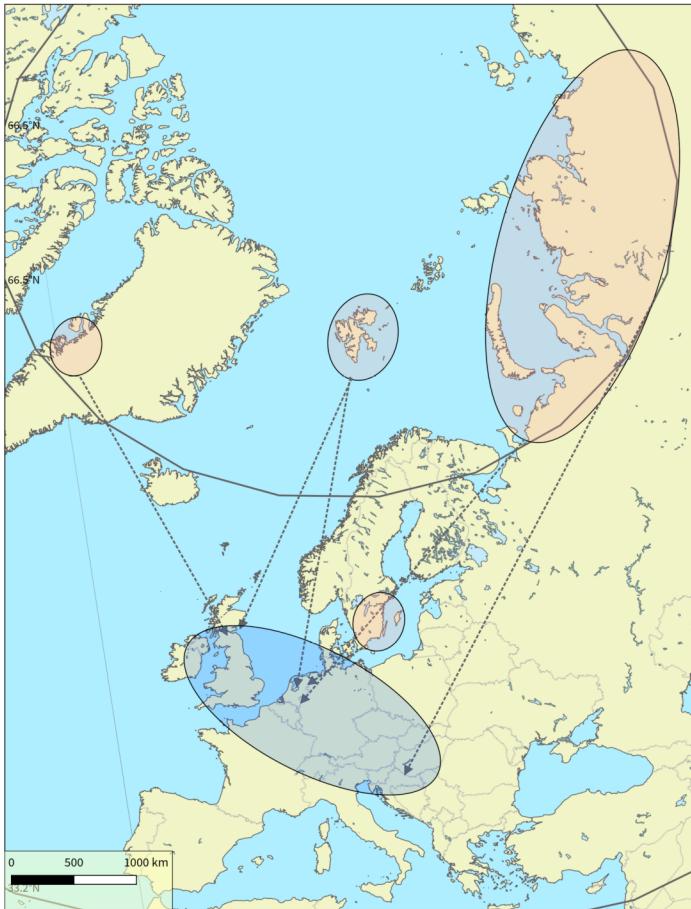


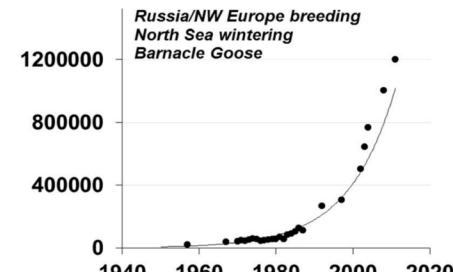
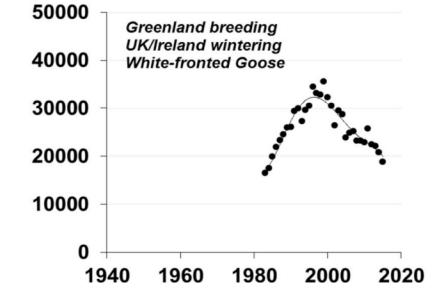
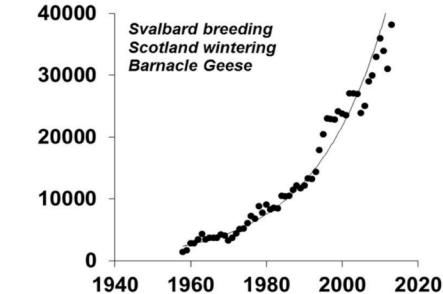
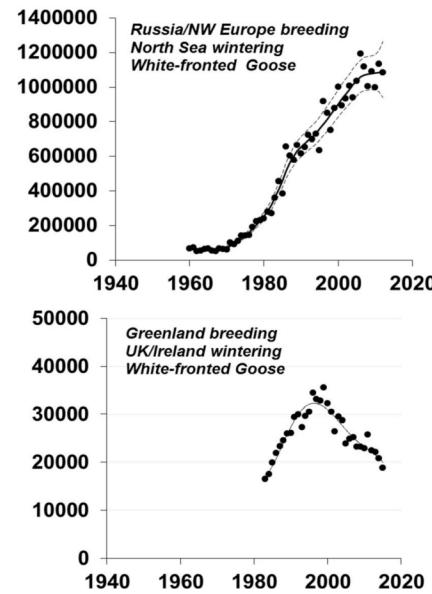
What are geese?

1. Large, terrestrial birds
2. Herbivorous, often grazers
- 3. Many species live in families**
4. Undertake impressive migrations

Geese in Europe: Current Trends



1. Mostly migratory
2. Large population increases 1960s – today: conservation success & crop expansion¹



1. Fox & Madsen 2017

Plots from Fox & Madsen 2017

Geese in Europe: Challenges

- Conflict with agriculture^{1, 2}
- Range expansion^{1, 2}
- Change in migration patterns³
- Much data, less analysis

