Family size dynamics in wintering geese

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Response to review

1 Review

ich finde, die grundsätzliche Fragestellung sehr interessant, hab allerdings das Gefühl, dass die verschiedenen Datensätze sehr unterschiedlich sind und die Synthese daraus nicht wahnsinnig gelungen. Es fehlt im Grunde eine Story, die als Ergebnis erzählt werden könnte.

Translation

I think that the underlying question is very interesting, but have the overall feeling that the various datasets are very different and their synthesis not overly successful. A story that can be sold as a result is missing.

Response

We thank the reviewer for their appraisal of our manuscript.

It's true that the five datasets we present (family size counts from Kolguyev Island, flock size counts from the Netherlands and Germany, family size counts from the same, family sizes from neckband resightings in the same, and GPS tracking of entire goose families) appear quite different.

However, we'd like to suggest that the data are not so much different as that they capture the same phenomenon at different scales. This allows us multiple views of the same process, which is the common thread running through the manuscript --- the interplay of movement and family size in white-fronted geese.

2 Review

Ich kann auch - ehrlich gesagt - nicht erkennen, dass die Daten wirklich so weitreichende Aussagen wie in den Conclusions dargelegt, rechtfertigen. Das ist mir zu dick aufgetragen, denn Nahrungsangebot, Störungen, Traditionen usw. sind unberücksichtigt und müssten m.E. für diese Schlußfolgerung dann zumindest geprüft worden sein.

Translation

I also honestly don't know that these data really support such far-reaching statements as in the 'Conclusions'. It seems a bit much to me, since food supply, disturbances, traditions etc. are overlooked and should in my opinion have at least been considered in this conclusion.

Response

We have rewritten the Conclusions to be more reasonable: in short, families and newly independent juveniles follow a different, delayed migration schedule, and this is an important consideration for conservation and management.

3 Review

Die drei verschiedenen Datensätze scheinen unterschiedlich behandelt worden zu sein. So zeigt Fig. 2 für Dataset C (internationale JV Erfassung SOVON) keine Fehlerbalken, obwohl es sich um über 7.000 Datensätze handelt. Hierbei handelt es sich allerdings um recht robuste Daten.

Translation

The three datasets seem as though they've been treated differently. Thus in Fig. 2 showing Dataset C (juvenile proportion data from SOVON) the error bars are missing, despite there being over 7,000 observations. Even so, this is fairly reliable data.

Response

The three datasets are treated exactly the same for Fig. 2. The circle showing dataset C does have error bars representing the 95% confidence interval around the mean family size, but they are too small to see. Indeed, this is a byproduct of the dataset's size, since the 95% confidence interval is calculated as $\frac{1.96 \times SD}{\sqrt{N}}$; this produces very small confidence intervals as the sample size rises.

This brings us to another important point: the reviewer appears to believe that the data size represented in Fig. 2 *dataset C* is ~7,000 observations. This is not so. The number of families seen during the first 60 days of goose arrival in 2016 was ~2,300 (see **Tab. 2** in the manuscript). The total number of flocks observed during 2000 – 2016 was indeed around 7,000.

Since the question of how many observations from which dataset are used in which analysis (**Tab. 2** in the manuscript) has evidently caused confusion, we have updated the **Analyses** section of the **Methods** with better references to **Tab. 2**.

4 Review

Im Dataset D (geese.org) dagegen haben wir es mit Informationen von Leuten zu tun, die wesentlich an den Halsbändern und weit weniger an den zusätzlichen sozialen Infos interessiert sind. Entsprechend lückig werden diese gemeldet und möglicherweise weniger Aufmerksamkeit bereits im Gelände auf die Familiengrößen gelegt (kurz: diesen Datensatz würde ich zumindest deutlich kritischer aufbereiten als hier scheinbar geschehen).

Translation

In dataset D (geese.org) on the other had, we have observations from people who are more interested in neckbands and far less in additional social information. Their [of additional social information] entry is correspondingly sporadic and possibly family sizes in the field have received less attention in the field (in short: this dataset could at a minimum be treated more critically than done here).

Response

The reviewer suggests further on that dataset D be dropped entirely, or restricted to our own or to trusted observations only, and we address that comment here as well. To begin with, we acknowledge that the inclusion of citizen science data may lead to an increase in noise due to observers not all following a standard protocol.

