PRRE-PRINT

Addendum / Correction to Treves A, Louchouarn NX. Uncertainty and precaution in hunting wolves twice in a year. PLoS One. 2022; 17(3):e0259604.

Treves, A.

Louchouarn, N.X.

In [1], we explained and modeled how uncertainty about Wisconsin gray wolf vital statistics would interact with a wolf-hunting quota in relation to three precautionary thresholds set by law and society. We estimated probable distributions of births and deaths, then imposed ten possible quotas to estimate the wolf population status by April 2022.

We concluded the quota for wolf-hunting set by the Natural Resource Board (300) posed a small but detectable risk of extirpating wolves from the state outside tribal reservations and a substantial risk of lowering the wolf population to the statutory level for listing under the state threatened and endangered species list. We also showed how the more moderate quota recommended by the state wildlife agency (130) posed a small but detectable risk of passing the latter threshold and a substantial risk of lowering the wolf population below the 1999 wolf management plan's population goal 350 wolves outside of tribal reservations. Finally, we showed that a court-ordered quota of zero had a small but detectable risk of lowering the population below the latter threshold. Here we recalculate these probabilities based on new information.

After publication, we were notified of a typographical error in a book chapter [2], p.111, that estimated wolf pup survival to 3-9 months in a subpopulation of Wisconsin

wolves. That estimate was 0.20 (0.05-0.72) but in correspondence with R. P. Thiel, he confirmed there was an uncorrected error never before reported. Thiel instead recommended estimates of pup survival from the same edited volume but in Table 6.3, p.99 [3]. That source estimated that annual pup survival to April of the following year was 0.29 (sd 0.09, range 0.14-0.58). Hence the mean and minimum were 0.09 higher but the maximum was 0.14 lower leading to a tighter distribution. We originally did not use [3] because (a) we needed an estimate for pup survival to November [1], and (b) there are several unresolved methodological issues with estimates of pup survival in [3]. Namely, the data in Table 6.3 of [3] appear to estimate pup survival from the annual averages of pups detected visually in late summer or early fall, then detected again by late winter of the following year but using different methods. Because few pups were marked or individually identifiable and counts are done differently at the start and end points of these observation periods, the annual estimates in [3] do not meet the rigor of [2] with its marked pups. Specifically, the methods of counting are not described in detail as to sampling, validation, or allocation of effort to summer howl surveys. Indeed, howl surveys conducted by experts were experimentally shown to be unreliable in other regions [4]. Also, summer ground and aerial telemetry-based sightings are difficult when trees are in leaf and only an average of 13% of wolf packs had radio-collared animals. By contrast, winter snow tracking relied on age estimation from track size to detect pups for remaining wolf packs'; snow track surveys also varied in effort over time with periodic inclusion of civilian volunteers and some validation of track surveys by agency biologists [5-7]. The comparison of counts done by both civilian volunteers to agency biologists has not been reported formally and transparently. In short, the data in Table

6.3 [3] may be difficult or impossible to reproduce. Nevertheless, estimates in [3] have the advantages of attempting statewide estimates rather than a subpopulation, reflect a larger sample of packs and pups, and provide inter-annual variation rather than variation in time-to-event survival analyses [2]. Therefore, they present an alternative perspective with a narrower distribution and higher mean.

Methods

Here we recalculated our models in [1]. We did not recreate figures in the original but instead provide readers with another estimate of the Wisconsin wolf population in April 2022 based on the realized quota of zero set by court order in November 2021. As in our original paper [1], we estimated the April 2022 wolf population using the traditional census estimate and the newer occupancy model estimate, which provides wider bounds and has a probable right bias to over-estimate the wolf population [8].

Results

The recalculated estimate of the state wolf population outside of tribal reservations in April 2022 was 410 sd 45 (range 317-548, n=3600 iterations). Of 3600 iterations, 365 (10.1%) of the values fell below the 1999 wolf management plan's population goal of 350 wolves outside tribal reservations.

With the greater uncertainty of the newer occupancy model, the values are 648 sd 152 (range 291-1017, n=3600) with 2% crossing the threshold of 350 wolves.

Discussion

There was no measurable risk of lowering the population below the statutory threshold of 251 when the quota was zero. Therefore, the conclusions of the original paper remain the same.

This is the fifth case in which Wisconsin wolf managers (current or retired) did not correct omissions of information or errors in the published, peer-reviewed science promoted by the agency or used by it in policy-making. These omissions or errors have influenced policy and subsequent scientific work on wolves. Few if any of these problems have been disclosed transparently to the public.