1. Fox & Madsen 2017

2. Koffijberg et al. 2017

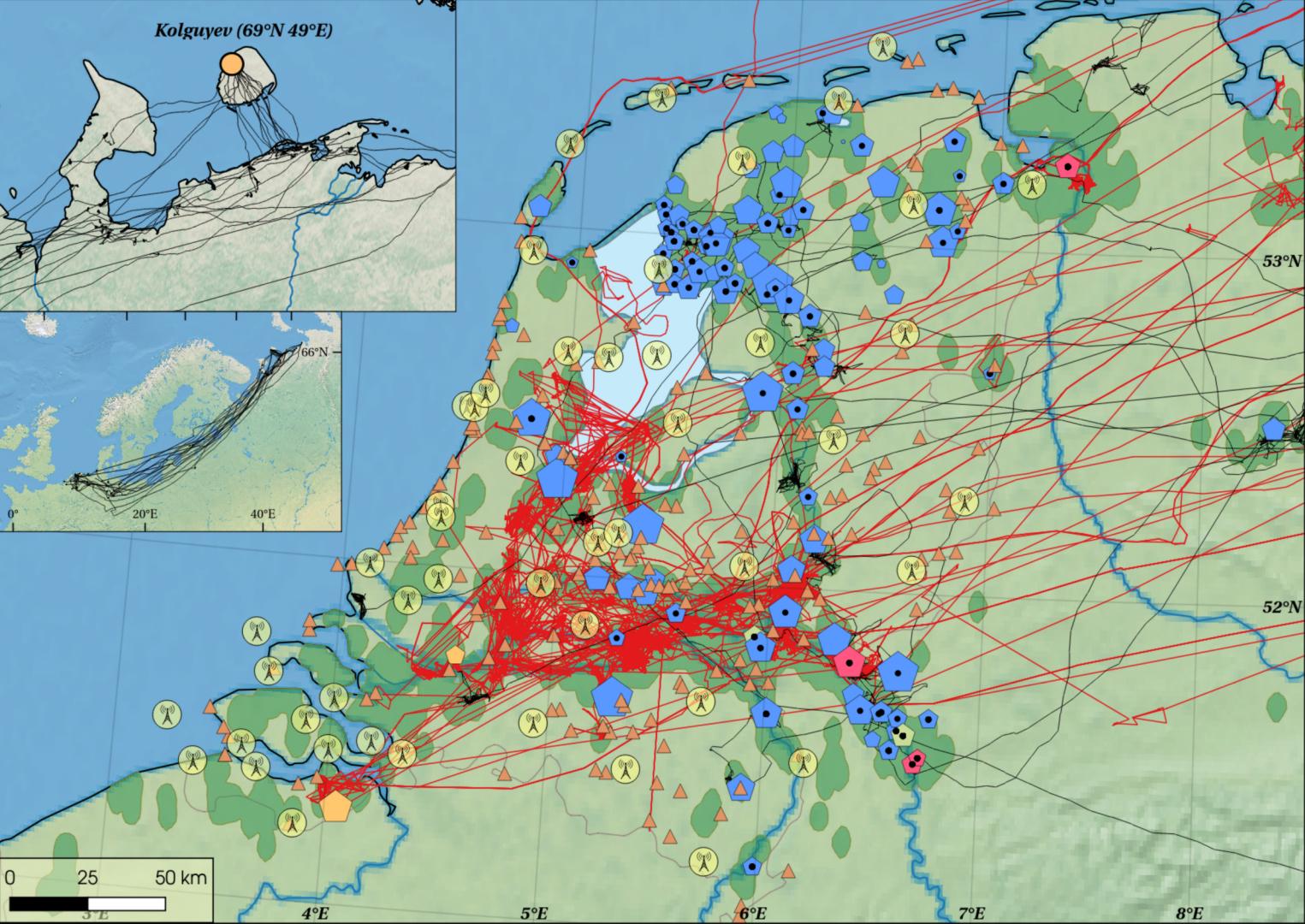
3. van der Jeugd et al. 2009

What is the role of families in spatio-temporal population patterns of geese wintering in the Netherlands, Belgium, and northern Germany?

