

# NUTRITIONAL ECOLOGY WORKING GROUP

## FALL 2022 NEWSLETTER

VOLUME 4, ISSUE 2



Hello NEWG members,

For the first time in two years, we can look forward to meeting in person at the annual meeting of The Wildlife Society in Spokane. Our meeting will occur from 12-1:30 pm on Wednesday, November 9, 2022, following the NEWG-sponsored symposium “Gold and new methods for determining wildlife diets”. The symposium will feature numerous NEWG members discussing pros, cons, and other lessons learned trying to develop and apply methods to determine composition of wildlife diets. More information on the symposium is provided later in the newsletter.

At the annual meeting, we hope to get your input on a couple of challenges the Board has been trying to tackle recently. First and foremost, we’ve faced significant challenges with recruitment of new officers. I will be stepping down as Chair in November and we have yet to find the next Chair, despite the best efforts of the Nominations and Elections Committee. If you know anyone who is interested (and yes, you can self-nominate), please send an inquiry to [twc.nutritional.ecology@gmail.com](mailto:twc.nutritional.ecology@gmail.com).

In addition to recruitment, we also would like to receive input on finances. While last year’s skills workshop raised some funds, for NEWG we have struggled to identify other revenue streams to help ensure we can meet our goal of supporting our members through travel grants, scholarships, etc. In the same vein, we also need to develop a process to handle and distribute funds in an equitable manner. These points will be primary foci of our annual meeting this year.

The webinar committee also has been hard at work developing another winter webinar series for the NEWG and is still determining the line up. Stay tuned for an update.

While that completes what I have to share on behalf of the board, be sure to check out the exciting announcements elsewhere in the newsletter to see how NEWG is continuing to make an impact and meet our goals.

Kristin Denryter

Chair, Nutritional Ecology Working Group

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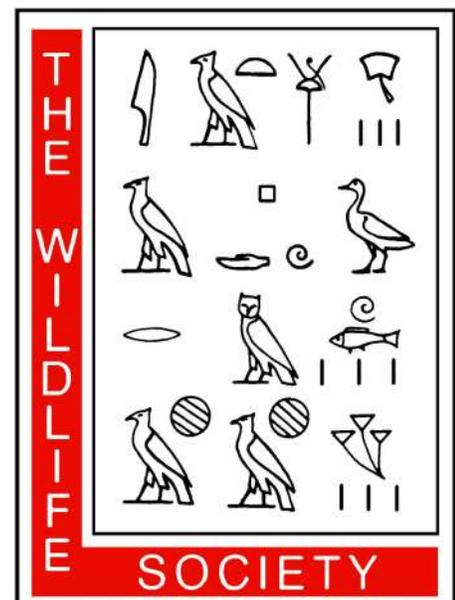
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## ANNOUNCEMENTS & UPCOMING EVENTS

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### SYMPOSIUM FOR TWS 2022

#### Gold and new methods for determining wildlife diets

The foods animals eat are of interest to wildlife managers and researchers, but in many cases, efforts to quantify diet composition have been stymied by methodological limitations. Recent advances in methods for determining diet composition promise to improve our understanding of how much of each dietary item animals are eating, but may not be applicable universally and each method has its own strengths and limitations. In this symposium, we aim to bring together speakers with expertise in a variety of methods for determining diet composition to share their experiences (successes and failures) in trying to apply these methods to study wildlife diets across a variety of ecological settings and taxa.

The goal of the symposium is to provide attendees with a comprehensive overview of the state of the science for wildlife diet composition methods, including an introduction to diet composition and selection, classic and new methods, and case studies that demonstrate the relevance of diet composition to management and conservation. We hope attendees will take away important insights into many of the available methods and considerations for which may be most appropriate to their research questions. Find the speaker line up here: <https://www.xcdsystem.com/tws/program/3fe8AWm/index.cfm>

### SKILLS WORKSHOP

**Mark Your Calendar!** The Nutritional Ecology Working Group is pleased to announce they will be holding a second skills workshop on ‘Measuring Forage Quality and Quantity for Herbivores’ in Kingsville, TX during fall/early winter 2023. As soon as dates have been finalized, we will send out a full announcement with all the important details.



