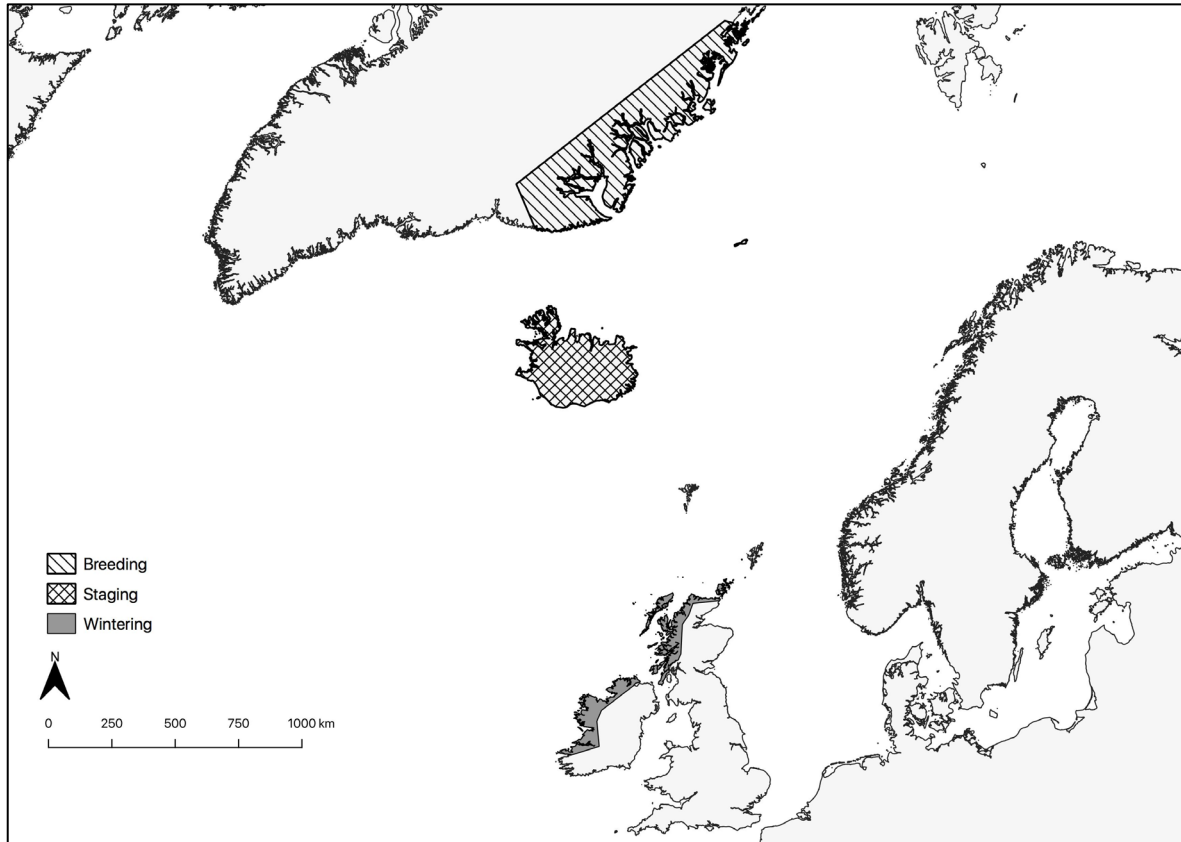




Barnacle Goose Session

Integrated Population Model for the Greenland Barnacle Goose

East Greenland Flyway Population



Data

Time series: 1987 - 2019

Count

- Flyway
- Islay

Productivity

- Autumn juvenile proportion