However, we make the following arguments in favour of retaining these data: first, that many, if not most or all of the observers reporting to www.geese.org are quite dedicated. Second, reading neckbands is a task at least as difficult if not more so than noting social information, so observers trusted to report one correctly are equally likely to report the other accurately. Third, and most importantly, we handled dataset D with particular care as detailed below with regard to family size specifically and confounding factors in general, starting with 18,035 observations:

1. Removed observations where neckbanded geese and their **partner's neckband was reported the same**: *3,360 observations removed*
2. Removed observations where the birth year was unknown or less than two years prior to the date of being observed (**removal of immature birds** not expected to contribute to the breeding population): *1,675 observations removed*
3. Dealing with **reported family sizes**:
    a) We found that observers had entered 73 unique values in the data field for number of juveniles (family size).
    b) These represented a range of certainty, from the authoritative (eg. `0,1,2, ... 9`, or `4, ongerind`) to the unsure (eg. `2 – 4`, or `minimaal 3, max.5`), to the completely uncertain (eg. `>0`, or `1 (minimum)`).
    c) We extracted the first two characters of each of these values (eg. family size reported `0` extracted as `0`; family size reported `10` extracted as `10`; family size reported `2 – 4` extracted as `2`; family size reported as `minimaal 3, max.5` extracted as `mi`).
    d) This resulted in a **conservative (lower) estimate of family sizes** in cases such as `2 – 4` (estimated as `2`), and a loss of data in cases such as `minimaal 3, max.5` (considered as `missing data`). The latter case could have been rescued and assigned a value of 3, but no general rule could be found that suited all 73 cases.
    e) This process resulted in the removal of 405 observations, or 3.1% of the 13,000 observations remaining following steps 3.a and 3.b.
4. Removed observations where the family size was 0 *and* no partner was noted (**removal of unpaired birds with no young**): 1*,960 observations removed*.
5. The entire filtering process discarded 7,400 observations (41%) and retained 10,635 (**Tab. 1** in the manuscript).

A simple graphical method by which it's possible to examine whether family sizes reported in dataset D are subject to a specific bias is by plotting their frequency distribution alongside that of the same from dataset C. Their agreement (see Fig. 1 in this document) indicates the opposite; both datasets appear to report essentially the same trend, which is that small families are the norm, large families are rare. Indeed, we argue that dataset D has more accurate observations of family sizes since the time taken to read a neckband is quite sufficient to observe and classify social interactions as well. This might explain why dataset D has slightly higher frequencies of family sizes ≥ 2.

We accept that the dataset's flaws (such as 73 different values in the family size column) should be openly discussed and dealt with rather than left to readers' imaginations, there to niggle away.

Finally, and though "It's been done before" isn't a particularly good argument, we'd like to point out that neckband resighting data from www.geese.org have indeed been used to study the distribution of pink-footed geese *(A. brachyrhynchus)* on these very same wintering grounds (Clausen *et al.* 2018).

We've added text clarifying the extent to which dataset D was 'cleaned' to address these concerns in paragraph 3 of the **Age ratios and family size** section of the **Methods**, as well as a reference to Clausen *et al.* 2018 to reassure readers that using this sort of data does indeed constitute valid scientific practice.

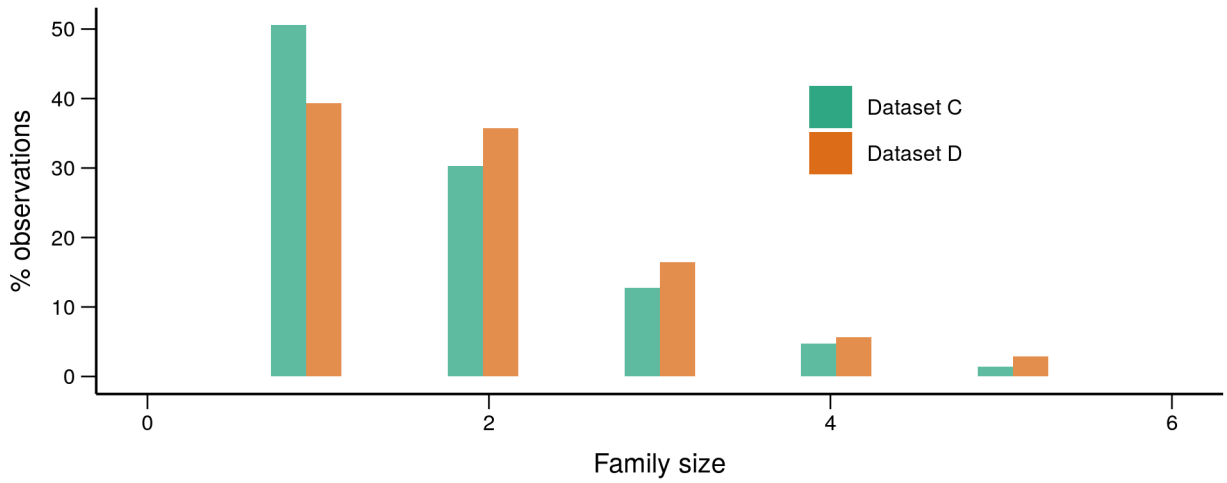

Fig. 1: Frequency distributions of family sizes from datasets C (family size counts by SOVON; green bars) and D (family sizes reported to www.geese.org; orange bars).