# PUBLICATION ANNOUNCEMENT:

## Sequential detergent fiber assay results used for nutritional ecology research: Evidence of bias since 2012.

WSB pre-print: <https://wildlife.onlinelibrary.wiley.com/doi/10.1002/wsb.1348>

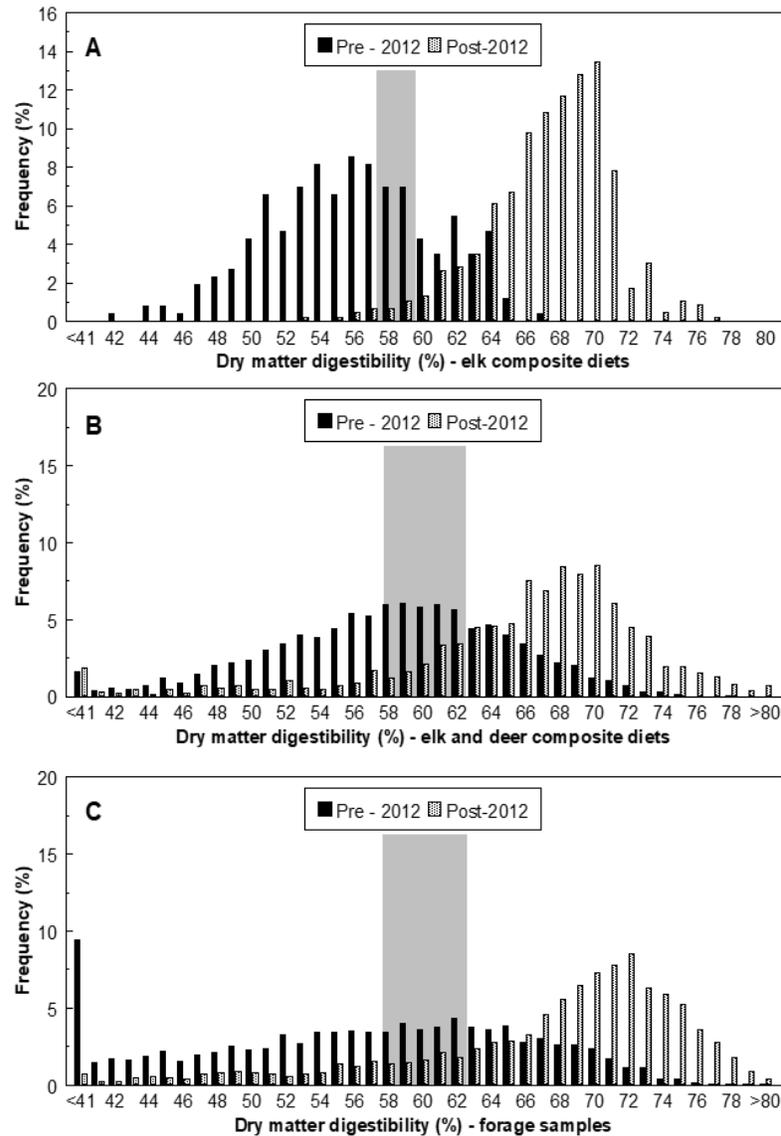
### Key takeaways from the paper:

- We found a substantial overestimation bias in digestibility since 2012 using 36 stockpiled forage samples assayed before 2012 and again after 2012 (assays conducted at WSU) using ANKOMs sequential fiber methodology. The overestimation bias was as high as 31 percentage points, increased as soluble fiber increased, and increased across the 4 fiber steps.
- Using additional data sets ( $n = 12,390$ ) of samples analyzed pre- and post-2012, we again found a significant shift of DMD estimates for single-species and mixed-species forage samples across the WA, ID, OR region (see figure 2), confirming the repeated measures comparison of the original 36 stockpiled samples.
- We evaluated differences between laboratories (WSU versus Dairy One in New York), fiber bag and solution issues, and sample storage length but failed to pinpoint the source of the bias. We found no additional shifts in assay results since 2012 at WSU.
- We compared results pre-2012 to post-2012 and found pre-2012 results to be far more biologically consistent with ungulate performance when compared to ungulate requirements. Thus, we developed correction equations to convert post-2012 fiber results to pre-2012 results.

We also found methodological inconsistencies among labs and evaluated the effect these differences could have on estimated DMD. These issues are particularly important for samples submitted to Dairy One (and other ag-based labs) -- the Supplemental document provides step-by-step instructions for how to get results from Dairy One needed for estimating DMD using methodology of Robbin's et al.

We recommend researchers use our correction equations until a different solution to this issue is found. Because of the increasing extent of bias as fiber levels increase, even relative trends will be impacted. We also strongly recommend researchers critically examine lab results to identify errors and nonsensical results, and that authors present more detail in methods sections of manuscripts when describing estimating digestibility using sequential fiber fractionation (our recommendations are described in the discussion). Laboratories should consider developing a set of stockpiled samples to use as standards as a check on changing assay results in the future. It is critical the samples used for detecting a shift or for justifying a change in methodology or equipment accurately reflect not only the variation in vegetation quality, but also the physical characteristics (e.g., varying mass-specific volume, fiber content) of the vegetation itself (i.e., use a range of >20 native vegetation samples, not feedstuffs like hay or pellets).

Don't hesitate to reach out to Rachel Cook ([rachierae@gmail.com](mailto:rachierae@gmail.com)) should you have any questions.