Survival

- Apparent natural survival

Harvest

- Bag totals
- Wing returns

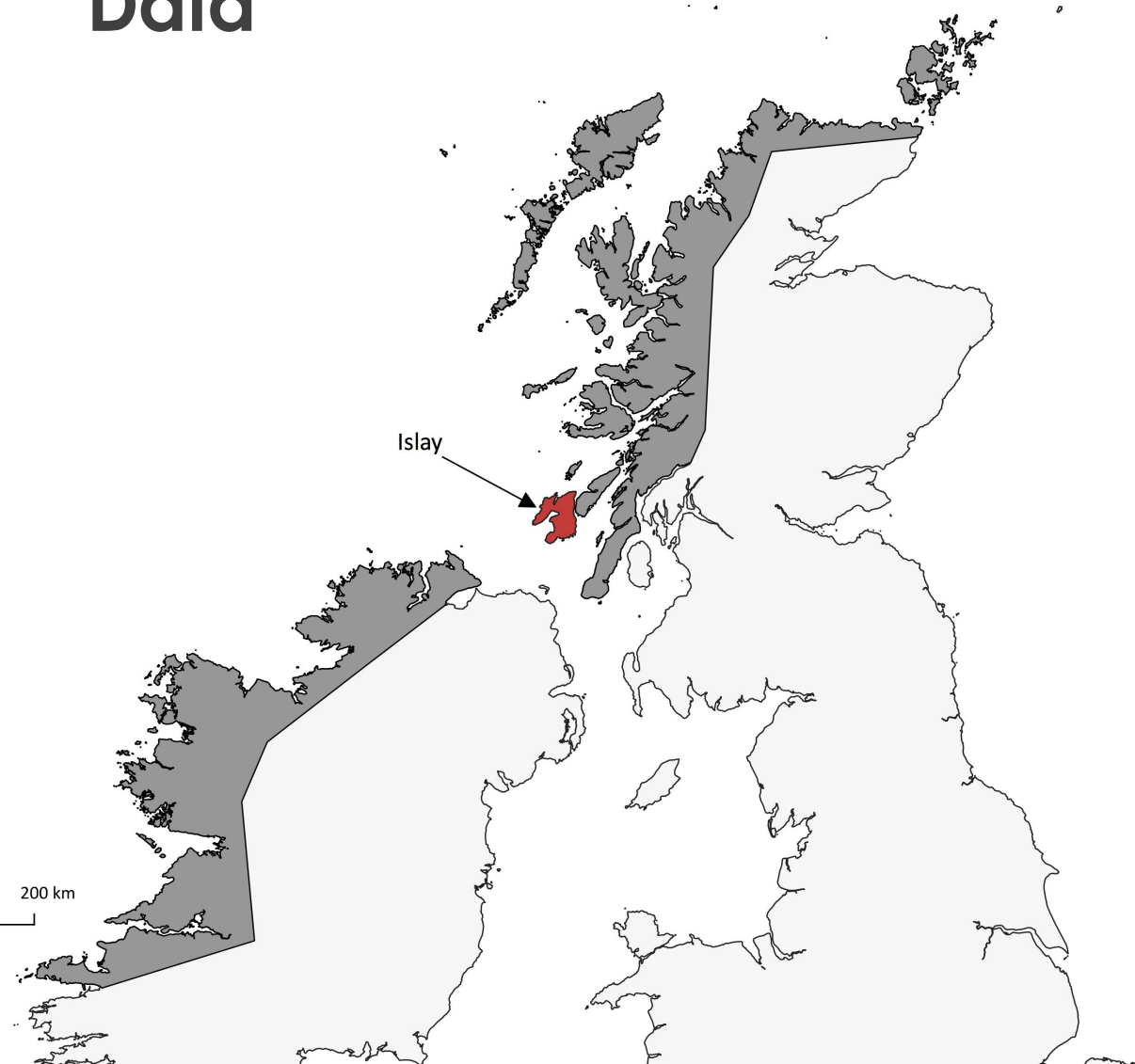
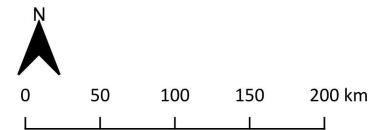
Data

Count

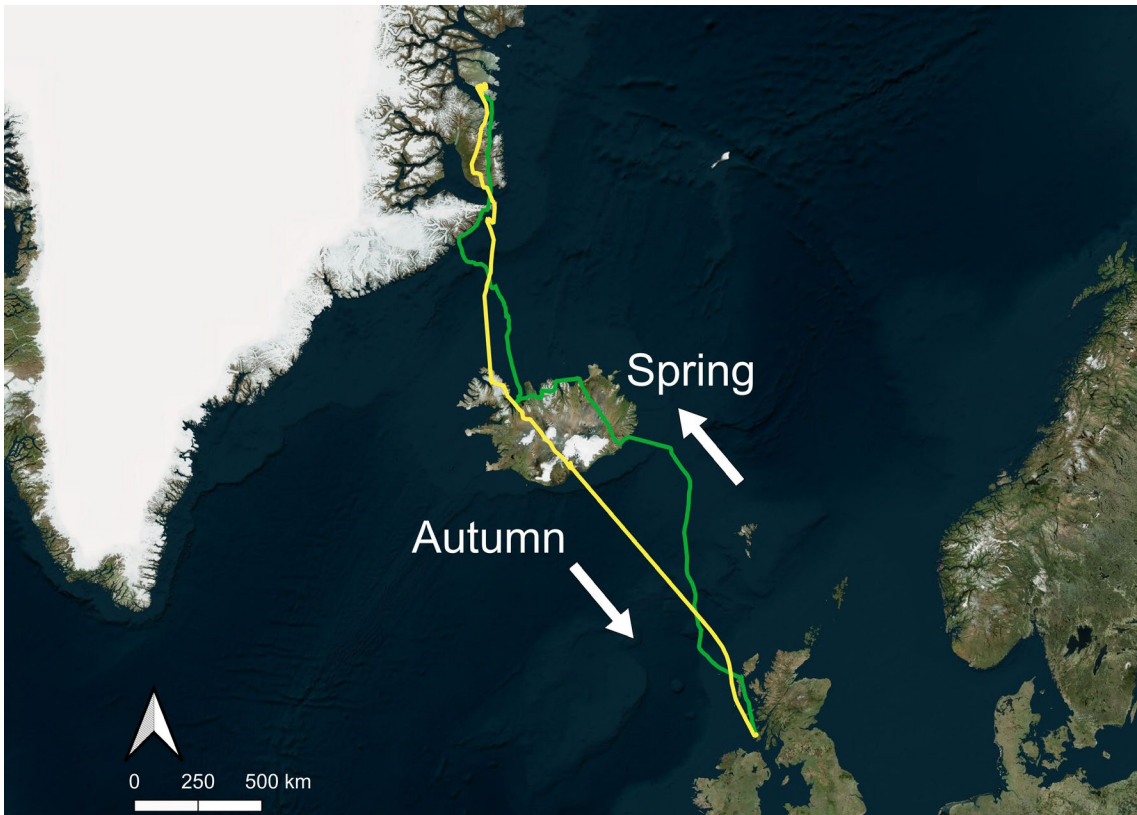
- Flyway - 5 year census
- Islay – annual