White-fronted geese

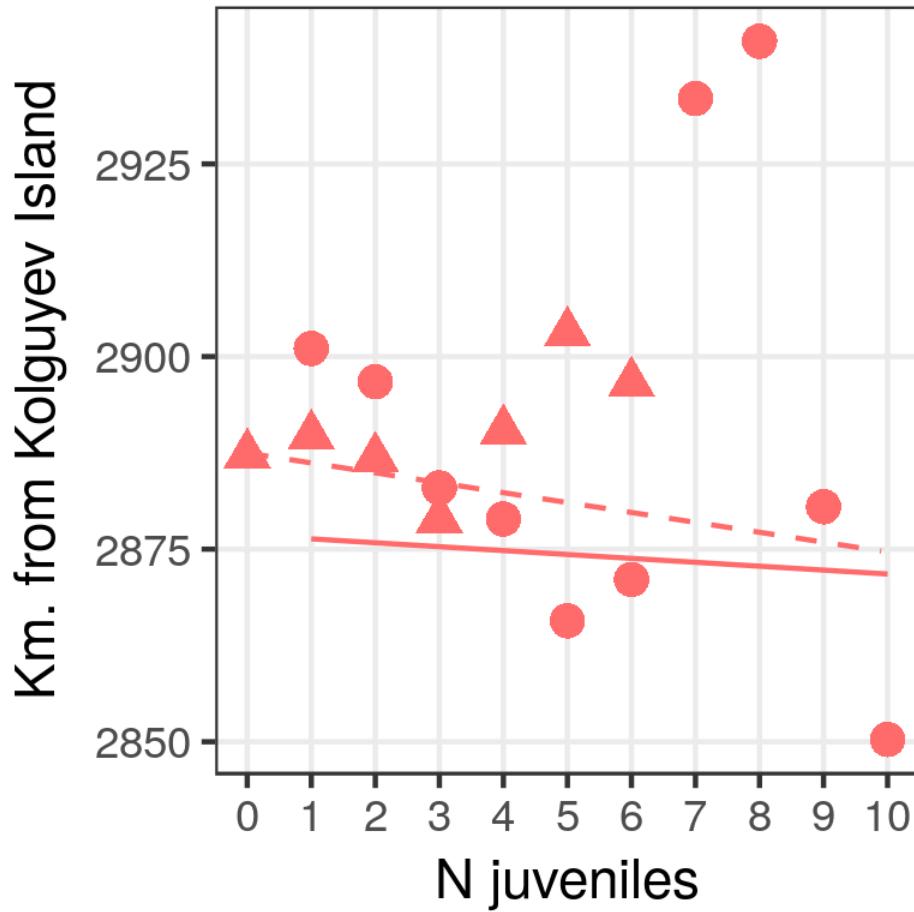


Death by Data



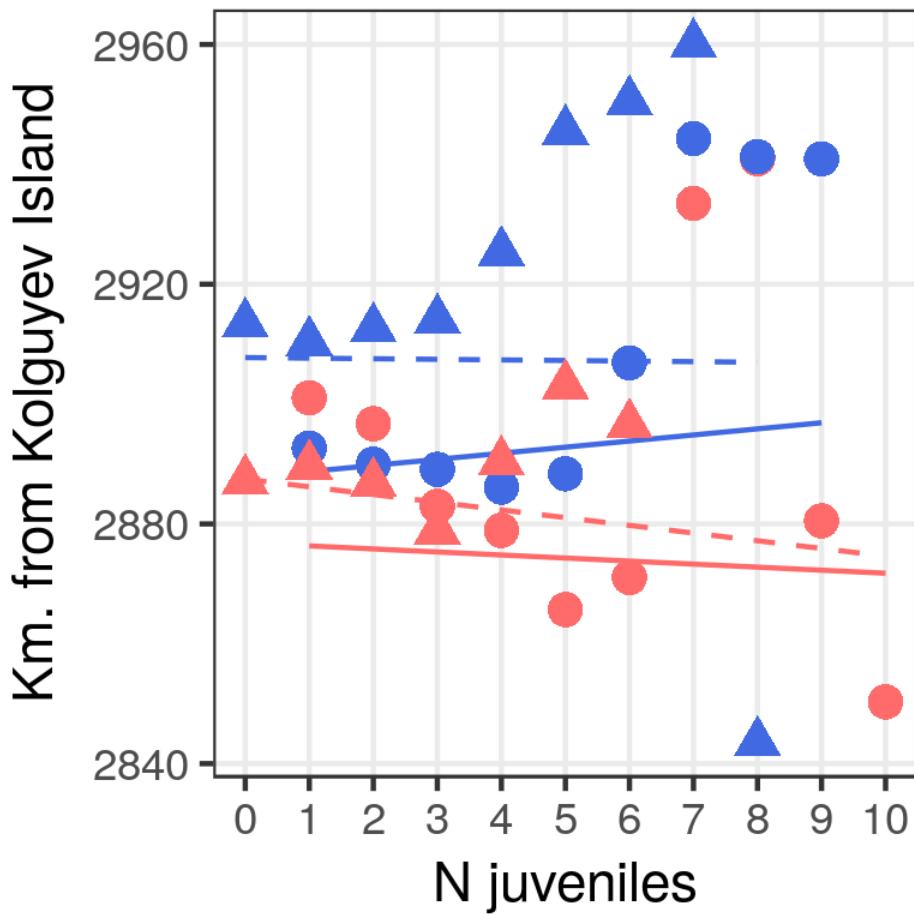
What did we find?

