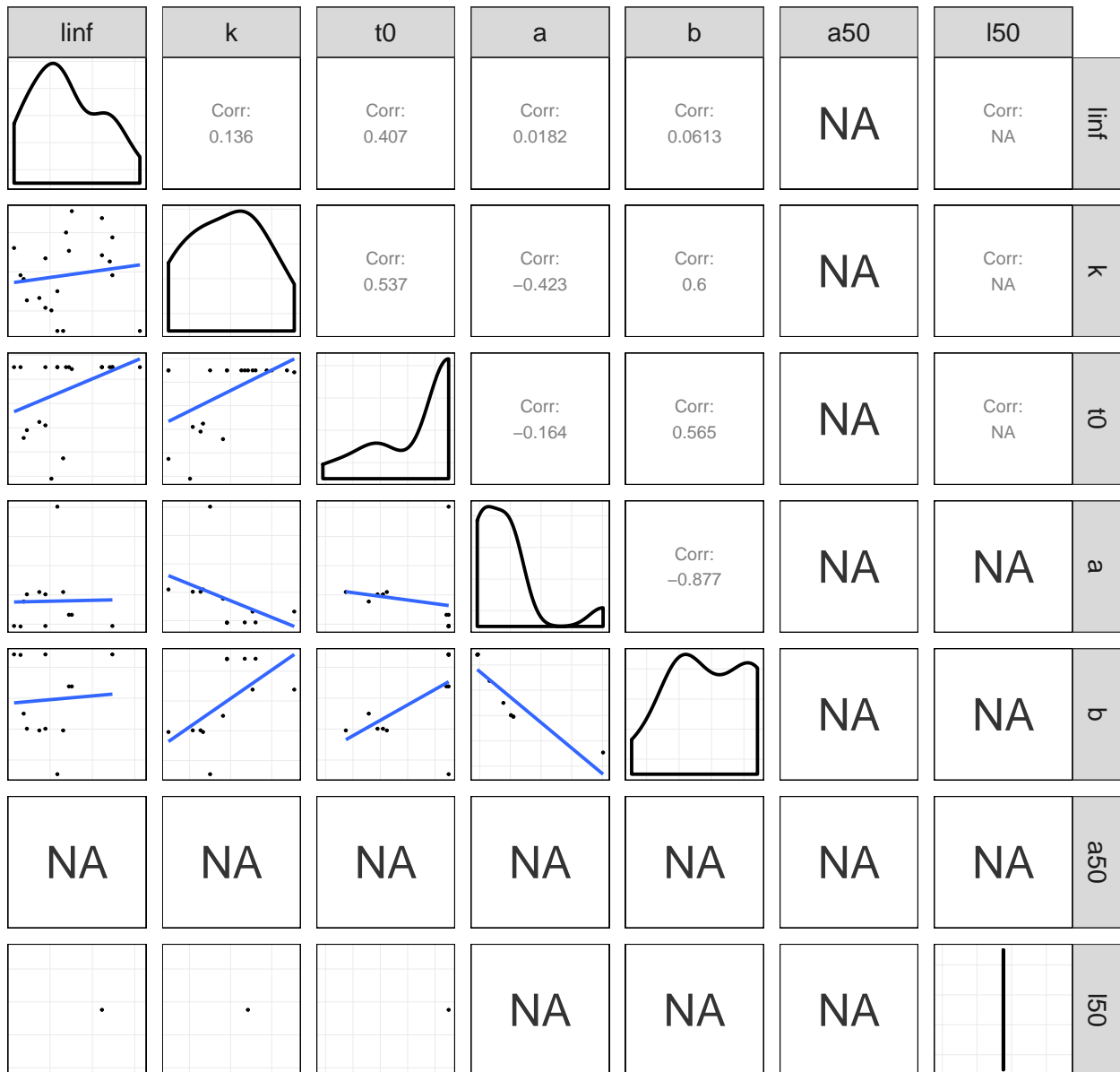
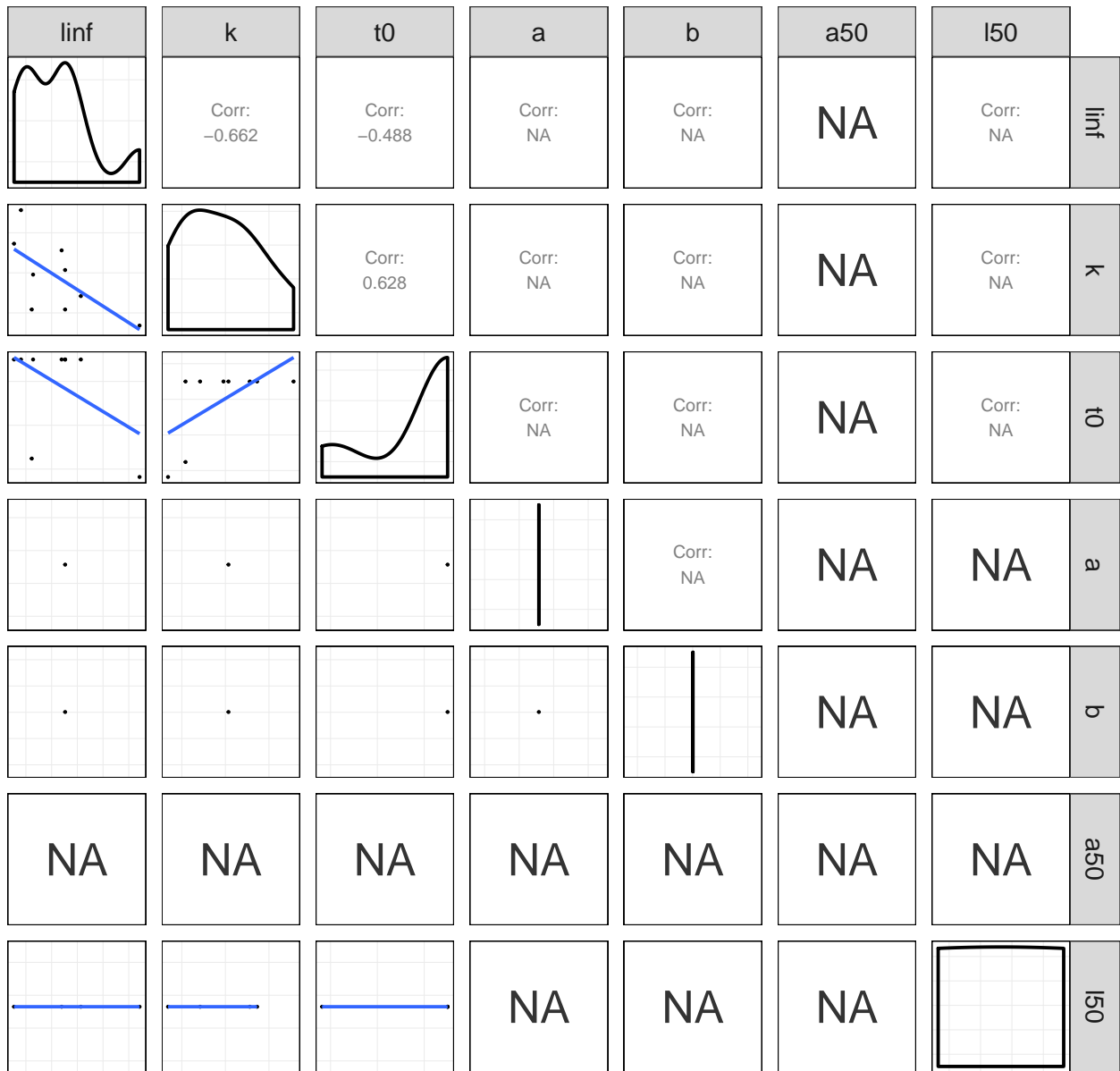
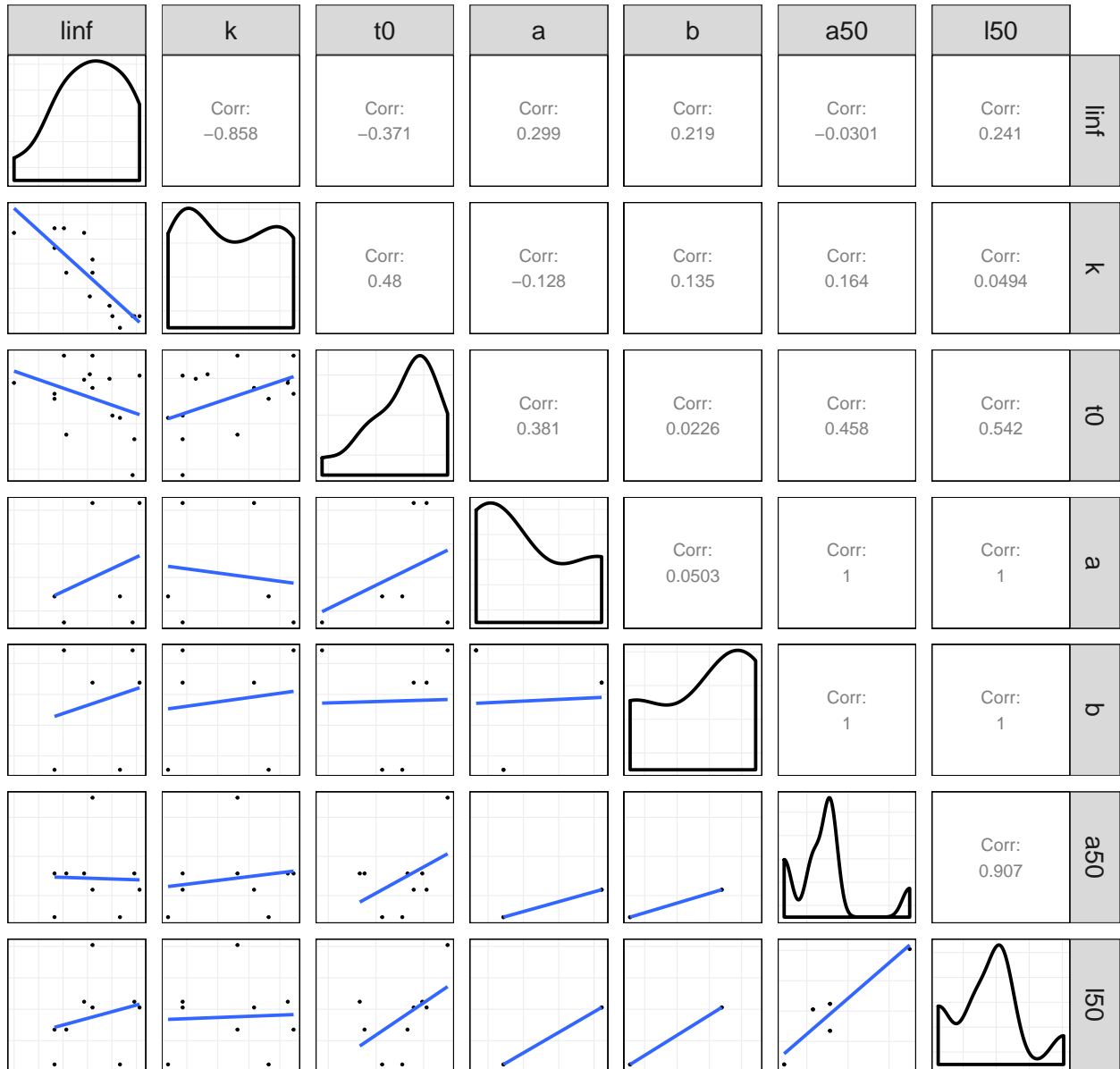


