

Population growth rate (λ) of Atlantic Puffin in Iceland 2010-2021

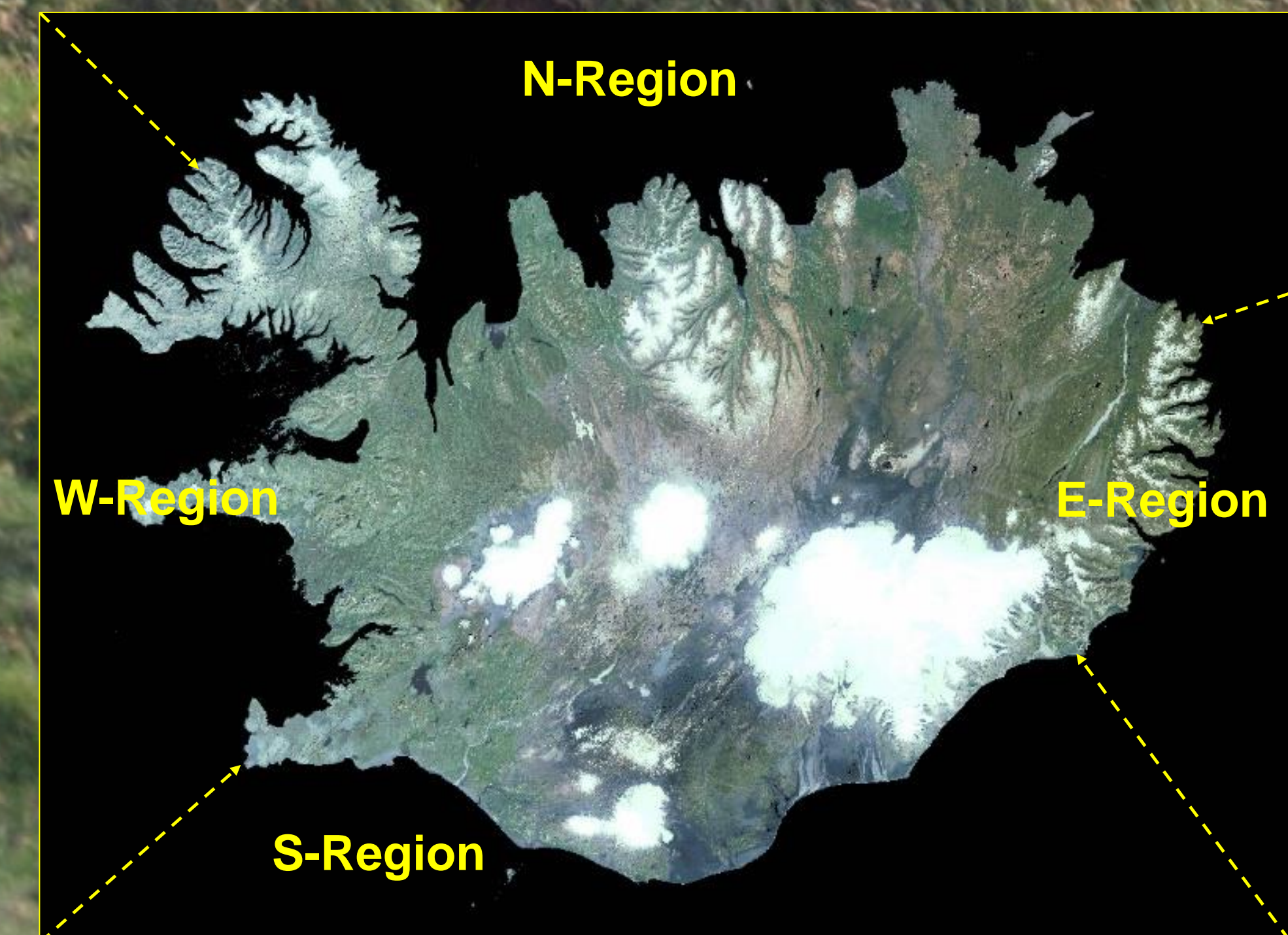
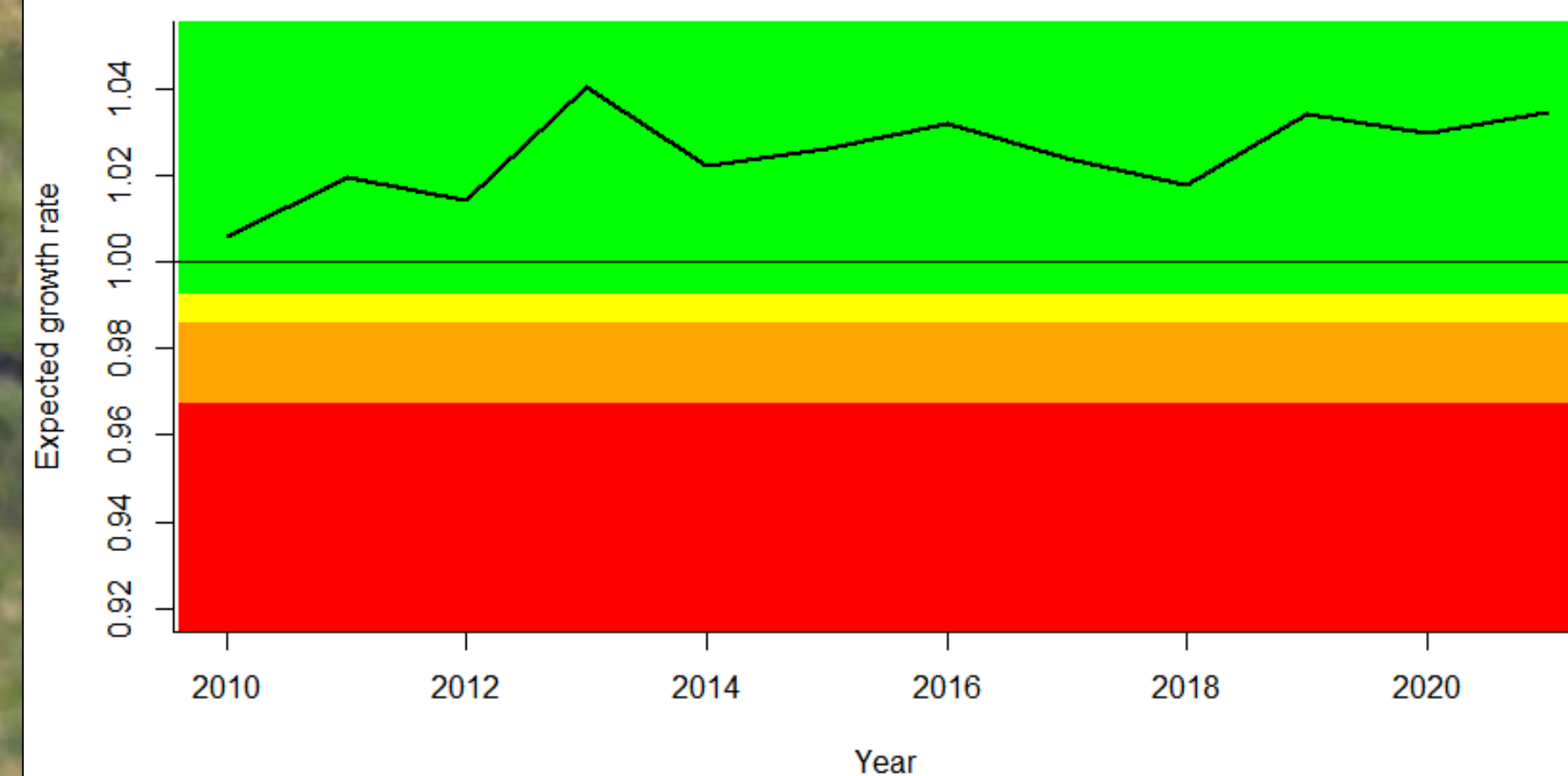