Families in early winter
show no spatial trend

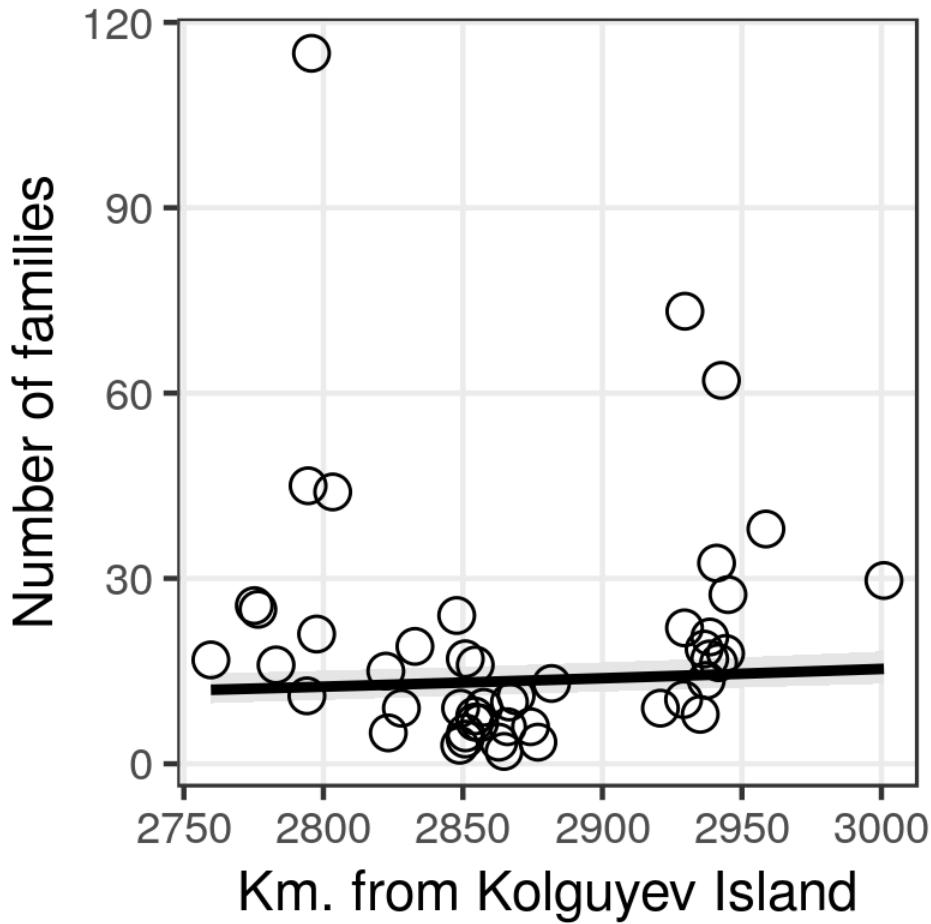


Larger families winter
farther west later in winter

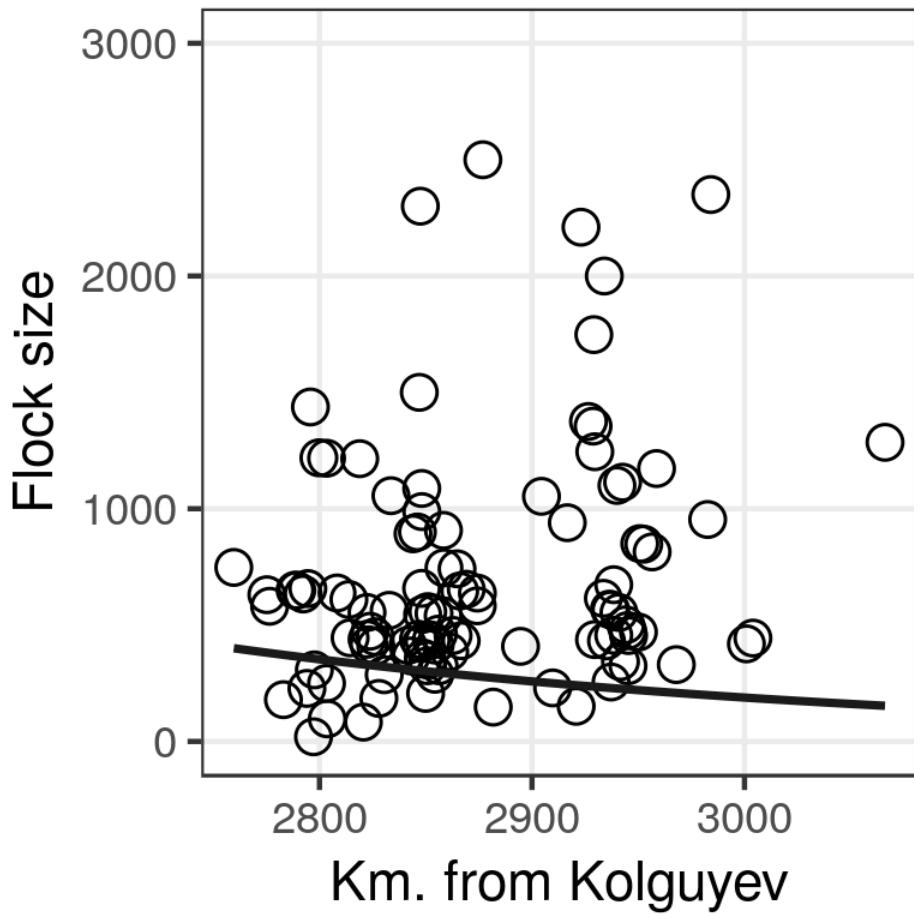