Productivity

- Autumn juvenile proportion



Data



Harvest

- Iceland harvest bag
- Scotland harvest bag
- Iceland wing
- Scottish wing
- Pink-feet vulnerability

Survival

- Svalbard barnacle geese -
Apparent natural survival

Key Model Parameters

Count

N = Flyway population size in March

p^{Islay} = Proportion flyway wintering on Islay

N^{Islay} = Islay March population size

Productivity

ψ = Autumn juvenile proportion

r = Pre-season age ratio

Survival

θ = Apparent natural survival

s^a = Adult survival rate

s^j = Juvenile survival rate

Harvest

H^I = Iceland harvest bag

h^i = Harvest rate Iceland

H^S = Scotland harvest bag

h^s = Harvest rate Scotland

h^a = Adult harvest rate

h^j = Juvenile harvest rate

v^s = Differential vulnerability Scotland

v^i = Differential vulnerability Iceland

Model Assumptions

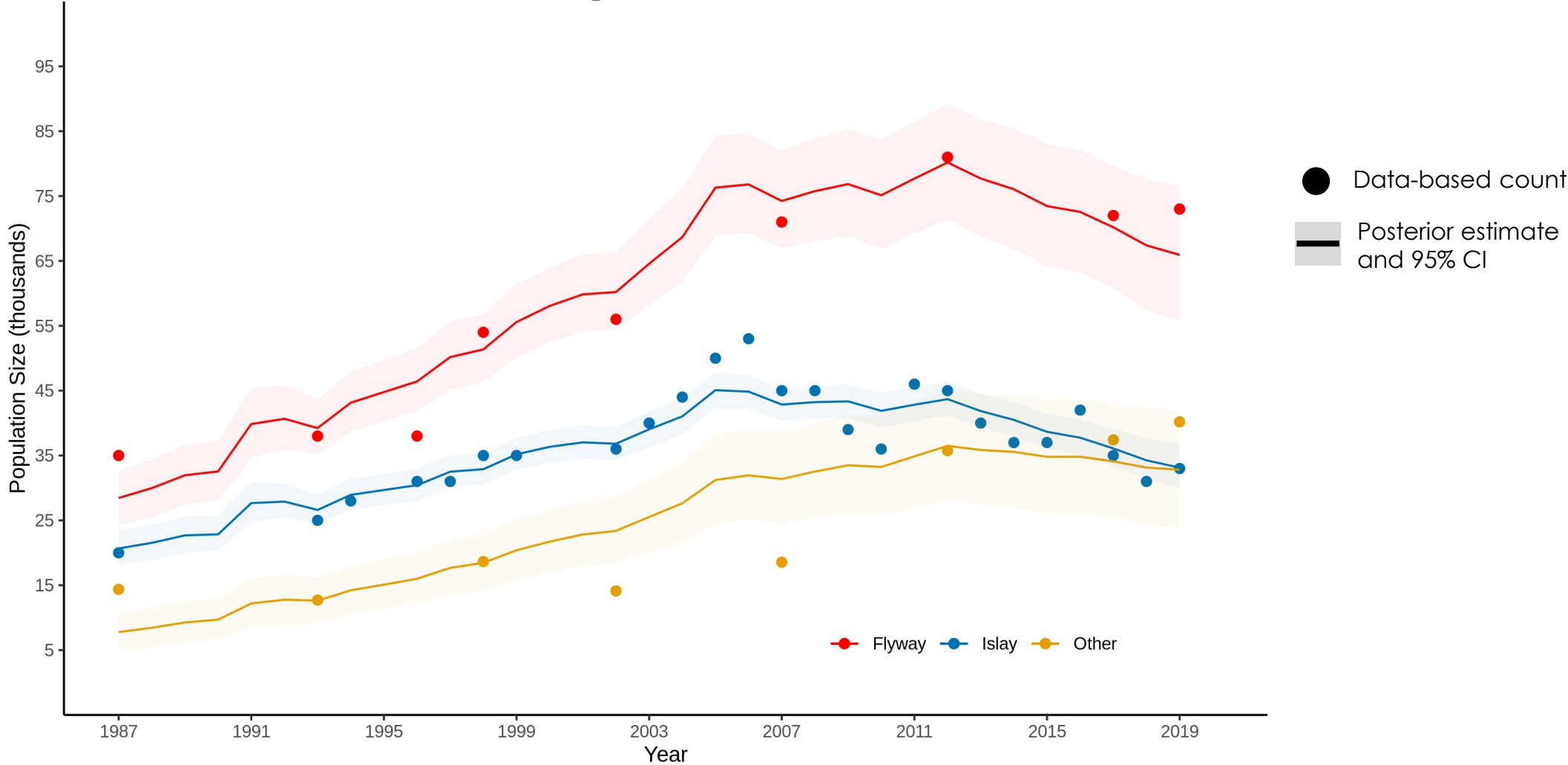
- March annual cycle
- Annual survival rate
- Shooting mortality is additive to natural mortality
- Juvenile vulnerability is fixed by site
- Shooting takes place sequentially