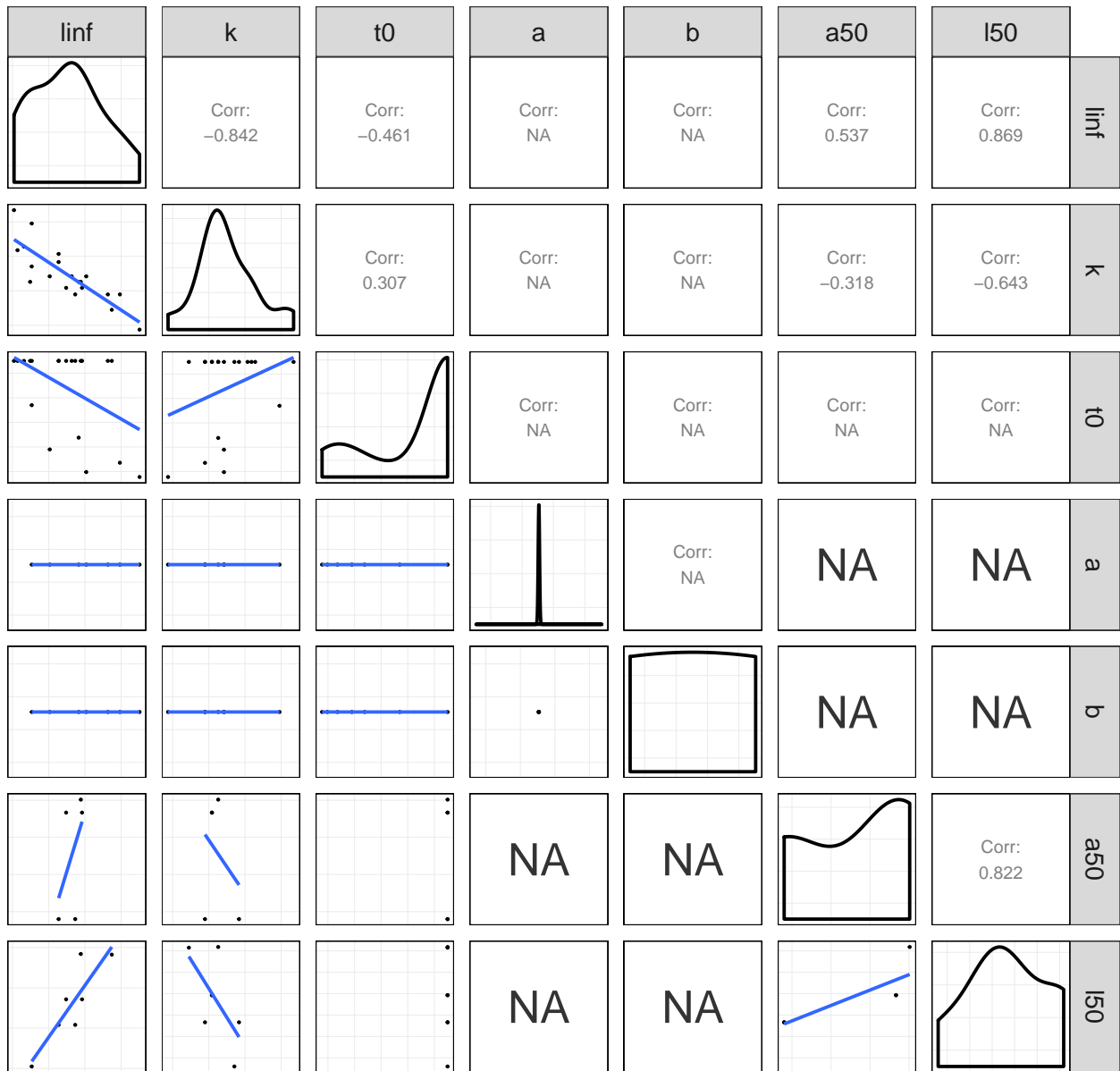
Figure 1 Pairwise scatter plots of sprat life history parameters.