No effect of flock size



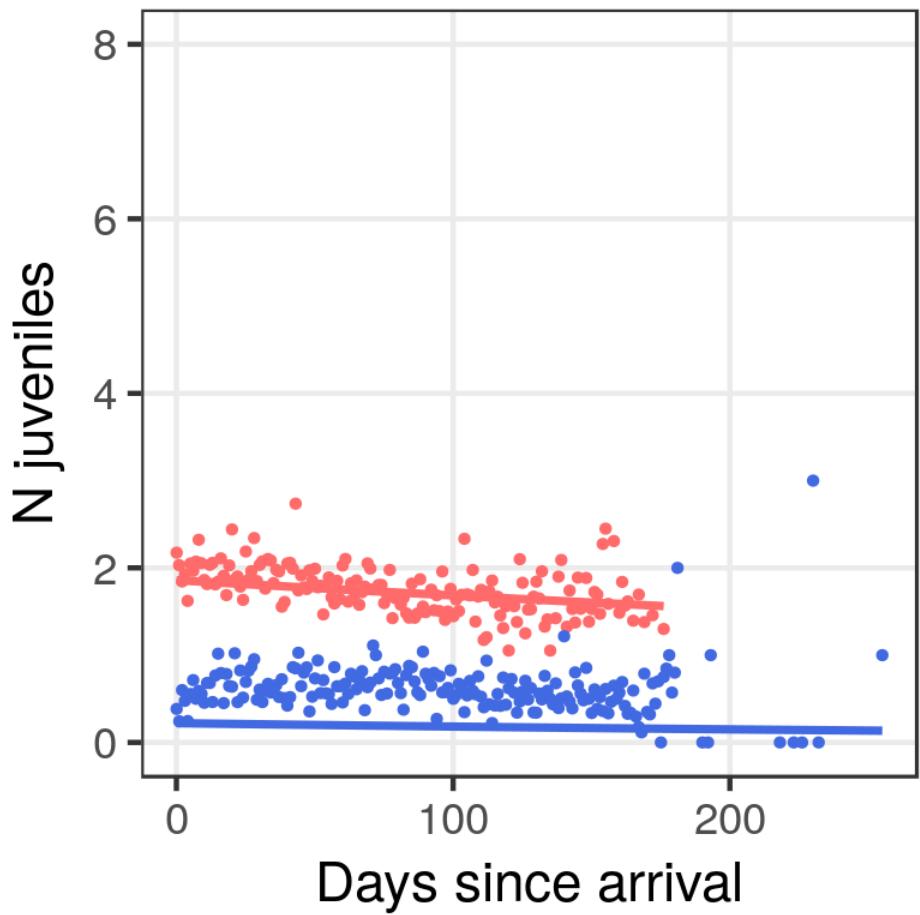
Flocks in the west have more families



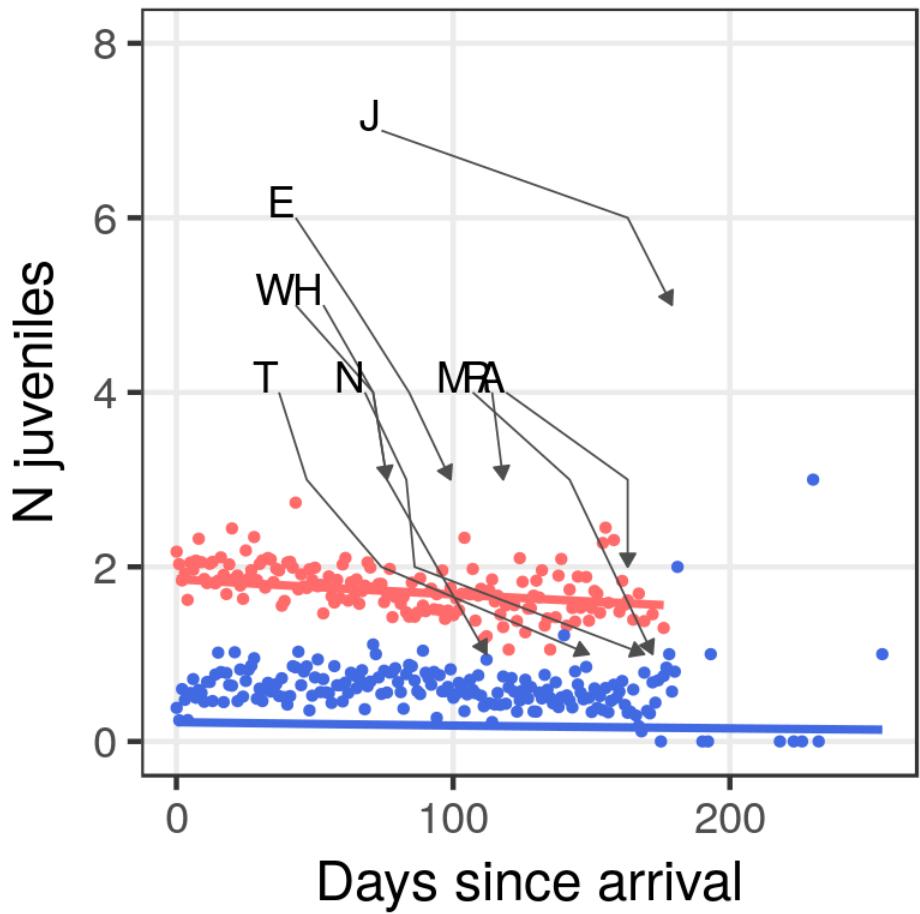
Flocks also get smaller to the west