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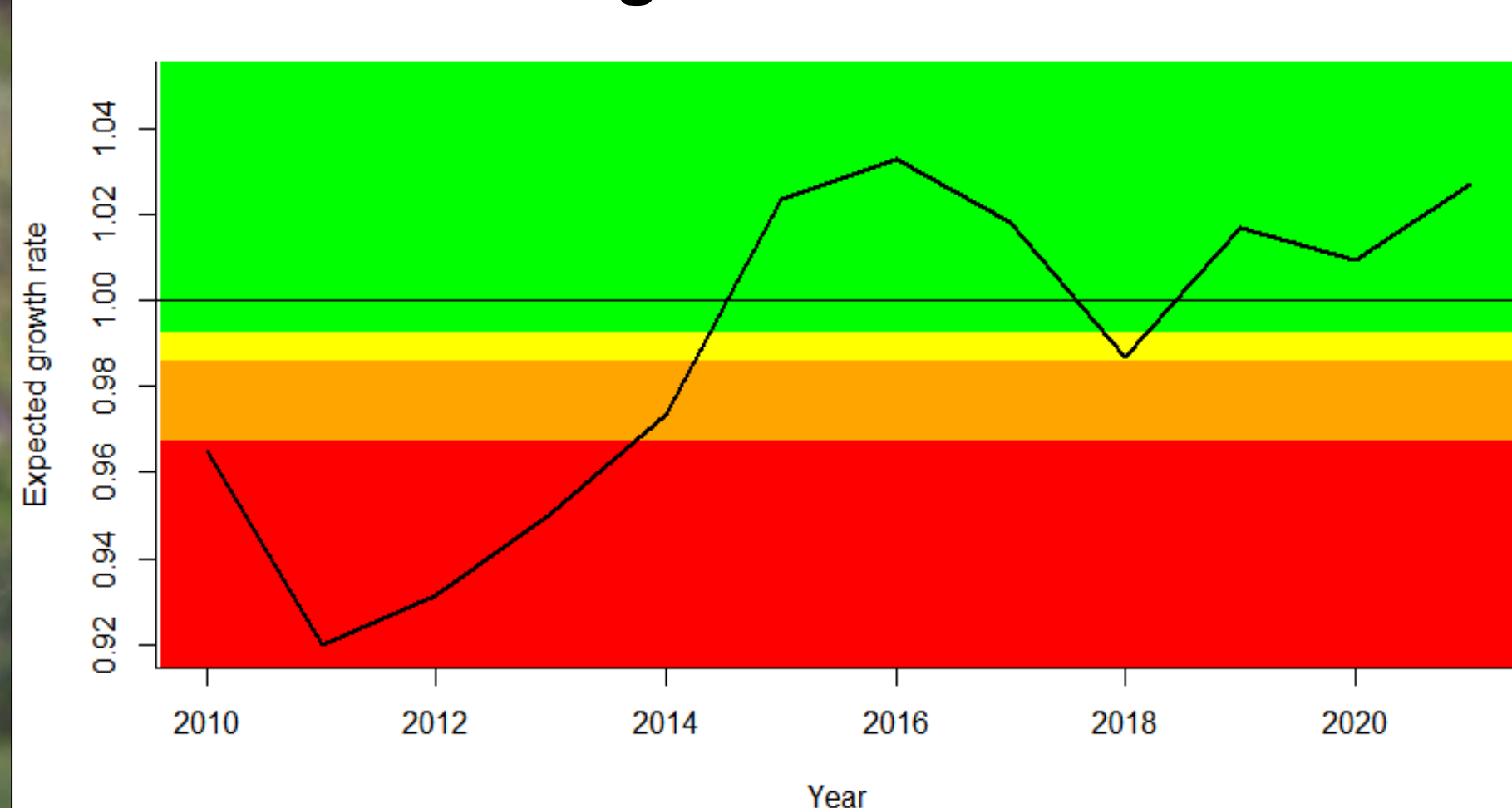
METHODS

