Autumn freeze–thaw events carry over to depress late-winter reproductive performance in Canada jays

Alex O. Sutton, Dan Strickland, Nikole E. Freeman, Amy E. M. Newman and D. Ryan Norris

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Note: Reports are unedited and appear as submitted by the referee. The review history appears in chronological order.

Note: This manuscript was transferred from another Royal Society journal with peer review.

Review History

RSOS-181754.R0 (Original submission)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No
Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept with minor revision (please list in comments)

Comments to the Author(s)
To Author:

The authors have generally done a satisfactory job of responding to comments, but further details are still needed. In general, I think the manuscript would benefit from a more explicit documentation of its limitations regarding measures of reproductive success. First, the authors stated in their response that “we are not able to estimate clutch size”. However, in two previous papers that they cite and that some of the present authors were a part of, clutch size is estimated in the same study system. Second, the use of number of nestlings on day 11 as a measure of nest success is not ideal given that it’s only about halfway through the nestling period. If that’s the best you can do, that’s fine, but the reader should be made aware of this limitation and the implications of this choice should be discussed. Third, more detail is needed on your measure of body condition in relation to day of banding. Please see detailed comments below.

Lines 56-58. You still haven’t compared the strength of your effects to those found by Waite and Strickland. How much stronger and more convincing are your effects? Also, I’m not entirely sure it’s fair to say there was no evidence that fall temperature affected brood size in that study. They found a negative trend of similar strength to clutch size at P = 0.08.

Lines 96-99. I still have some issues here. How long is the nestling period for Canada Jays? I’m seeing estimates as long as 22-24 days. This means that you’re estimating nest success only halfway through the nestling period. Do you have any evidence that nestling presence at day 11 is indicative of overall nest success at the time of fledging? From your response to previous comments it appears not. The limitations of your definition of “success” needs to be made really explicit to the reader. I think you need to state the length of the nesting period, why you did not check nests after day 11, and argue to the best of your ability why your measure of nest success is still likely to be accurate.

Lines 107-116. Do you have evidence that this is a good measure of condition (i.e., that it has documented consequences)? If not, that’s ok as it’s a standard assumption - but you should state that you’re making an assumption that this measures body condition.

Lines 105-106. Does excluding failed nests reduce sample size mentioned in line 96? Or is that still accurate? Should be made clear for the reader either way.

Line 191. But above you said that “brood size” excluded failed nests. Here they are included. Clarify. I think it makes the most sense to state how many nests failed in the methods, state that you excluded failed nests, and then only report on the nests in the analysis in the results section.

Line 192. Since you have no information about why nests fail, I think you should state that explicitly. I think most readers are going to immediately want to know why nests are failing.

Line 192-194. Does any of this variation stem from the variation in measuring day? Looking back to Derbyshire et al. 2015 it looks like nestlings were measured anywhere from 7 to 12 days, a potentially big difference for fast-growing nestlings. Was day of measurement controlled for in your body condition measure? If not, why not?
Line 267 – 270. In your response to previous comments you state that you were not able to estimate clutch size. However, in Derbyshire et al. 2015 clutch size was able to be estimated for 325 of 394 nests from presumably the same data set. Why the discrepancy? If for some reason you can’t estimate clutch size, then you need to make it explicit that you’re assuming brood size at day 11 is representative of clutch size since the mechanism you’re mentioning here is really focused on number of eggs laid.

Lines 272 – 274. As I mentioned in a previous review, the fact that you haven’t given any information about how nests fail in this species makes it hard to evaluate your argument here. Abandonment is just one way a nest could fail. What about predation, starvation, etc? I realize are not able to determine why a nest failed, but nonetheless it seems important to understand the mechanism and must be discussed. Is it possible that a food limited female might have a tradeoff between time spent foraging away from the nest and time defending the nest from predators? In this manner could food limitation decrease nest success indirectly through increased predation? The reader needs to understand that you cannot determine why nests fail, how that limits your understanding of the precise mechanisms behind the effects you’ve found evidence for, and what future research is needed to clarify.