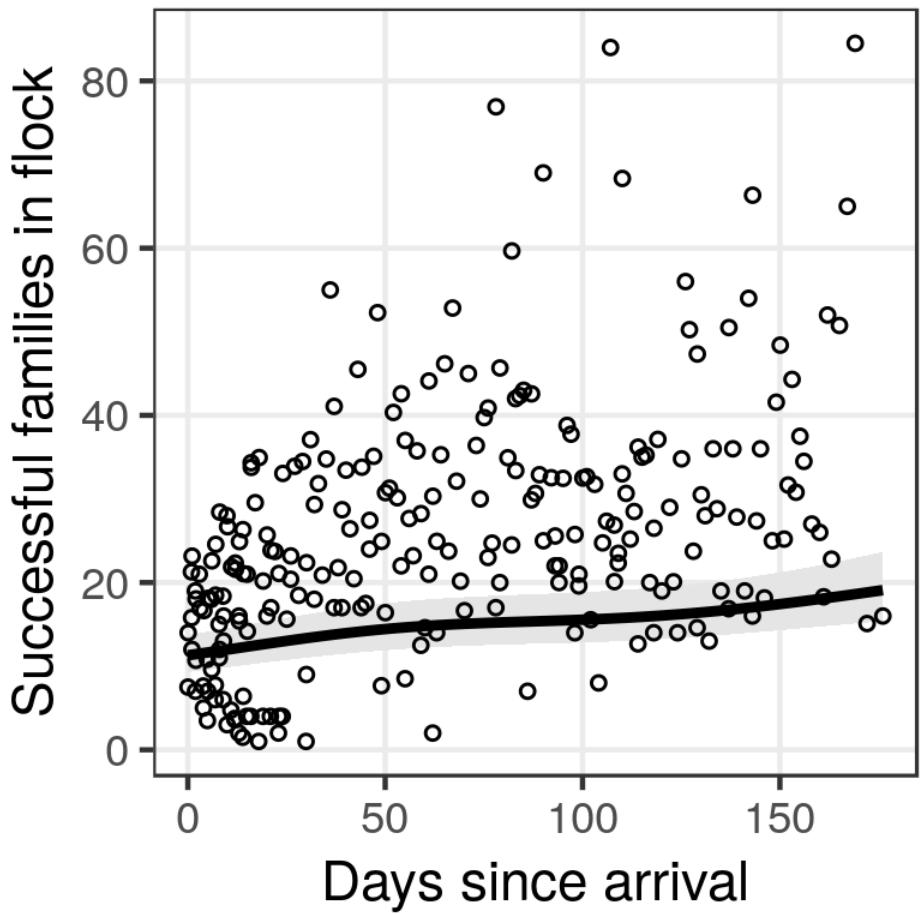
Families get smaller through the winter



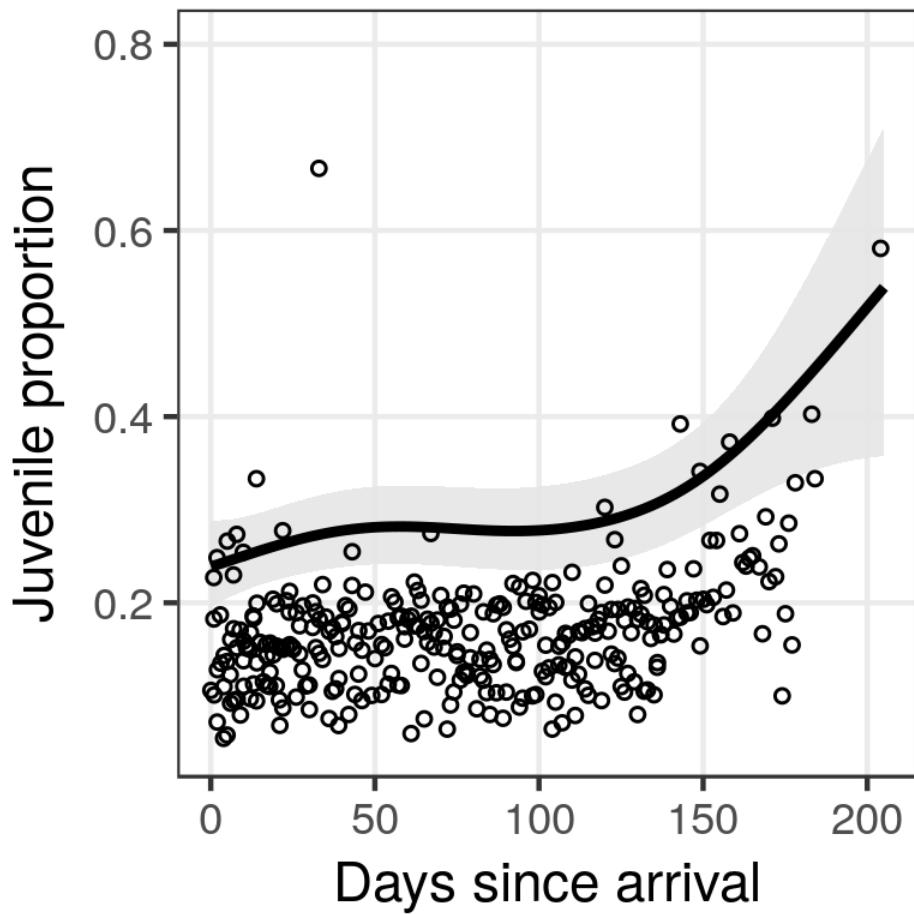
Families get smaller through the winter



Families stay longer