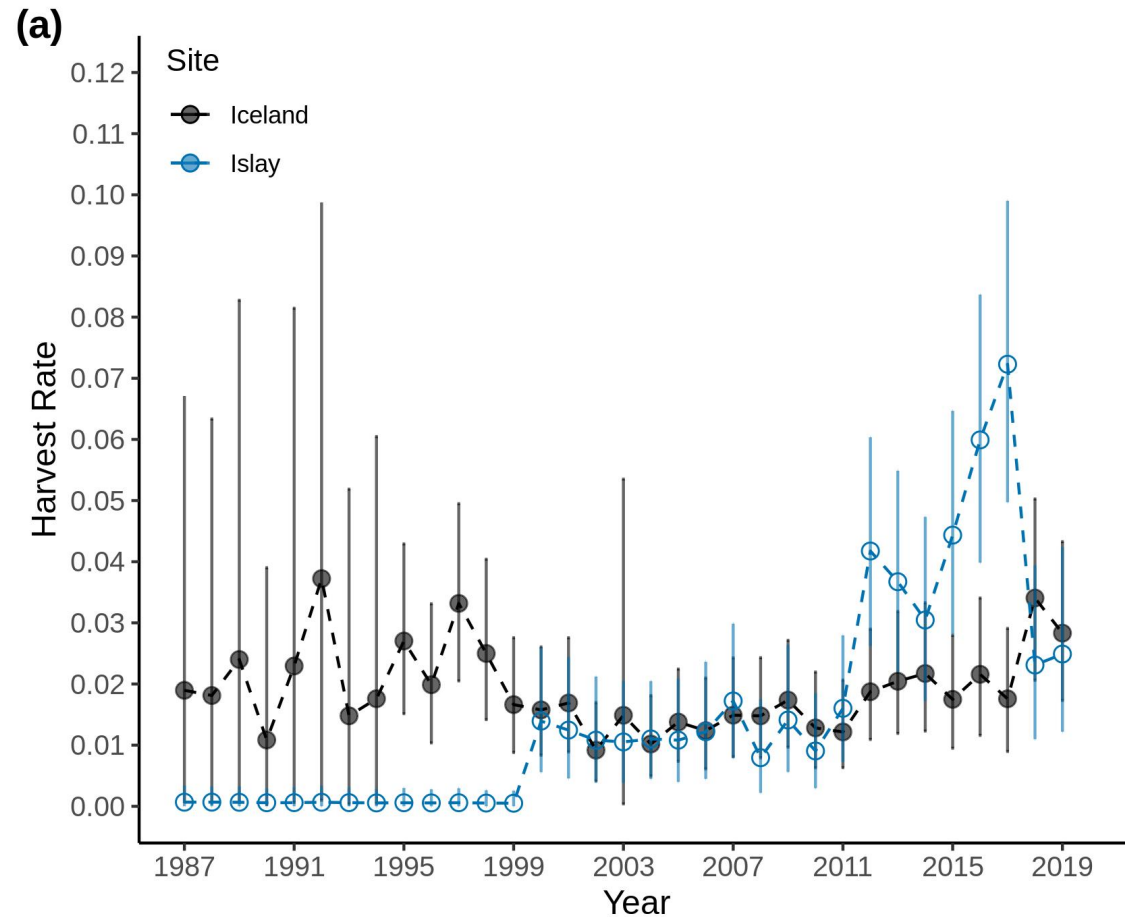
Doc. AEWA/EGMIWG/6.13

Population Size

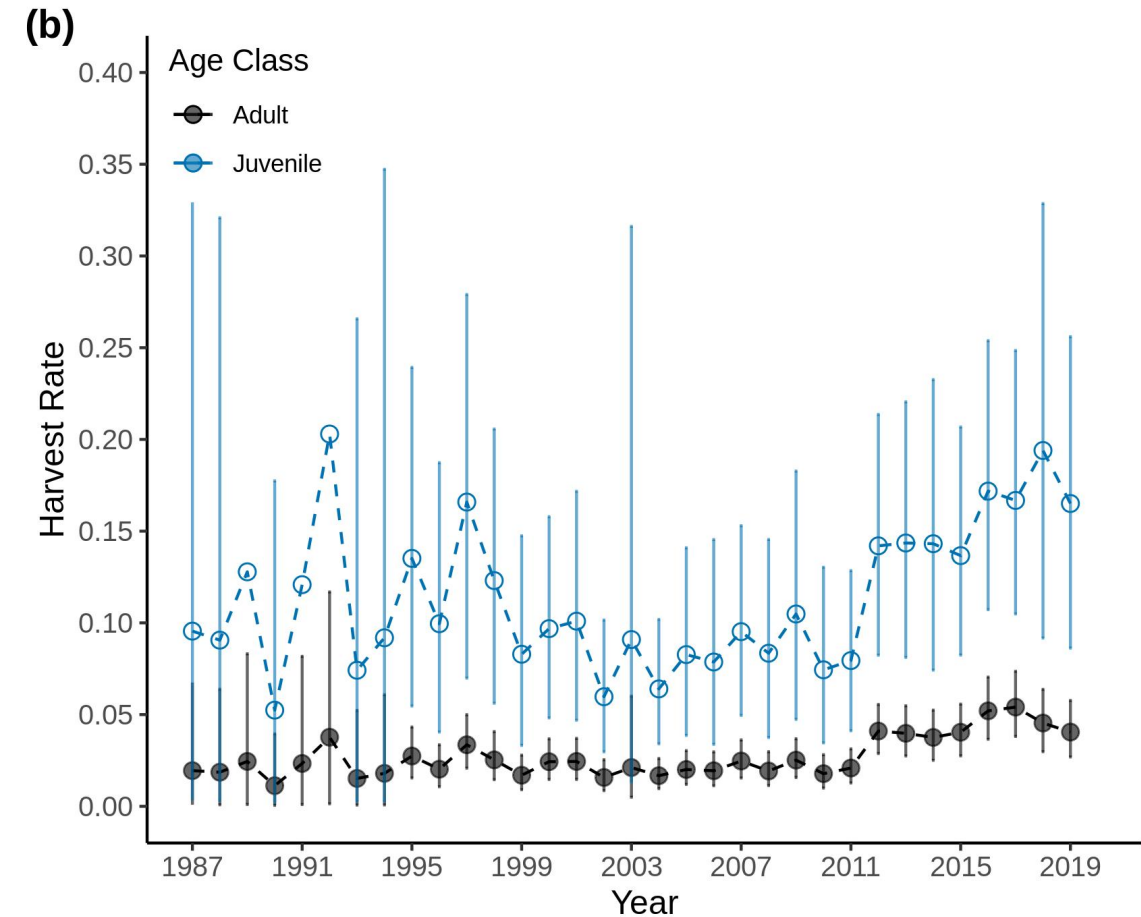


Harvest Rate