Lines 313-316. In your response to a previous comment you state that “Immediately after these studies were published, we had a period of cold winters that have caused the observed trend to become non-significant over time.” Ok – that makes sense, but probably should be explained so the reader is clear on why there used to be a trend, but isn’t anymore. Moreover, if you’re doing an analysis, shouldn’t it be in the results?

Lines 326-328. You state in your response that you don’t have any evidence that such areas where increased in temperature and freeze-thaw event exist. This statement you make in these lines implies that these areas definitely exist – edit text for clarification. Maybe you could be more clear about the “pronounced climactic changes” to strengthen this overall argument as well?

Review form: Reviewer 2

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
No
Recommendation?
Accept as is

Comments to the Author(s)
It is the second time that I am reviewing the paper “Fall freeze-thaw events carry over to depress late-winter reproductive performance in Canada jays” by Sutton and colleagues. The authors have addressed most of my comments in the revised version of the manuscript and I congratulate them for their great work and this very interesting study.

Decision letter (RSOS-181754.R0)

22-Feb-2019

Dear Dr Sutton

On behalf of the Editors, I am pleased to inform you that your Manuscript RSOS-181754 entitled “Fall freeze-thaw events carry over to depress late-winter reproductive performance in Canada Jays” has been accepted for publication in Royal Society Open Science subject to minor revision in accordance with the referee suggestions. Please find the referees’ comments at the end of this email.

The reviewers and handling editors have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the comments and revise your manuscript.

• Ethics statement
If your study uses humans or animals please include details of the ethical approval received, including the name of the committee that granted approval. For human studies please also detail whether informed consent was obtained. For field studies on animals please include details of all permissions, licences and/or approvals granted to carry out the fieldwork.

• Data accessibility
It is a condition of publication that all supporting data are made available either as supplementary information or preferably in a suitable permanent repository. The data accessibility section should state where the article's supporting data can be accessed. This section should also include details, where possible of where to access other relevant research materials such as statistical tools, protocols, software etc can be accessed. If the data has been deposited in an external repository this section should list the database, accession number and link to the DOI for all data from the article that has been made publicly available. Data sets that have been deposited in an external repository and have a DOI should also be appropriately cited in the manuscript and included in the reference list.

If you wish to submit your supporting data or code to Dryad (http://datadryad.org/), or modify your current submission to dryad, please use the following link: http://datadryad.org/submit?journalID=RSOS&manu=RSOS-181754

• Competing interests
Please declare any financial or non-financial competing interests, or state that you have no competing interests.
• Authors’ contributions
All submissions, other than those with a single author, must include an Authors’ Contributions section which individually lists the specific contribution of each author. The list of Authors should meet all of the following criteria; 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

All contributors who do not meet all of these criteria should be included in the acknowledgements.

We suggest the following format:
AB carried out the molecular lab work, participated in data analysis, carried out sequence alignments, participated in the design of the study and drafted the manuscript; CD carried out the statistical analyses; EF collected field data; GH conceived of the study, designed the study, coordinated the study and helped draft the manuscript. All authors gave final approval for publication.

• Acknowledgements
Please acknowledge anyone who contributed to the study but did not meet the authorship criteria.

• Funding statement
Please list the source of funding for each author.

Please ensure you have prepared your revision in accordance with the guidance at https://royalsociety.org/journals/authors/author-guidelines/ -- please note that we cannot publish your manuscript without the end statements. We have included a screenshot example of the end statements for reference. If you feel that a given heading is not relevant to your paper, please nevertheless include the heading and explicitly state that it is not relevant to your work.

Because the schedule for publication is very tight, it is a condition of publication that you submit the revised version of your manuscript before 03-Mar-2019. Please note that the revision deadline will expire at 00.00am on this date. If you do not think you will be able to meet this date please let me know immediately.

To revise your manuscript, log into https://mc.manuscriptcentral.com/rsos and enter your Author Centre, where you will find your manuscript title listed under “Manuscripts with Decisions”. Under ”Actions,” click on ”Create a Revision.” You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript and upload a new version through your Author Centre.