- λ was calculated using a Leslie matrix in R.
- Adult survival was set as constant 0.92, & 1Y survival as 0.5.
- Production was measured annually in 10 colonies by examining the same burrows twice during the breeding season.
- Regional mean annual production was weighted by the study colonies population size.
- Total annual mean production was weighted by regional population proportional size of the total.

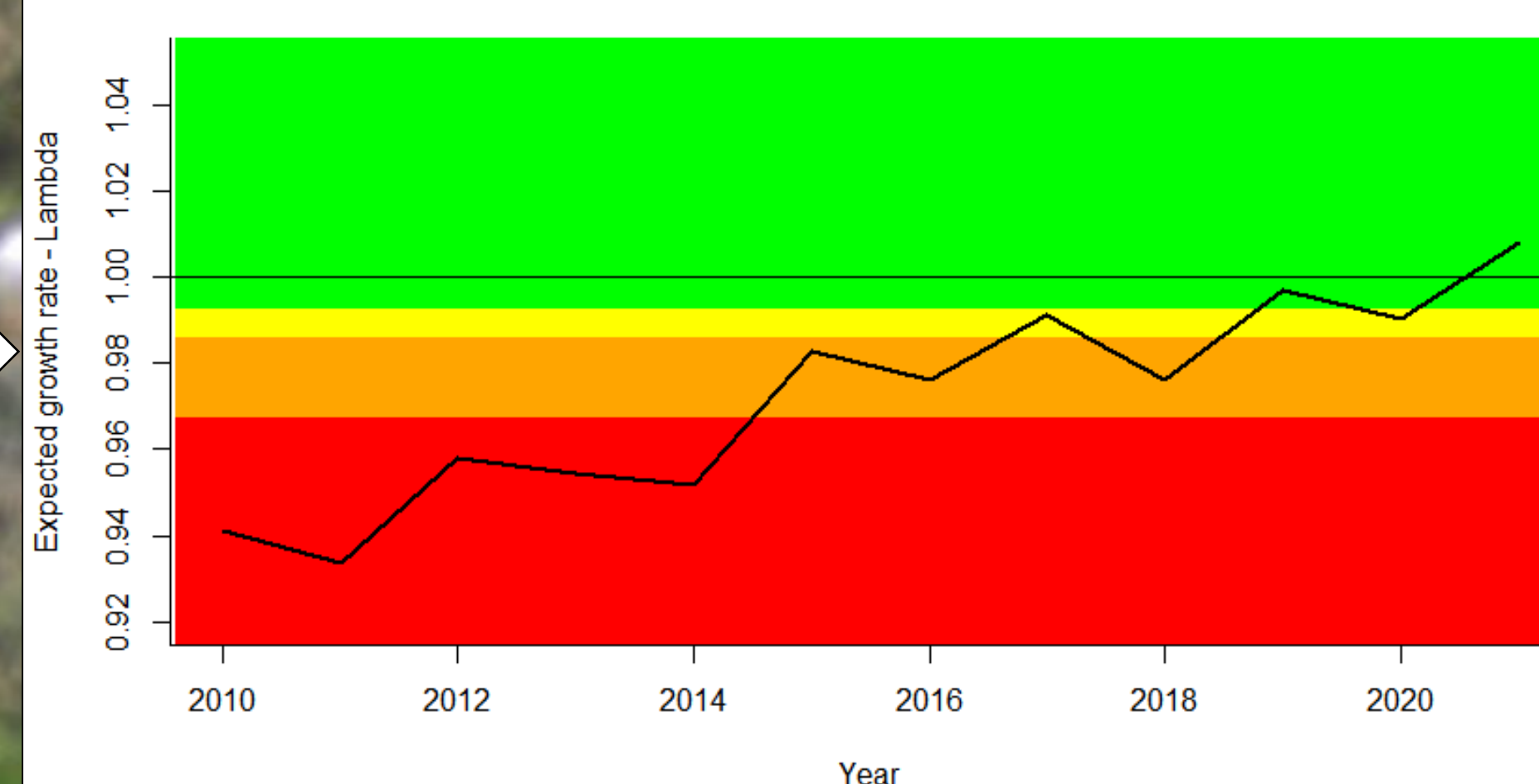
λ in N-Region: 566.000 burrows



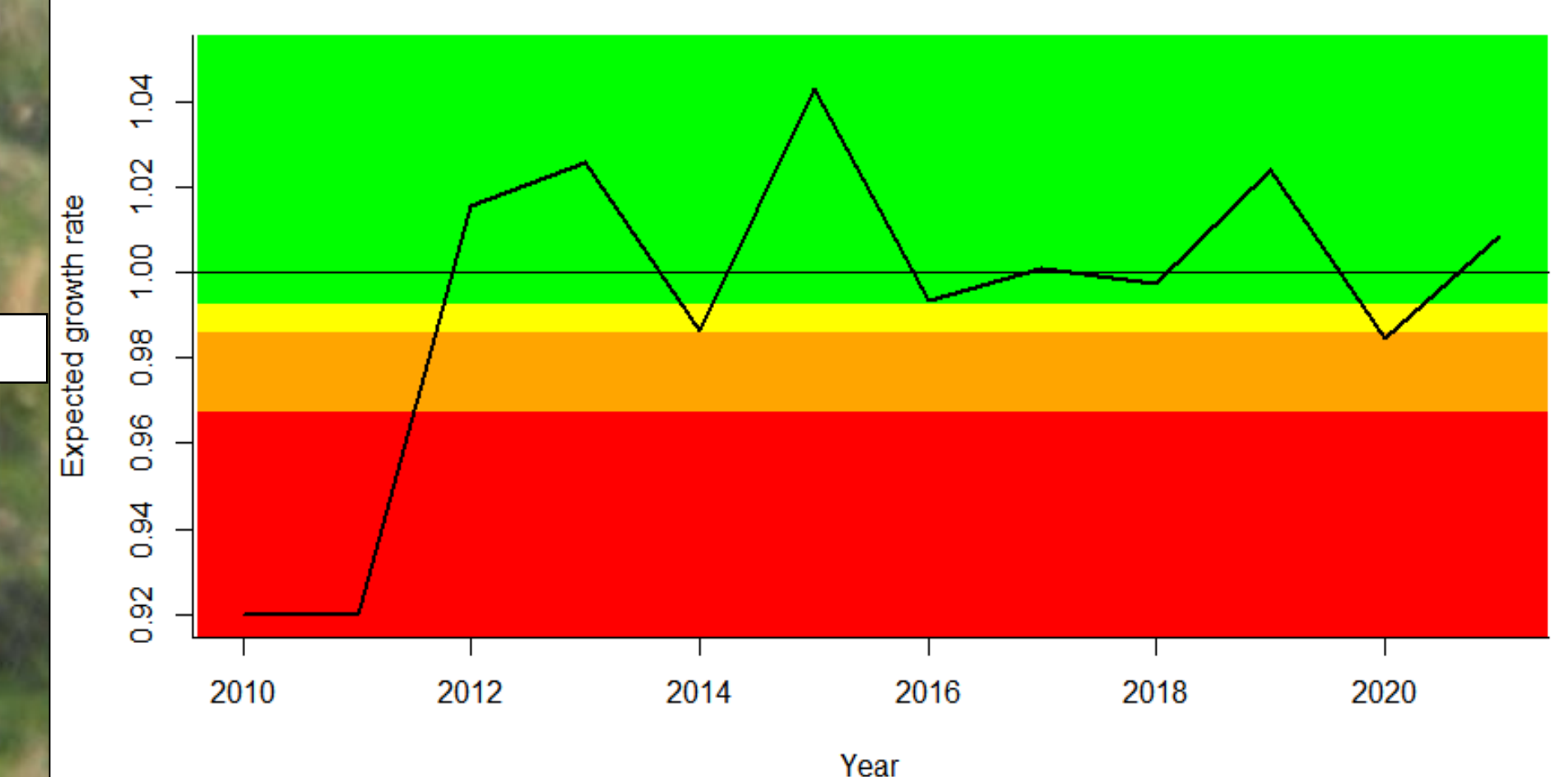
λ in W-Region: 664.000 burrows



λ in Iceland: 2.835.000 burrows



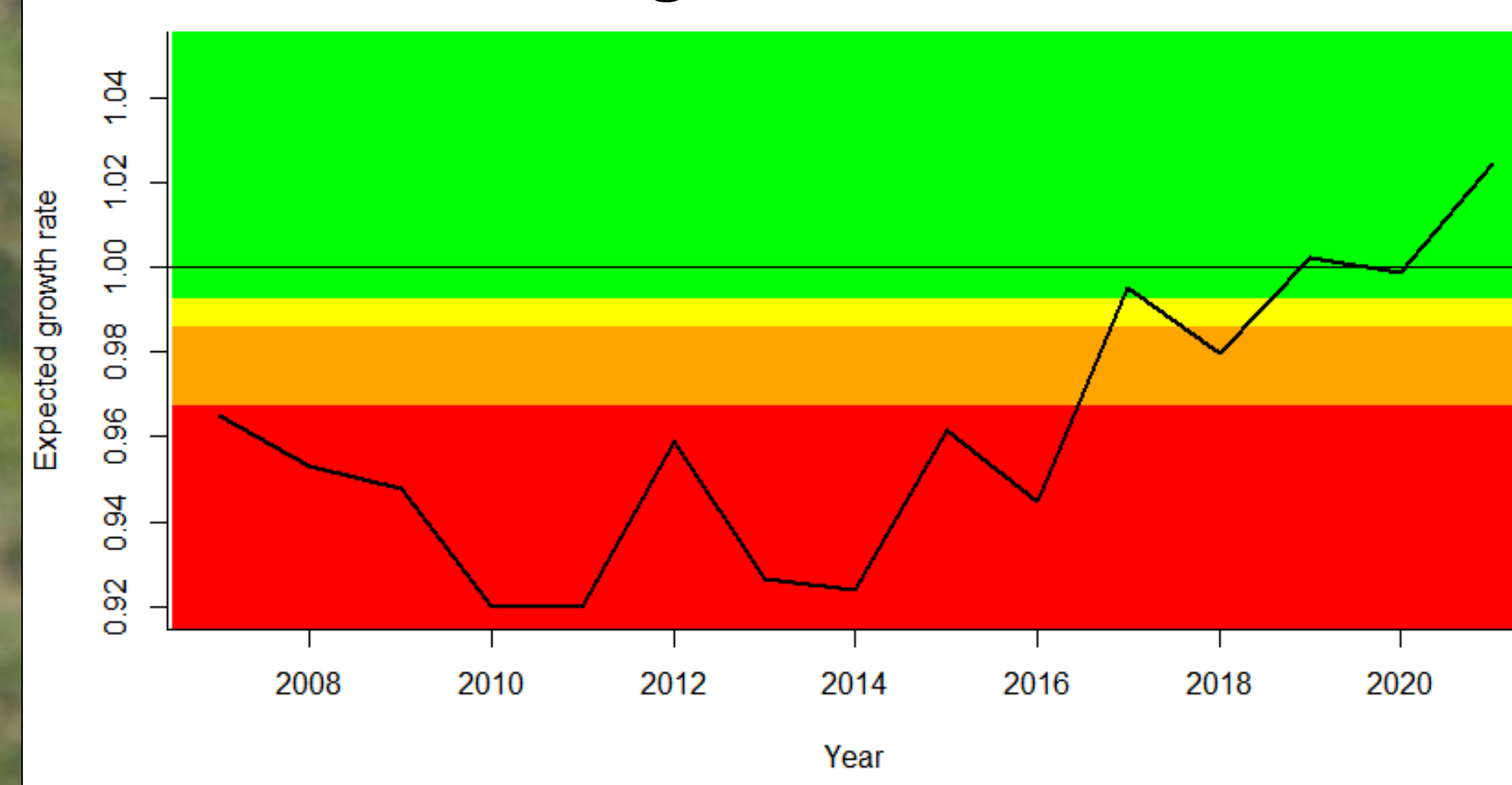