Site



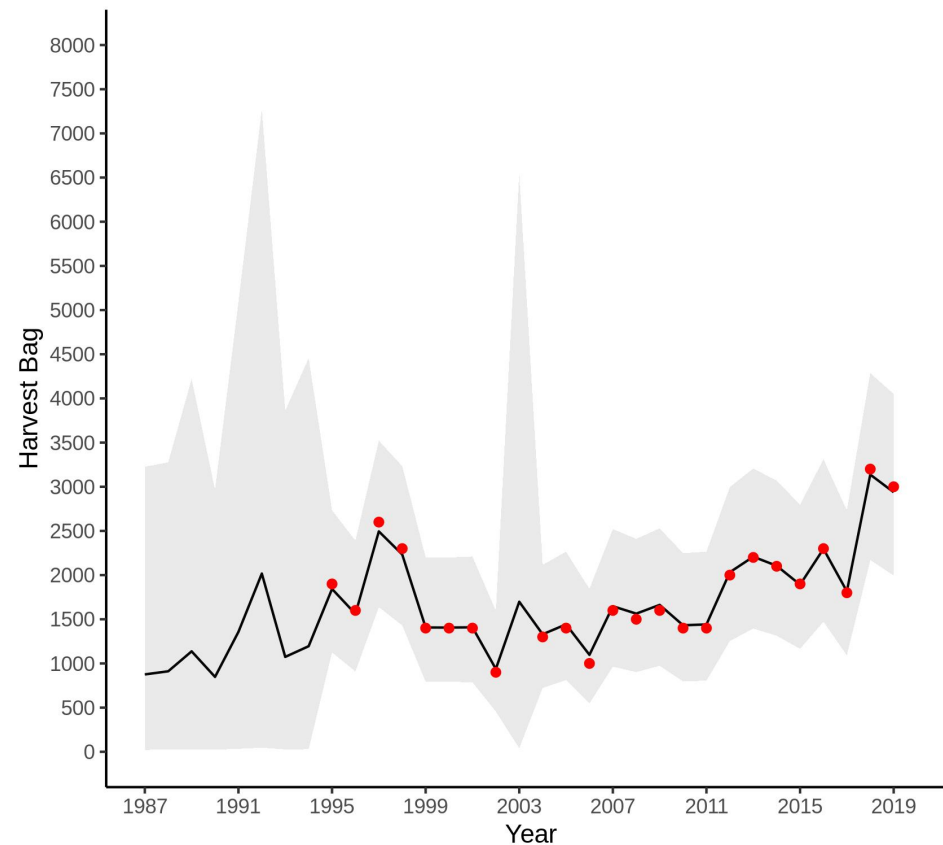
Age



Harvest Bag

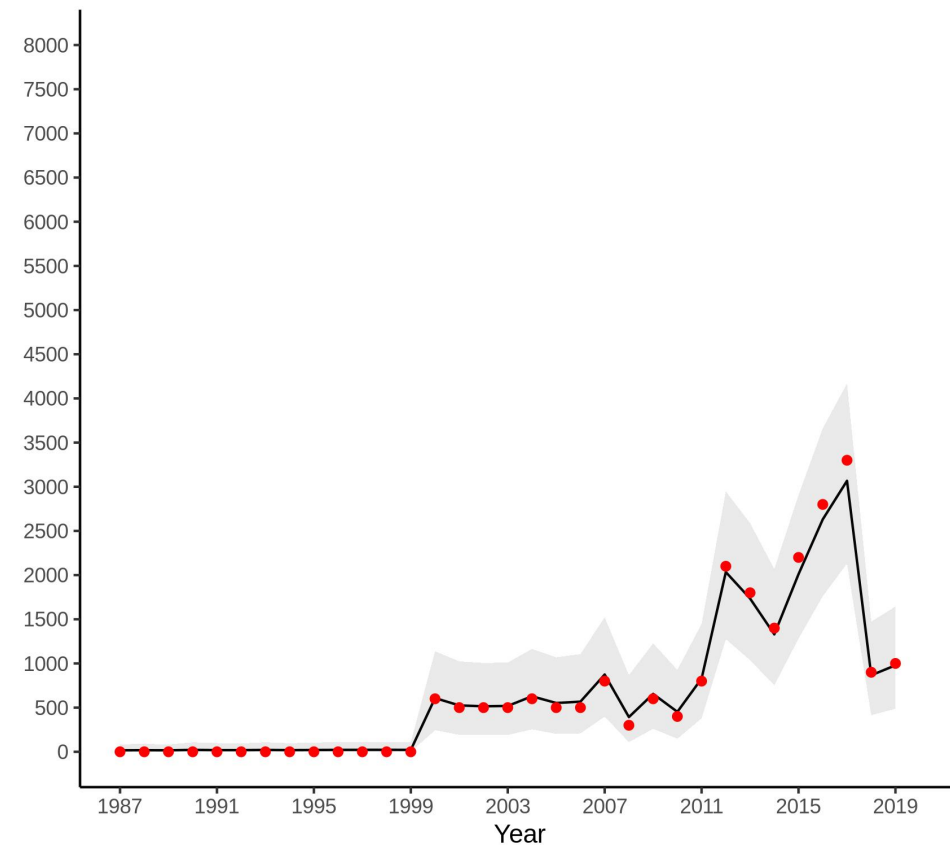
Iceland

(a)