5 Review

Insgesamt habe ich den Eindruck, dass bei maßgeblichen Aussagen zum zeitlichen Auftreten von Familien im Wintergebiet Kolguev als alleiniges Maß gesehen (so z.B. Fig. 3, distance zum breeding ground - das kann man so nicht sagen, bei einer Art, die von Kanin bis Taimyr brütet) und das extrem großflächige Verbreitungsgebiet der Blässgans ingesamt eher vernachlässigt wurde.

Translation

On the whole I get the impression that Kolguyev is the only measure on which statements about temporal family occurrence on the wintering grounds are based (for example Fig. 3, distance from breeding grounds – one can't say this for a species that breeds from Kanin to Taimyr) and the extremely large distribution of White-fronted geese has been rather neglected.

Response

This impression is correct. However, the reviewer is right to point to Fig. 3 as the source of this impression, since we haven't explicitly stated in the text that "distance from the breeding grounds" is actually "distance from Kolguyev Island (~49 °E, ~69 °N)". We do repeatedly state that the breeding grounds are on Kolguyev, but we can see that readers might be confused.

We have now added this information to the **Analyses** section of the **Methods**.

We recognise too that the species has a wide distribution in summer. Surveying this range for geese is a challenging task as is fieldwork in the Arctic in general (Mallory *et al.* 2018). The specific problem here is determining where individuals seen in winter spend the summer; answering this question with sufficient spatio-temporal resolution and sample size would be a massive breakthrough for Arctic bird research.

A definitive answer for this flyway population wants for sufficient data. Neckband resighting studies might be expected to be a promising approach from our data (esp. dataset D). However, neckbanding efforts in the Russian Arctic are restricted to opportunistic expeditions to only a few sites (Kolguyev Island and nearby Kolokolkova Bay foremost among them). Thus, in strong contrast with Svalbard breeding pink-footed geese (see Clausen et al. 2018 for yearly figures; overall number of individuals similar to our study dataset D), most white-fronted geese are marked on the wintering grounds in the Netherlands and northern Germany (*unpublished data*).

This leaves us with the following approaches when selecting a measure of distance from the breeding range:

1. Calculate distance from known core breeding grounds on Kolguyev Island (Kruckenberg et al. 2008),
2. Calculate distance from a stop-over site common to the population such as the German-Polish border (*unpublished data AK*),
3. Other, more fanciful techniques such as random-point selection and subsequent distance bootstrapping.

Methods 1 and 2 differ only in the point to which variation in summer site location is abstracted, i.e., neither distance tells us more about variation among families' distance travelled as a function of their start point in the Arctic. Method 3 would be applicable if the population were evenly dispersed over the breeding range (~564,000 km^2; Madsen *et al.* 1999 --- Kanin to the Yenisei River, above the Arctic Circle) in summer, but with nearly a third of the population summering on Kolguyev (~5,300 km^2; 0.9% total area; Kruckenberg *et al.* 2008), this is clearly not the case.

We thus opted for the first approach as the most reasonable. First, Kolguyev Island hosts around 30% of the flyway population (Kruckenberg *et al.* 2008); second, only failed breeders from this population continue to Taimyr (eg. the Pyasina delta) to moult (Kruckenberg et al. 2008; unpublished data AK). Finally, GPS tracking of families tagged in the Netherlands returning to Kolguyev, and of pairs from Kolguyev to the Netherlands confirms that it's a common starting point for a number of birds in this population. Faced with a lack of other data we feel we've thoroughly considered the available possibilities, as well as the vast summer distribution, and abstracted it to a reasonable level.

6 Review

Also: ich finde die Frage gut und wichtig und es ist angesichts der extremen methodischen Probleme, die gerade die Frage nach dem Survival der frischflüggen JV bei den Gänsen (zu klein für Sender....) darstellt, auf jeden Fall mal ein erster Aufschlag. Die Schwierigkeiten und Schwächen sollten m.E. daher aber stärker diskutiert werden. Ich würde zudem Dataset D weglassen oder aber auch eigene bzw. die Beobachtungen von wirklich zuverlässigen

Beobachtern beschränken. Die Diskussion sollte sich auf wirklich valide Ergebnisse fokussieren.

Translation

Therefore: I find the question good and important and a first step towards the question of the survival of recently fledged juvenile geese (too small for transmitters) especially in the face of extreme methodological problems. The difficulties and flaws should in my opinion be further discussed. I would remove dataset D or rather retain observations from truly reliable observers. The Discussion should focus on valid results.

Response

We thank the reviewer for this summary, and for recognising the nature of the task involved.

As detailed above, we've added information to various sections to clarify where there are gaps in our knowledge, and which approximations were made to bridge them.

We remain convinced that dataset D is a valuable addition to the literature. We've detailed the steps taken to filter our unreliable or confounding data above.

Finally, we've restricted the Discussion to conclusions supported by the data.

7 Review

Die dt. Zusammenfassung darf noch etwas hübscher werden. Zum English kann ich wenig sagen.

Translation

The German abstract could be a bit nicer. I can say little about the English.

Response

We thank the reviewer for this assessment, and have updated the German abstract.

References

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