When submitting your revised manuscript, you will be able to respond to the comments made by the referees and upload a file ”Response to Referees” in ”Section 6 - File Upload”. You can use this to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the referees. We strongly recommend uploading two versions of your revised manuscript:

1) Identifying all the changes that have been made (for instance, in coloured highlight, in bold text, or tracked changes);
2) A ‘clean’ version of the new manuscript that incorporates the changes made, but does not highlight them.
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2) A separate electronic file of each figure (EPS or print-quality PDF preferred (either format should be produced directly from original creation package), or original software format);
3) Included a 100 word media summary of your paper when requested at submission. Please ensure you have entered correct contact details (email, institution and telephone) in your user account;
4) Included the raw data to support the claims made in your paper. You can either include your data as electronic supplementary material or upload to a repository and include the relevant doi within your manuscript. Make sure it is clear in your data accessibility statement how the data can be accessed;
5) All supplementary materials accompanying an accepted article will be treated as in their final form. Note that the Royal Society will neither edit nor typeset supplementary material and it will be hosted as provided. Please ensure that the supplementary material includes the paper details where possible (authors, article title, journal name).

Supplementary files will be published alongside the paper on the journal website and posted on the online figshare repository (https://rs.figshare.com/). The heading and legend provided for each supplementary file during the submission process will be used to create the figshare page, so please ensure these are accurate and informative so that your files can be found in searches. Files on figshare will be made available approximately one week before the accompanying article so that the supplementary material can be attributed a unique DOI.

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Once again, thank you for submitting your manuscript to Royal Society Open Science and I look forward to receiving your revision. If you have any questions at all, please do not hesitate to get in touch.

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Dr Ryan Earley (Associate Editor) and Professor Kevin Padian (Subject Editor)
openscience@royalsociety.org
Reviewer comments to Author:
Reviewer: 1

Comments to the Author(s)
To Author:

The authors have generally done a satisfactory job of responding to comments, but further details are still needed. In general, I think the manuscript would benefit from a more explicit documentation of its limitations regarding measures of reproductive success. First, the authors stated in their response that “we are not able to estimate clutch size”. However, in two previous papers that they cite and that some of the present authors were a part of, clutch size is estimated in the same study system. Second, the use of number of nestlings on day 11 as a measure of nest success is not ideal given that it’s only about halfway through the nestling period. If that’s the best you can do, that’s fine, but the reader should be made aware of this limitation and the implications of this choice should be discussed. Third, more detail is needed on your measure of body condition in relation to day of banding. Please see detailed comments below.

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Lines 107-116. Do you have evidence that this is a good measure of condition (i.e., that it has documented consequences)? If not, that’s ok as it’s a standard assumption - but you should state that you’re making an assumption that this measures body condition.

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Line 267 – 270. In your response to previous comments you state that you were not able to estimate clutch size. However, in Derbyshire et al. 2015 clutch size was able to be estimated for 325 of 394 nests from presumably the same data set. Why the discrepancy? If for some reason you
can’t estimate clutch size, then you need to make it explicit that you’re assuming brood size at day 11 is representative of clutch size since the mechanism you’re mentioning here is really focused on number of eggs laid.

Lines 272 – 274. As I mentioned in a previous review, the fact that you haven’t given any information about how nests fail in this species makes it hard to evaluate your argument here. Abandonment is just one way a nest could fail. What about predation, starvation, etc? I realize are not able to determine why a nest failed, but nonetheless it seems important to understand the mechanism and must be discussed. Is it possible that a food limited female might have a tradeoff between time spent foraging away from the nest and time defending the nest from predators? In this manner could food limitation decrease nest success indirectly through increased predation? The reader needs to understand that you cannot determine why nests fail, how that limits your understanding of the precise mechanisms behind the effects you’ve found evidence for, and what future research is needed to clarify.

Lines 313-316. In your response to a previous comment you state that “Immediately after these studies were published, we had a period of cold winters that have caused the observed trend to become non-significant over time.” Ok – that makes sense, but probably should be explained so the reader is clear on why there used to be a trend, but isn’t anymore. Moreover, if you’re doing an analysis, shouldn’t it be in the results?

Lines 326-328. You state in your response that you don’t have any evidence that such areas where increased in temperature and freeze-thaw event exist. This statement you make in these lines implies that these areas definitely exist – edit text for clarification. Maybe you could be more clear about the “pronounced climactic changes” to strengthen this overall argument as well?