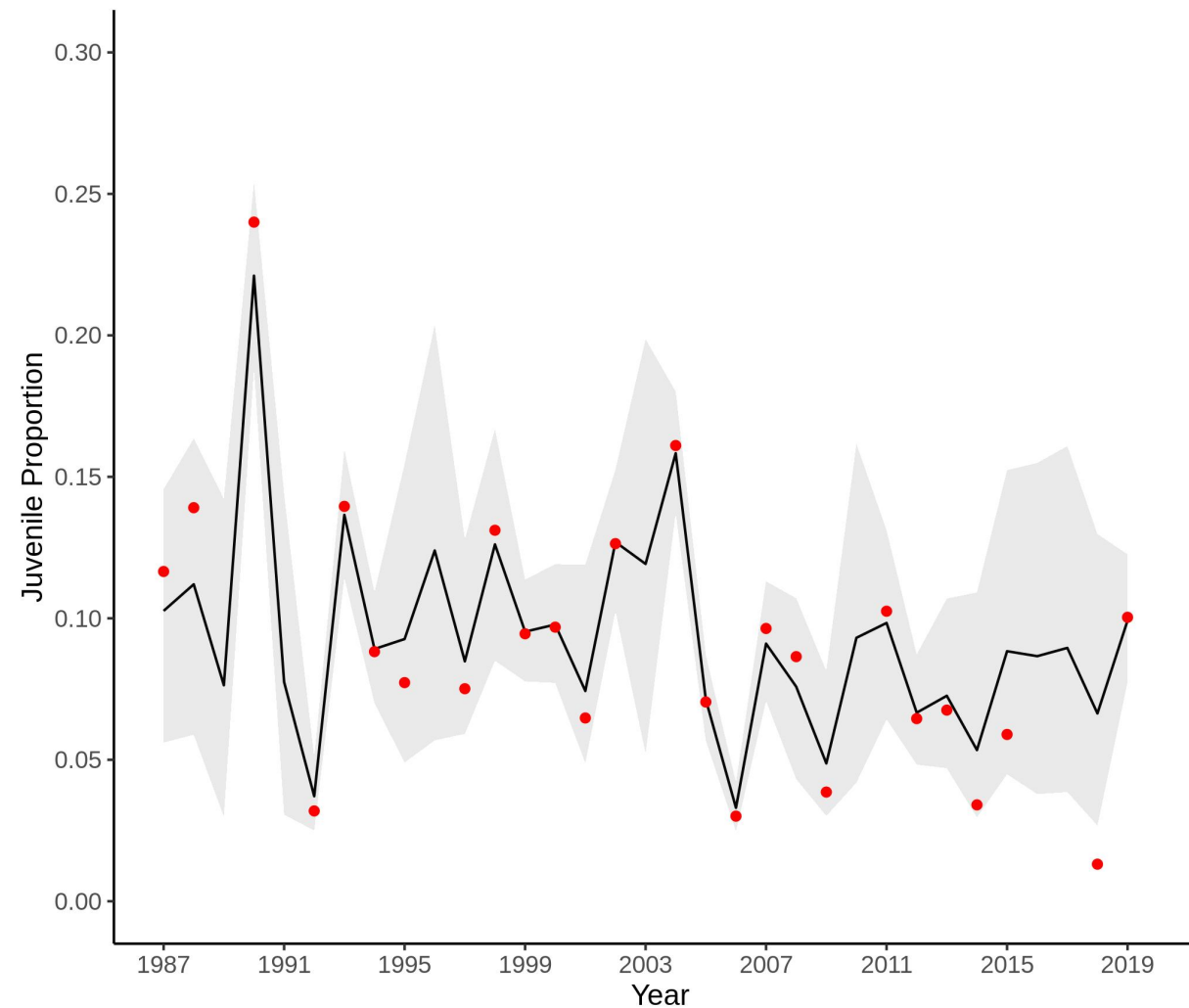
Islay

(b)