**Figure 2** Pairwise scatter plots of bigeye life history parameters.



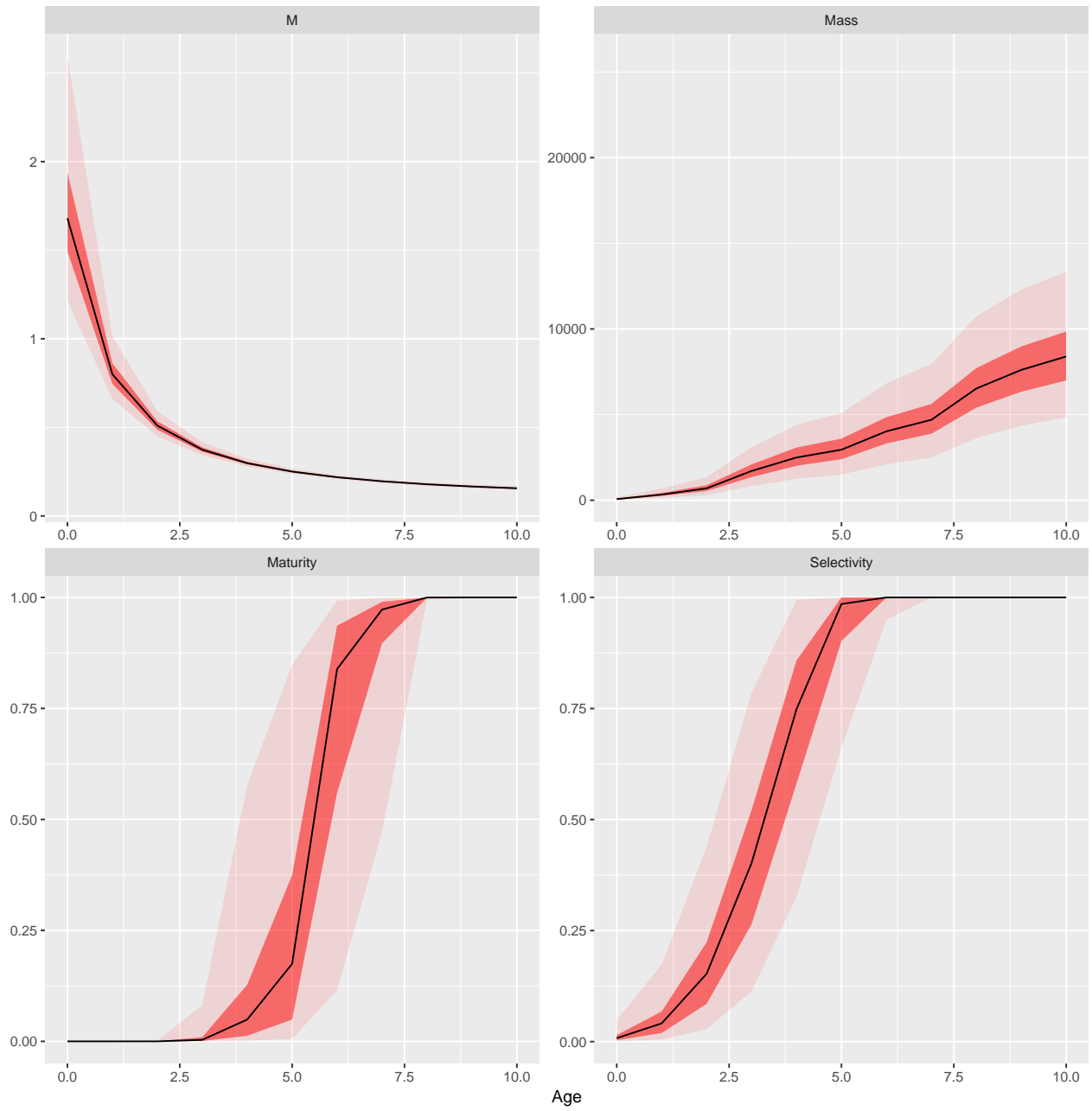
**Figure 3** Pairwise scatter plots of thornback ray life history parameters.