Reviewer: 2

Comments to the Author(s)
It is the second time that I am reviewing the paper “Fall freeze-thaw events carry over to depress late-winter reproductive performance in Canada Jays” by Sutton and colleagues. The authors have addressed most of my comments in the revised version of the manuscript and I congratulate them for their great work and this very interesting study.

Author’s Response to Decision Letter for (RSOS-181754.R0)
See Appendix A.

Decision letter (RSOS-181754.R1)

07-Mar-2019

Dear Dr Sutton,

I am pleased to inform you that your manuscript entitled "Fall freeze-thaw events carry over to depress late-winter reproductive performance in Canada Jays" is now accepted for publication in Royal Society Open Science.
You can expect to receive a proof of your article in the near future. Please contact the editorial office (openscience_proofs@royalsociety.org and openscience@royalsociety.org) to let us know if you are likely to be away from e-mail contact. Due to rapid publication and an extremely tight schedule, if comments are not received, your paper may experience a delay in publication.

Royal Society Open Science operates under a continuous publication model (http://bit.ly/cpFAQ). Your article will be published straight into the next open issue and this will be the final version of the paper. As such, it can be cited immediately by other researchers. As the issue version of your paper will be the only version to be published I would advise you to check your proofs thoroughly as changes cannot be made once the paper is published.

On behalf of the Editors of Royal Society Open Science, we look forward to your continued contributions to the Journal.

Kind regards,
Andrew Dunn
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Dr Ryan Earley (Associate Editor) and Kevin Padian (Subject Editor)
openscience@royalsociety.org

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Appendix A

All our responses to reviewers appear below their comments and are bolded for clarity. Additionally, all revisions included in the text of our manuscript appear in red.

Reviewer comments to Author:
Reviewer: 1

Comments to the Author(s)
To Author:

The authors have generally done a satisfactory job of responding to comments, but further details are still needed. In general, I think the manuscript would benefit from a more explicit documentation of its limitations regarding measures of reproductive success. First, the authors stated in their response that “we are not able to estimate clutch size”. However, in two previous papers that they cite and that some of the present authors were a part of, clutch size is estimated in the same study system. Second, the use of number of nestlings on day 11 as a measure of nest success is not ideal given that it’s only about halfway through the nestling period. If that’s the best you can do, that’s fine, but the reader should be made aware of this limitation and the implications of this choice should be discussed. Third, more detail is needed on your measure of body condition in relation to day of banding. Please see detailed comments below.

Lines 56-58. You still haven’t compared the strength of your effects to those found by Waite and Strickland. How much stronger and more convincing are your effects? Also, I’m not entirely sure it’s fair to say there was no evidence that fall temperature affected brood size in that study. They found a negative trend of similar strength to clutch size at \( P = 0.08 \).

As suggested, we have compared the strength of the effects in our study to those presented in Waite and Strickland (2006) in the discussion (lines 243-247).

Lines 96-99. I still have some issues here. How long is the nestling period for Canada Jays? I’m seeing estimates as long as 22-24 days. This means that you’re estimating nest success only halfway through the nestling period. Do you have any evidence that nestling presence at day 11 is indicative of overall nest success at the time of fledging? From your response to previous comments it appears not. The limitations of your definition of “success” needs to be made really explicit to the reader. I think you need to state the length of the
nesting period, why you did not check nests after day 11, and argue to the best of your ability why your measure of nest success is still likely to be accurate.

As suggested, we have included the length of the nesting period in the manuscript (lines 98-99). We have also further expressed the limitations of our nest success estimate and why we think it is still a good indicator of success (lines 113-118).

More generally, we do have a small sample size of nests that were monitored until fledge. In most of these cases, if a nest was successful at the time of banding it did successfully fledge young. Historically, nests were not monitored to determine if young successfully fledged due to logistical constraints associated with accessing nests, counting nestlings still in the nest and locating young post fledge.

Lines 107-116. Do you have evidence that this is a good measure of condition (i.e., that it has documented consequences)? If not, that’s ok as it’s a standard assumption - but you should state that you’re making an assumption that this measures body condition.

As suggested, we have stated that we assume our estimate of condition is a good measure of body condition (lines 128-130).

Lines 105-106. Does excluding failed nests reduce sample size mentioned in line 96? Or is that still accurate? Should be made clear for the reader either way.