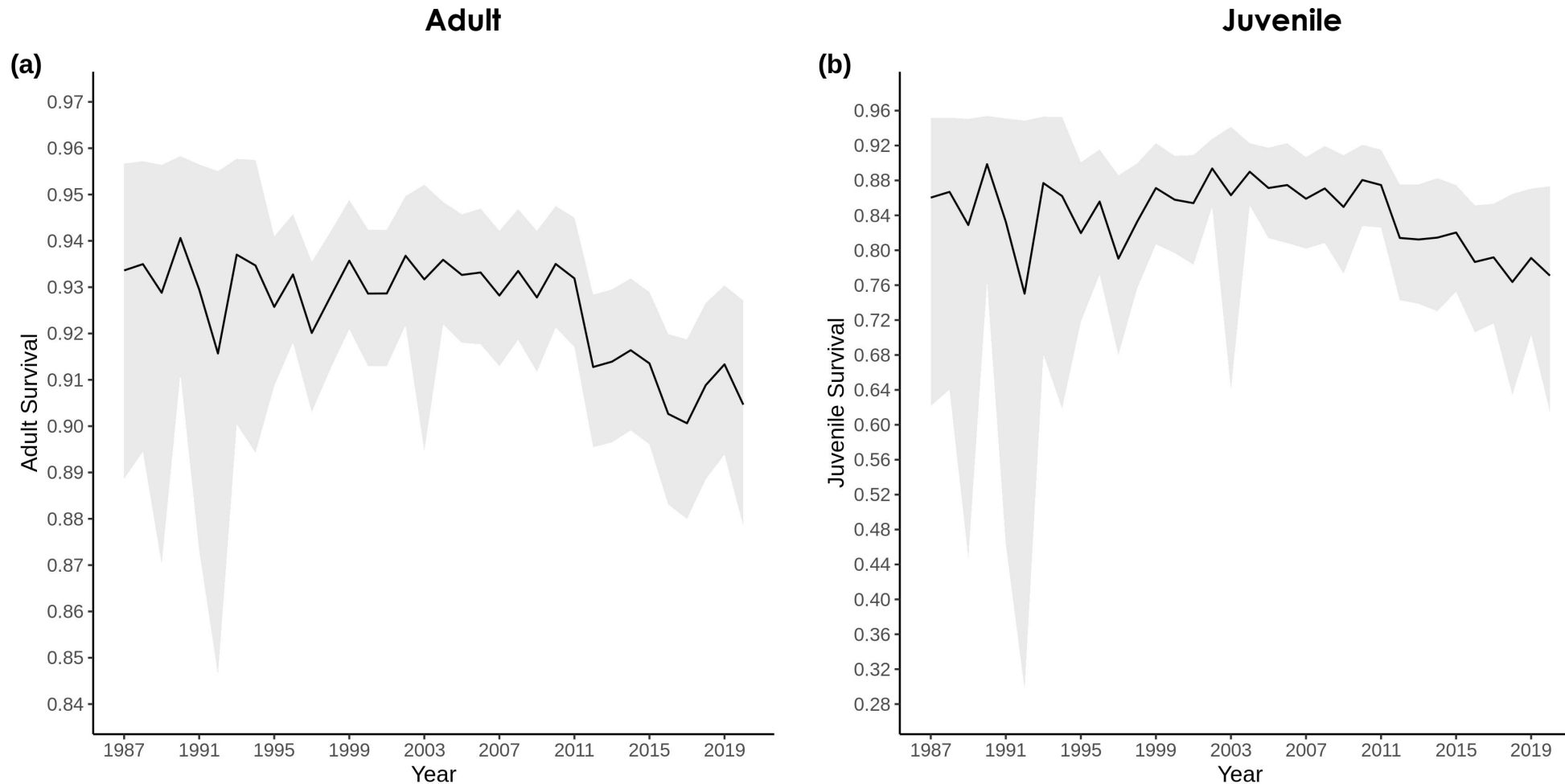


Doc. AEWA/EGMIWG/6.13

Productivity – Juvenile Proportion



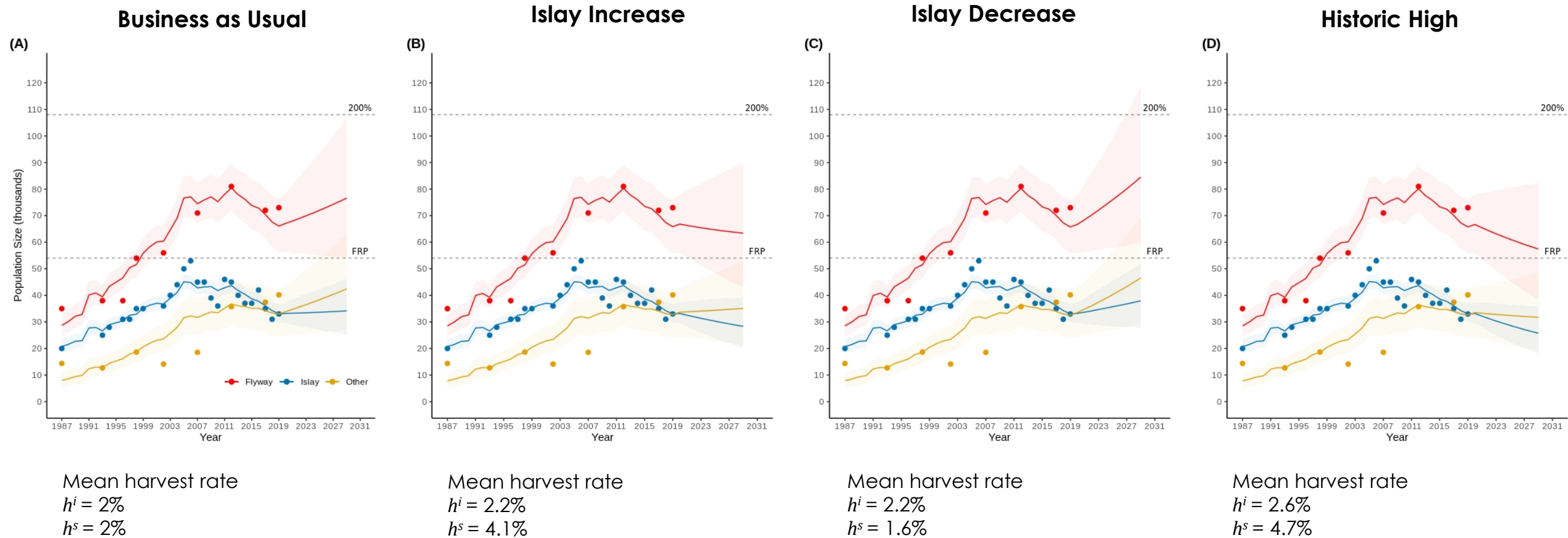
Survival Rate



Population Projections

Scenario	Description	Mean harvest rate
Business as usual	Harvest rate continues at current rate in Iceland and Islay	$h^i = 0.02$ $h^s = 0.02$
Islay increase	Iceland continues at current rate, Islay increases	$h^i = 0.022$ $h^s = 0.041$
Islay decrease	Iceland continues at current rate, Islay reduced	$h^i = 0.022$ $h^s = 0.016$
Combined historic high	Increase harvest rate in Iceland and Islay using mean historic peak	$h^i = 0.026$ $h^s = 0.047$

Results – Future Offtake



Conclusions and Next Steps

- Decline flyway since 2012
- Scottish/Islay harvest = key
- Alternative sites increasingly important
- Other projections
- Consider alternative data sources



Thank you!

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- All data contributors and funders



**An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreacht**
Department of Housing,
Local Government and Heritage