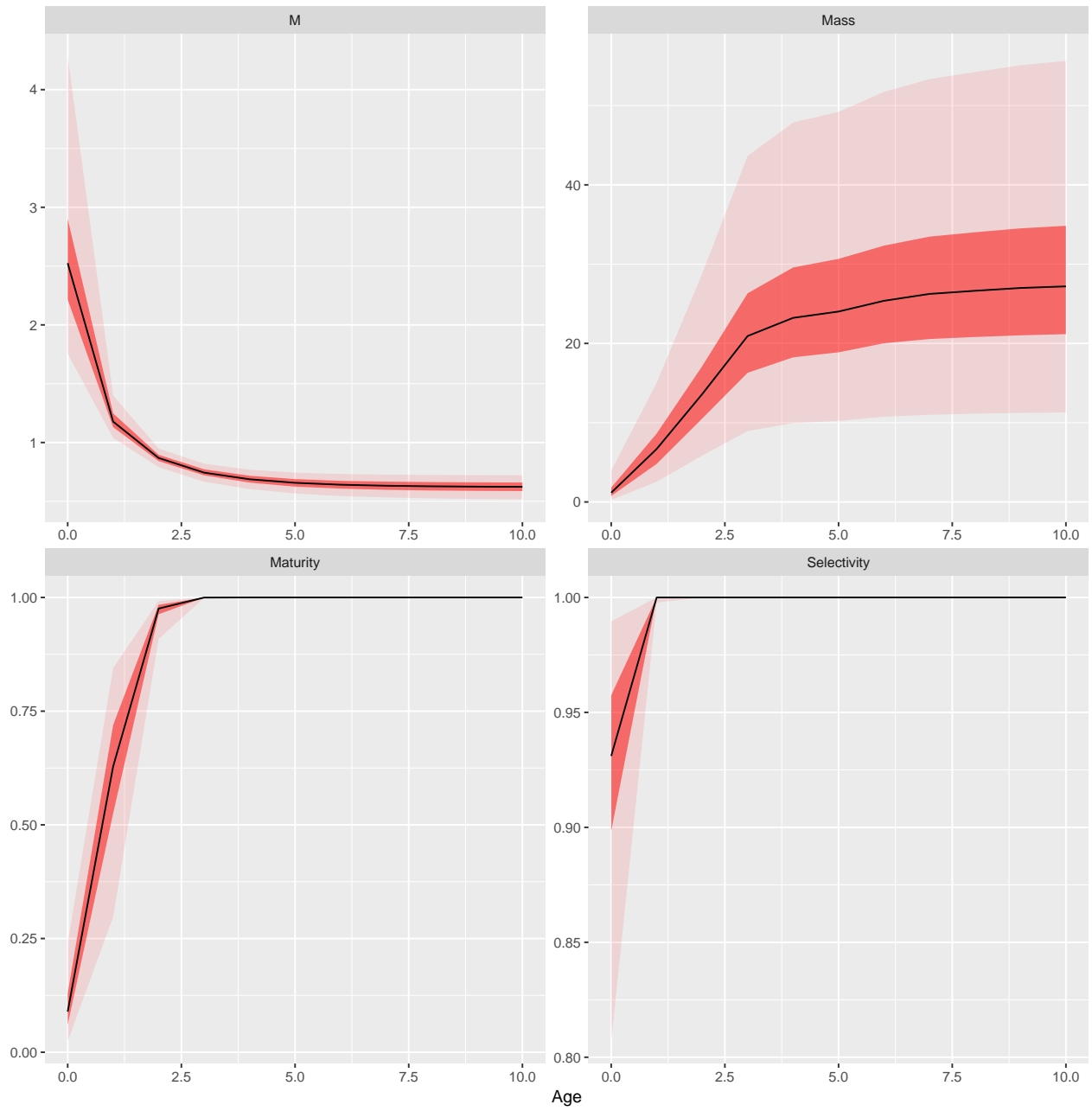
**Figure 4** Pairwise scatter plots of plaice life history parameters.