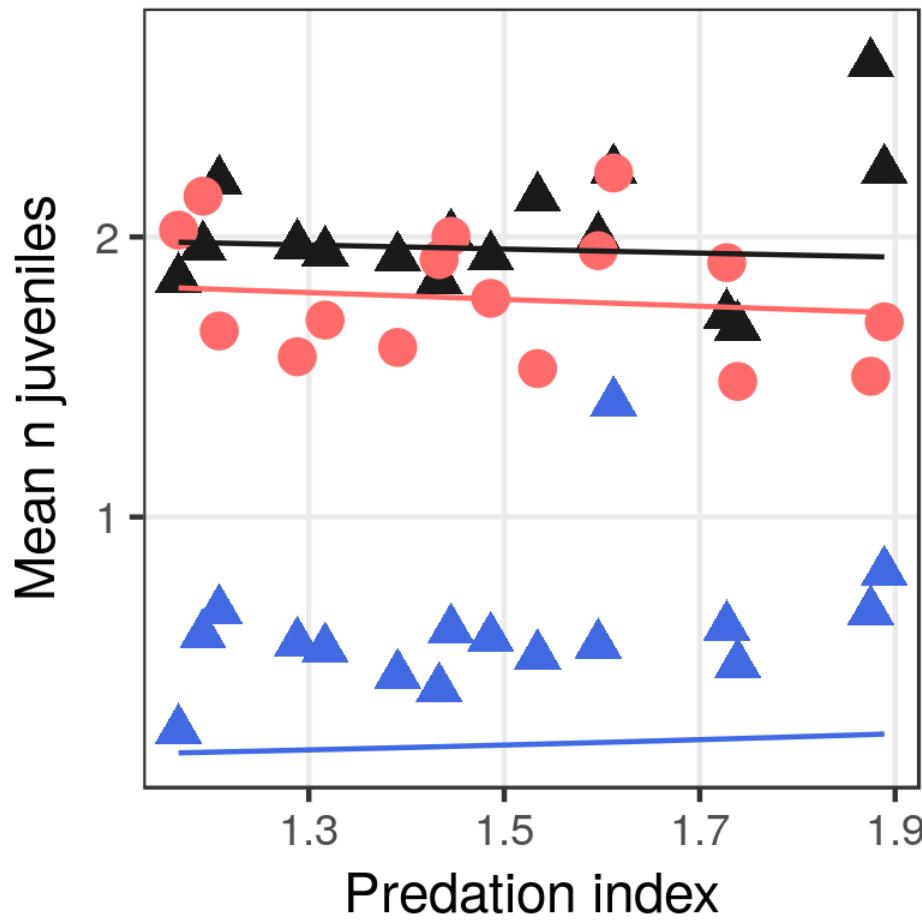


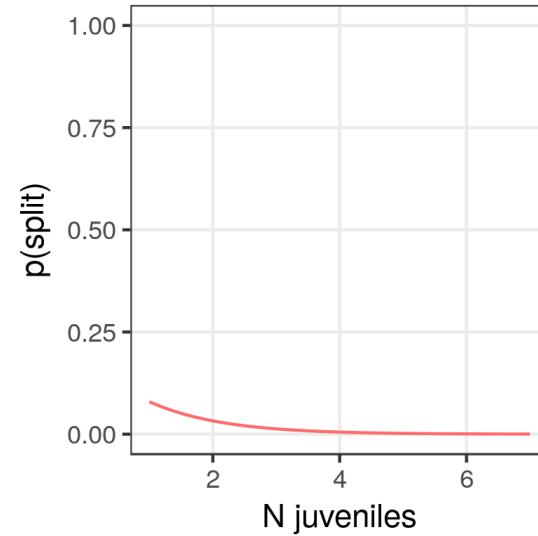
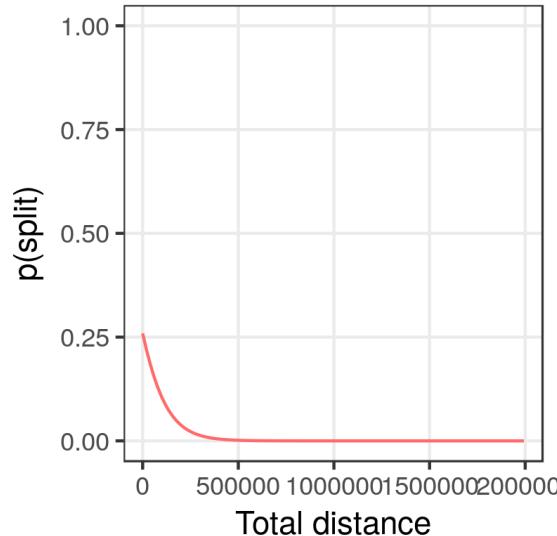
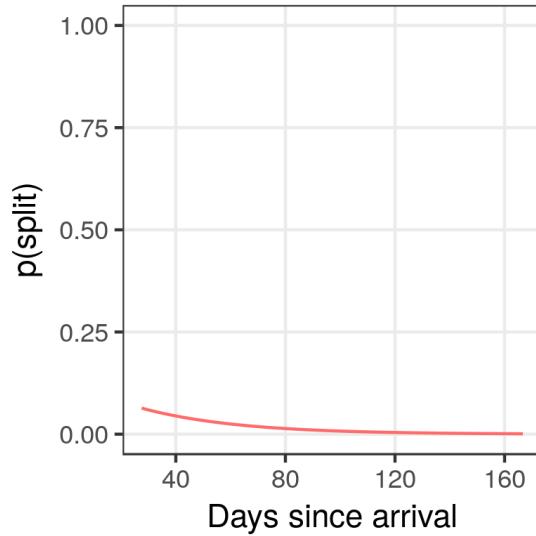
Juvenile proportion in
flocks grows