As suggested, we have clarified that the stated mean and range of nests monitored each year does include failed nests (lines 96-97).

Line 191. But above you said that “brood size” excluded failed nests. Here they are included. Clarify. I think it makes the most sense to state how many nests failed in the methods, state that you excluded failed nests, and then only report on the nests in the analysis in the results section.

As suggested, we have clarified that in subsequent analyses of brood size that all failed nests were excluded (lines 168-170). The stated range of brood size in this section of the results is a summary of brood size across all nests.
Line 192. Since you have no information about why nests fail, I think you should state that explicitly. I think most readers are going to immediately want to know why nests are failing.

**As suggested, we have clarified that we do not know the cause of failure of nests in the discussion (lines 293-297).**

Line 192-194. Does any of this variation stem from the variation in measuring day? Looking back to Derbyshire et al. 2015 it looks like nestlings were measured anywhere from 7 to 12 days, a potentially big difference for fast-growing nestlings. Was day of measurement controlled for in your body condition measure? If not, why not?

**In Derbyshire et al. (2015), a negative exponential growth curve was fit to the data based on known age nestlings. This curve represented the best relationship between size and mass of growing nestlings. This relationship is based solely on the size and mass of an individual and therefore variation in the age at banding does not drive variation in our condition estimates because size is controlled for.**

Line 267 – 270. In your response to previous comments you state that you were not able to estimate clutch size. However, in Derbyshire et al. 2015 clutch size was able to be estimated for 325 of 394 nests from presumably the same data set. Why the discrepancy? If for some reason you can’t estimate clutch size, then you need to make it explicit that you’re assuming brood size at day 11 is representative of clutch size since the mechanism you’re mentioning here is really focused on number of eggs laid.

**As suggested, we have edited the text in the methods section (lines 108-112) to reflect this uncertainty.**

**We cannot estimate clutch size independent of brood size because we do not check nest contents before banding. At the time of banding, there may be eggs in some nests, which suggests that clutch size was larger than the observed brood size. This is a relatively infrequent occurrence and therefore we assume that clutch size and brood size are the same for most nests.**

Lines 272 – 274. As I mentioned in a previous review, the fact that you haven’t given any information about how nests fail in this species makes it hard to evaluate your argument here. Abandonment is just one way a nest could fail. What about predation, starvation, etc? I
realize are not able to determine why a nest failed, but nonetheless it seems important to understand the mechanism and must be discussed. Is it possible that a food limited female might have a tradeoff between time spent foraging away from the nest and time defending the nest from predators? In this manner could food limitation decrease nest success indirectly through increased predation? The reader needs to understand that you cannot determine why nests fail, how that limits your understanding of the precise mechanisms behind the effects you’ve found evidence for, and what future research is needed to clarify.

As suggested, we have explicitly stated our uncertainty as to why nests fail and have also discussed how decreased food quality could affect predation rates in addition to why breeding pairs may abandon nests as they experience decreasing food quality (line 293-297).

Lines 313-316. In your response to a previous comment you state that “Immediately after these studies were published, we had a period of cold winters that have caused the observed trend to become non-significant over time.” Ok – that makes sense, but probably should be explained so the reader is clear on why there used to be a trend, but isn’t anymore. Moreover, if you’re doing an analysis, shouldn’t it be in the results?

As suggested, we have indicated in the discussion why our reported trend in mean fall temperature differs from previous studies (lines 338-340). We have also moved the presentation of the statistical results of our linear regression to the results section (lines 209-211).

Lines 326-328. You state in your response that you don’t have any evidence that such areas where increased in temperature and freeze-thaw event exist. This statement you make in these lines implies that these areas definitely exist – edit text for clarification. Maybe you could be more clear about the “pronounced climactic changes” to strengthen this overall argument as well?

As suggested, we have edited the text for clarification (line 354).

Reviewer: 2

Comments to the Author(s)
It is the second time that I am reviewing the paper “Fall freeze-thaw events carry over to depress late-winter reproductive performance in
Canada jays” by Sutton and colleagues. The authors have addressed most of my comments in the revised version of the manuscript and I congratulate them for their great work and this very interesting study.