## Equilibrium dynamics

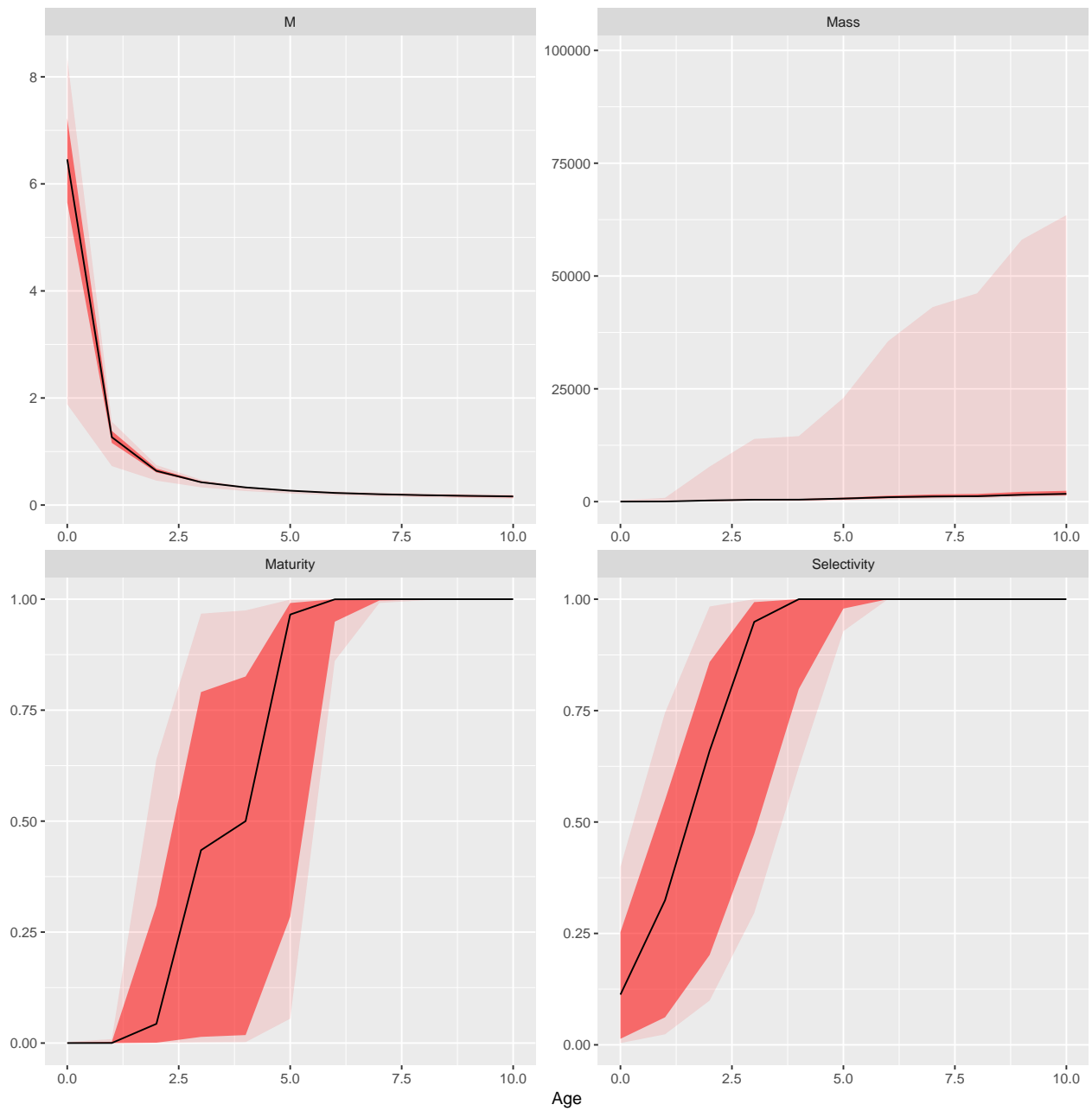
The parameters are then used by `1hEq1` to simulate the equilibrium dynamics by combining the spawner/yield per recruit relationships with a stock recruitment relationship.