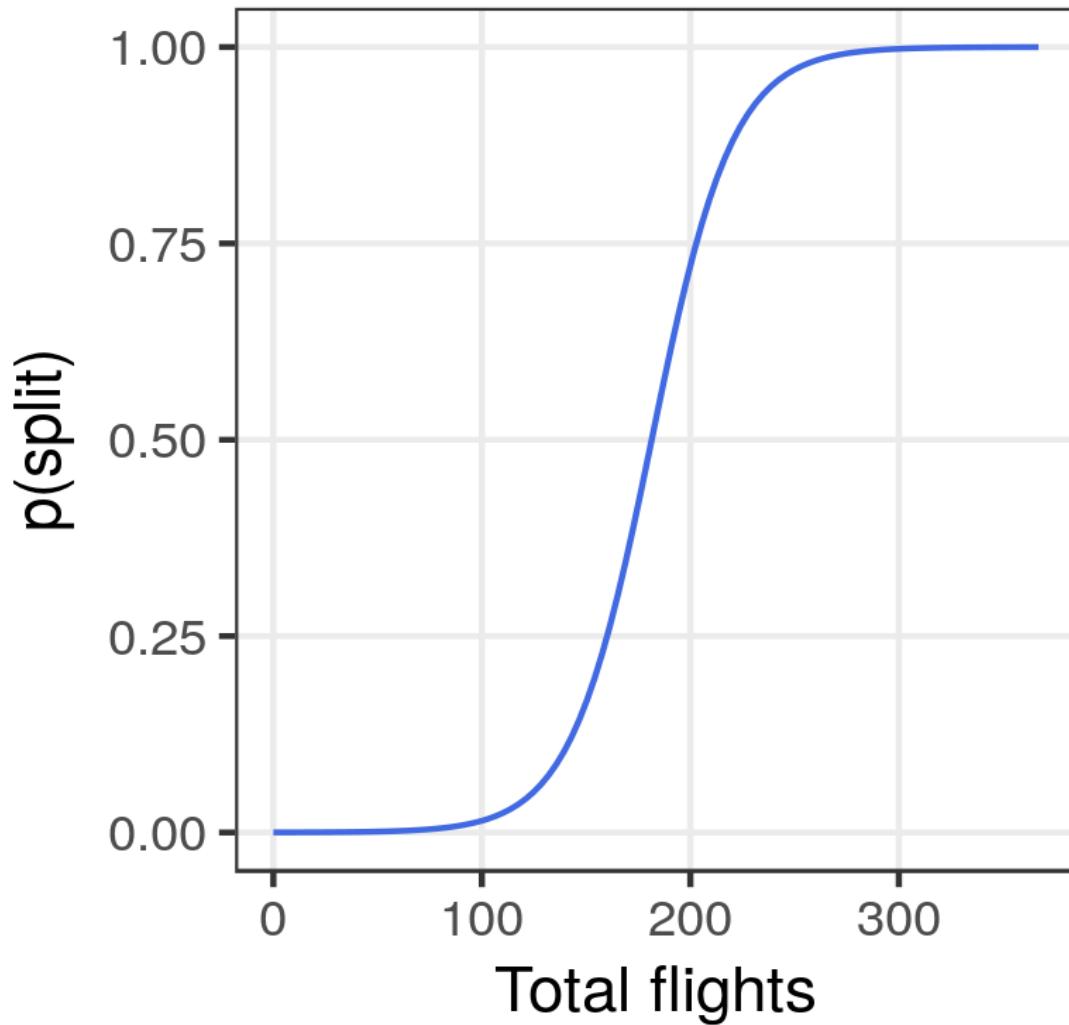
Families may be larger
when predation is higher

Juvenile proportion shows no
response





Large families later in winter are less likely to split



Families split when they make many flights

Hypotheses: yea or nay?

1. Larger families winter in the west.
2. Families are smaller in larger flocks.
~~1. Families are smaller in larger flocks.~~
3. Families get smaller over the winter.
~~2. Families get smaller over the winter.~~
4. Families split when they fly more.

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75+ volunteer goose observers

Russia

Peter Glazov et al.