λ in E-Region (Papey): 472.000 burrows



IUCN Red List categories:

- Green:** Least Concern
- Yellow:** Vulnerable
- Orange:** Endangered
- Red:** Critically Endangered

λ in South Region: 1.133.000 burrows



CONCLUSIONS

- Total population geometric mean λ has been <1 until 2021, & hunting non-sustainable prior to 2021.
- Production has increased over the period, λ surpassing 1 for the first time in year 2021.
- $\lambda > 1$ in E-Region in 2012 & in W-Region in 2015.
- In S-Region λ has increased since 2017.
- Total population (N) has declined by 45% ≥ 2003 .
- Variation in climate (wNAO 2010-11), Sea surface temperature [1], & Spring bloom timing (work in progress) explain most of the variation in puffin production via bottom up effects on the puffin's prey.

[1] Hansen *et al.* (2021). Centennial relationships between ocean temperature and Atlantic puffin production reveal shifting decennial trends. *Global Change Biology* **27** (16): 3753-3764.
<https://doi.org/10.1111/gcb.15665>

Region	Geometric mean λ	$r = \ln(\lambda)$	$\Delta N\%/year$	$\Delta N\%$ since 2003
South (Eyjar)	0.961	-0.040	-2.8	-53.1
West	0.987	-0.013	-1.1	-21.8
North	1.024	0.024	3.1	59.6
East (Papey I.)	0.992	-0.008	-0.7	-13.3
Total - Iceland	0.969	-0.031	-2.4	-45.0