**Figure 5** Vectors for thornback ray.

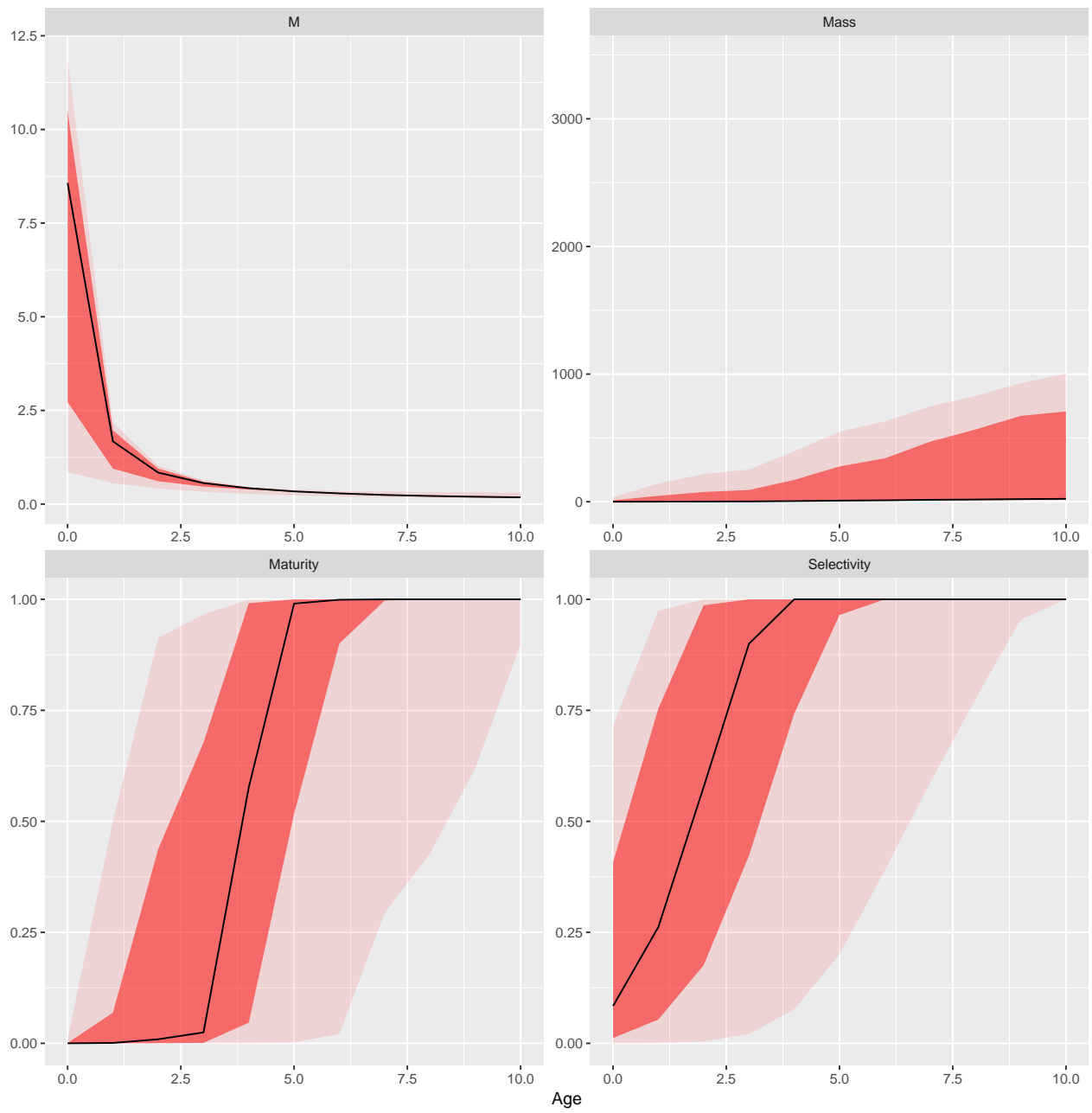


**Figure 6** Vectors for sprat.



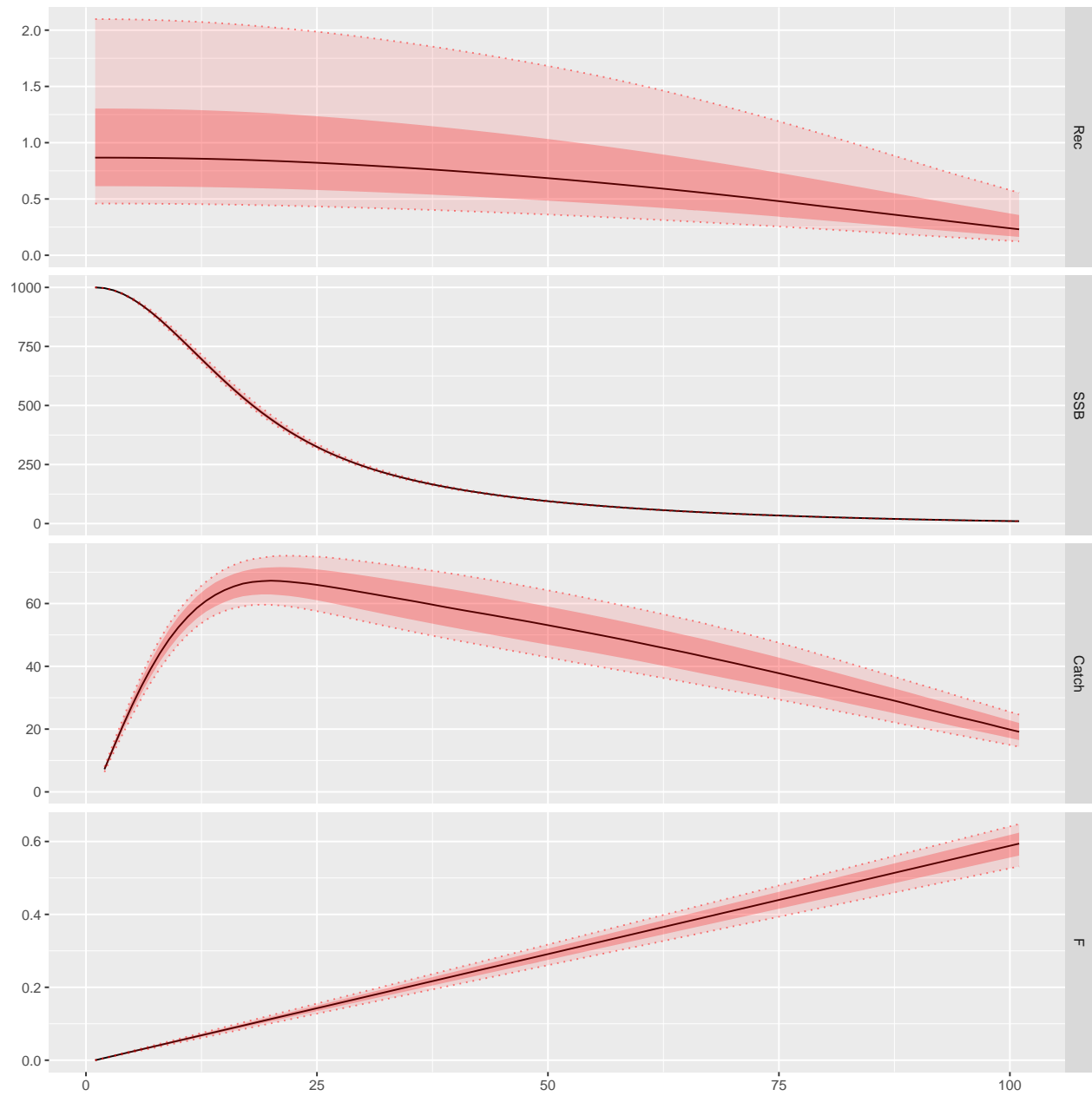
**Figure 7** Vectors for bigeye.