The earliest case involved omissions of census methods and omissions and errors in presentation of population dynamics [6, 9]. The second involved misidentified causes of death or omissions of records of wolf mortality and necropsy that led to under-estimation of illegal wolf-killing [10, 11]. The third case involved the inappropriate handling of data on radio-collared wolves. This case involves both the unscientific handling of data on disappearances of radio-collared wolves (ignoring them rather than accounting for them) and also administrative mishandling or refusal to share data relating to radio-collared wolves from 2012 [12, 13]. The fourth case related to the only instance in which a formal correction was published [14]. We applaud the WDNR staff (current and retired) for this healthy step. However, the correction did not undergo anonymous peer review and we found additional concerns in the Correction. We raised our concerns with the editors that claims about wolf pup production in the original and the correction rested on data that do not exist https://faculty.nelson.wisc.edu/treves/archive_BAS/reply%20to%20Correction_preprint.pdf. To our knowledge, [2] has not been corrected with a proper time-to-event analysis and the methods for pup survival [3], have not been described scientifically. Several other scientific articles published by Wydeven or other co-authors rely on those methods. Furthermore, the data in [3]. present different problems affecting accuracy, precision, and bias, which we previously suggested would require correction themselves [6]. See here for a summary of the problems herehttp://faculty.nelson.wisc.edu/treves/pubs/Correction_penultimate.pdf. In sum, Wydeven and Thiel appear to agree that Thiel's estimate of pup survival contains an error and recommend we use instead Wydeven's estimates which we previously analyzed and found wanting. We call for earlier, more rapid, and more transparent disclosure to the public when scientific errors arise and persist in wildlife agency management and policy.

References

1. Treves A, Louchouarn NX. Uncertainty and precaution in hunting wolves twice in a year. PLoS One. 2022; 17(3):e0259604.

2. Thiel RP, Hall W, Heilhecker E, Wydeven AP. A disjunct gray wolf population in central wisconsin. In: Wydeven AP, Van Deelen TR, Heske EJ, editors. Recovery of gray wolves in the great lakes region of the united states: An endangered species success story. New York: Springer; 2009. p. 107-18.

3. Wydeven AP, Wiedenhoeft J, Schultz RN, Thiel RP, Jurewicz RR, Kohn B, et al. History, population growth and management of wolves in wisconsin. In: Wydeven AP, Van Deelen TR, Heske EJ, editors. Recovery of gray wolves in the great lakes region of the united states: An endangered species success story. New York: Springer; 2009. p. 87-106.

4. Palacios V, Font E, García EJ, Svensson L, Llaneza L, Frank J, et al. Reliability of human estimates of the presence of pups and the number of wolves vocalizing in chorus howls: Implications for decision-making processes. European Journal of Wildlife Research. 2017;63:59-66.

5. Wydeven AP, Treves A, Brost B, Wiedenhoeft JE. Characteristics of wolf packs in wisconsin: Identification of traits influencing depredation. In: Fascione N, Delach A, Smith ME, editors. People and predators: From conflict to coexistence. Washington, D. C.: Island Press; 2004. p. 28-50.

6. Treves A, Paquet PC, Artelle KA, Cornman AM, Krofel M, Darimont CT. Transparency about values and assertions of fact in natural resource management. Frontiers in Conservation Science: Human-Wildlife Dynamics. 2021;2:e631998.

7. Wiedenhoeft JE, Boles SR, Wydeven AP, editors. A volunteer carnivore tracking program and its potential use in monitoring the timber wolf (canis lupus) population in northern and central wisconsin. World Wolf Congress 2003: Bridging Science and Community; 2003; Banff, Alberta, Canada.

8. Stauffer GE, Roberts NM, MacFarland DM, Van Deelen TR. Scaling occupancy estimates up to abundance for wolves. The Journal of Wildlife Management. 2021;85(7):1410-22.

9. Chapron G, Treves A. Reply to comments by olson et al. 2017 and stien 2017. Proceedings of the Royal Society B. 2017; 284(1867):20171743.

10. Treves A, Langenberg JA, López-Bao JV, Rabenhorst MF. Gray wolf mortality patterns in wisconsin from 1979 to 2012. J Mammal. 2017;98(1):17-32.

11. Treves A, Artelle KA, Darimont CT, Parsons DR. Mismeasured mortality: Correcting estimates of wolf poaching in the united states. J Mammal. 2017;98(5):1256–64.

12. Santiago-Ávila FJ, Chappell RJ, Treves A. Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in wisconsin, USA. Scientific Reports. 2020;10:13881.

13. Santiago-Ávila FJ, Agan S, W.,, Hinton JW, Treves A. Evaluating how management policies affect red wolf mortality and disappearance. Royal Society Open Science. 2022; 9:210400. .

14. Stenglein J, Van Deelen TR. Correction: Demographic and component allee effects in southern lake superior gray wolves. PLoS One. 2022;17(5):e0269290.