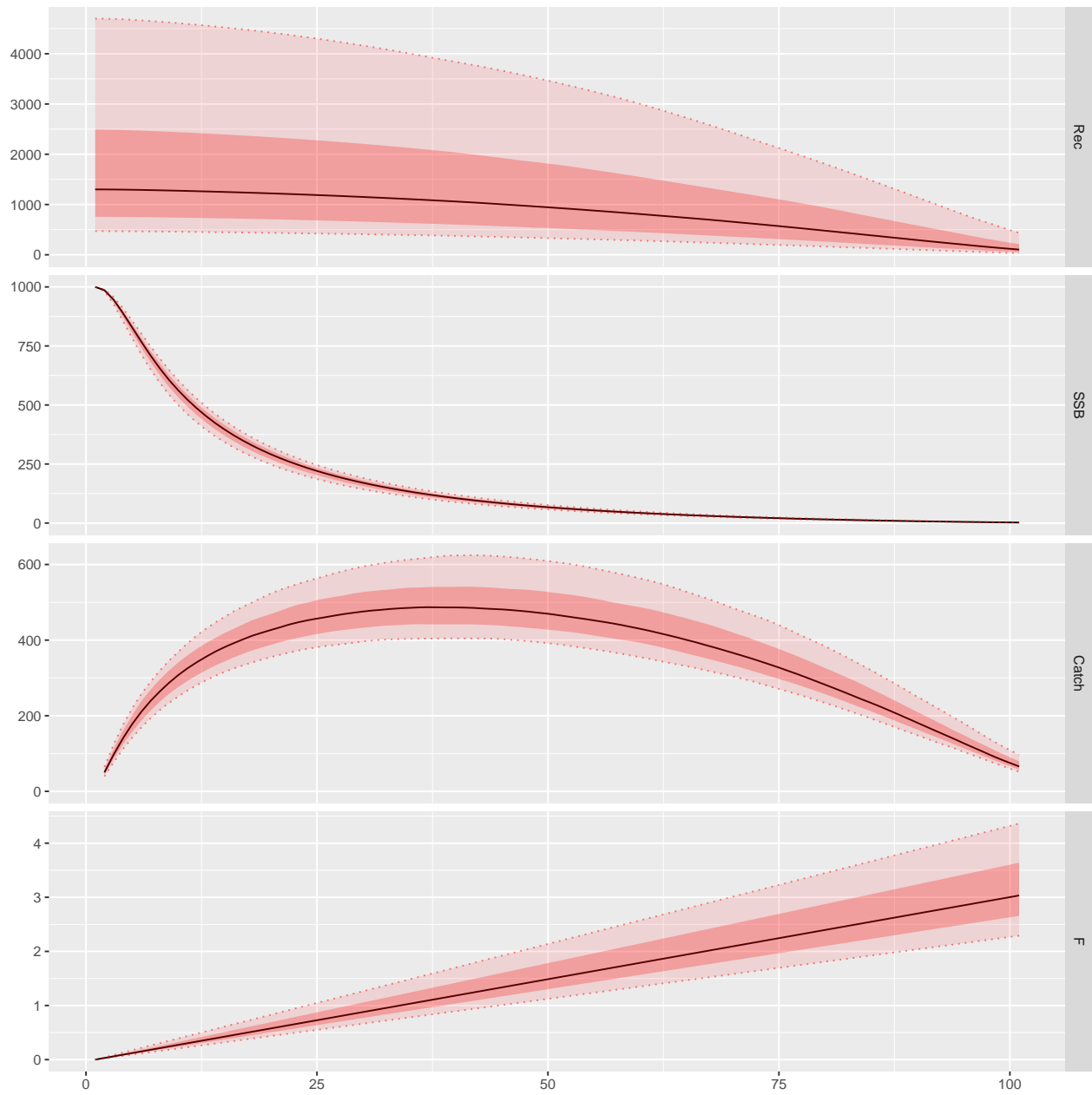


**Figure 8** Vectors for Plaice.

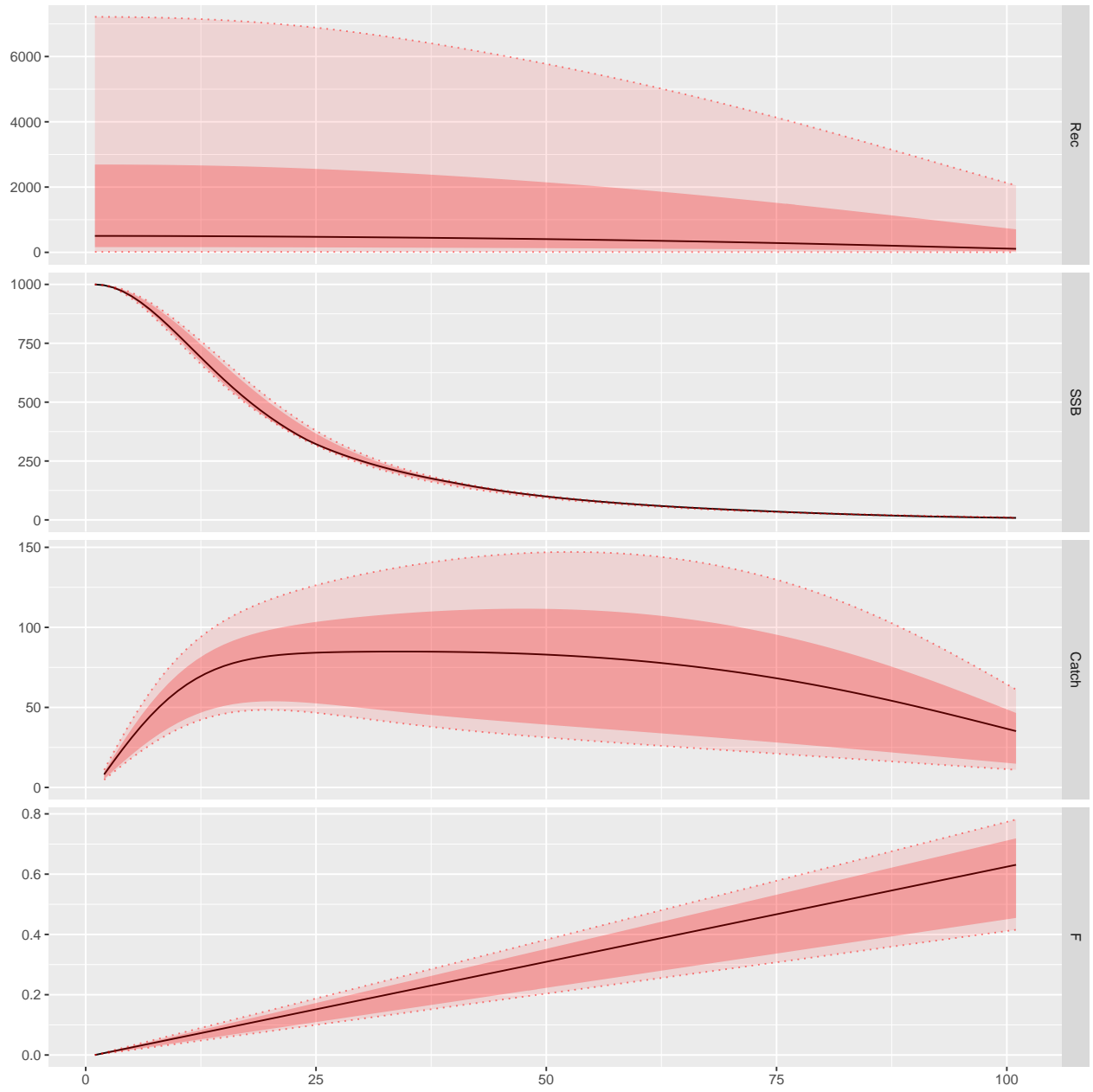
## Population dynamics



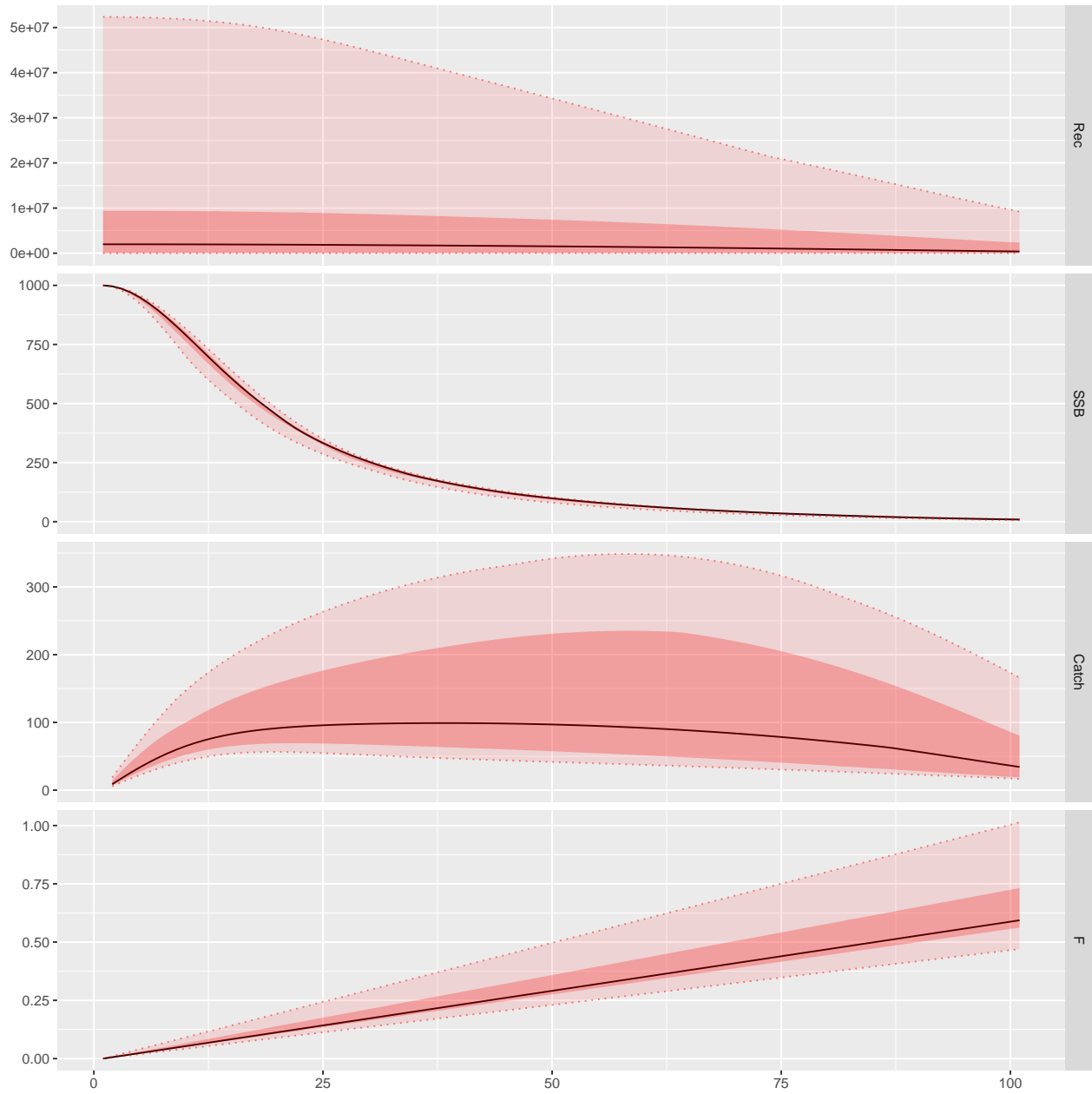
**Figure 9** Time series for thornback ray.



**Figure 10** Time series for sprat.



**Figure 11** Time series for bigeye.



**Figure 12** Time series for plaice.