Comparison of the distribution of forage or composite diet samples collected during the growing season (April–October) and analyzed for dry matter digestibility (%; DMD) either before 2012 or after 2012. A) Composite diet samples collected from elk during August at Starkey Experimental Forest at permanent enclosures each year from 2005 through 2012. Samples collected during 2005–2007 were analyzed by Washington State University (WSU) Wildlife Habitat and Nutrition Laboratory in 2008 whereas samples collected during 2008–2012 were analyzed in 2013 by the same lab. B) elk and deer composite diet samples and C) forage samples collected from a variety of studies across Oregon, Washington, and Idaho during 1998–2019. All methodologies for sample collection and storage were identical and all samples were analyzed identically by WSU. The gray bar represents the approximate DMD requirement for lactating deer and elk during summer.

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## INVITATION TO SUBMIT

Rachel Cook and Lisa Shipley will be guest editing a special issue in the journal *Animals*: **Integrating Nutrition into Management of Large Ungulate Populations**

The aim of this Special Issue is to gather 12–20 articles with state-of-the-art knowledge focused on integrating nutrition into the management of large ungulate populations: successes, failures, or inherent challenges. Both original research papers or well-researched viewpoint or review papers are welcome in this Special Issue. You can find the full announcement at: [https://www.mdpi.com/journal/animals/special\\_issues/OXBJ51O8ON](https://www.mdpi.com/journal/animals/special_issues/OXBJ51O8ON) The deadline for manuscript submissions is October 21, 2023.

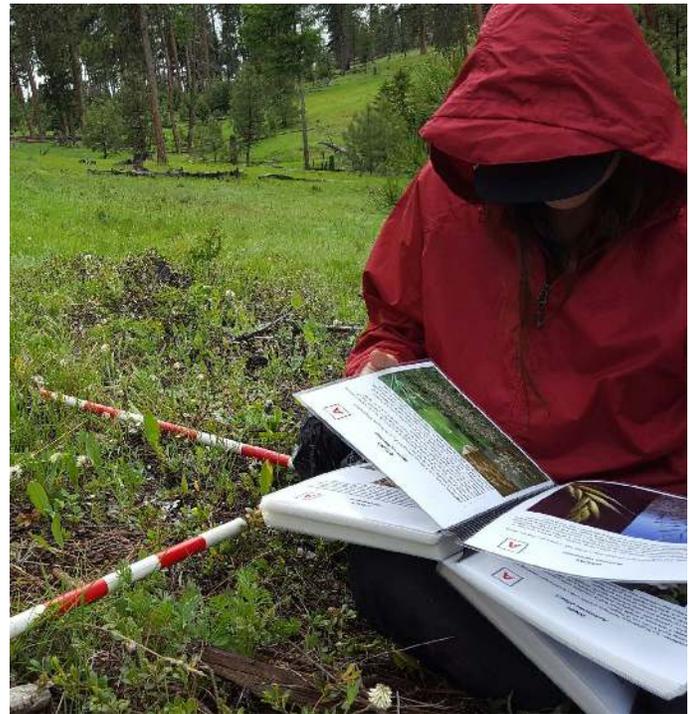
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## LAB ANALYSES FOR NUTRITION WORK

We are still looking for tips and suggestions for our comprehensive list of analyses for nutrition work. We are close to finishing our preliminary list of laboratories in the USA and Canada that offer *in vitro* digestibility assays, bomb calorimetry and sequential fiber analysis, tannin precipitation, etc. and provide a key to help you determine which assays you need and which labs can perform those assays.

If you have some good tips on where you've sent forage samples, please email us at [tw.s.nutritional.ecology@gmail.com](mailto:tw.s.nutritional.ecology@gmail.com) and we'll add them to our list.

**Right:** Sampling forage quality at Starkey Experimental Forest and Range. Photo: Jennifer Merems.



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## NEWG JOURNAL CLUB

The working group's journal club for students and new professionals is back again after taking a break for field work. This group is for anyone interested in discussing emerging technologies and techniques within the nutritional ecology field, as well as discussing the foundational papers and theories that have helped build the field. Our discussions have included DNA metabarcoding and other diet analyses, the effects of nutrition on hibernation, and properly linking plant chemistry to population regulation. Our first meeting will be September 21<sup>st</sup> at 4:30 pm Pacific, please contact the working group for the zoom link. Hope to see you there!



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## RECENT AND RELEVANT LITERATURE

- Brown, C. L., Coe, P. K., Clark, D. A., Wisdom, M. J., Rowland, M. M., Averett, J. P., & Johnson, B. K. (2022). Climate change effects on understory plant phenology: implications for large herbivore forage availability. *Environmental Research: Ecology*.
- Denryter, K., Conner, M. M., Stephenson, T. R., German, D. W., & Monteith, K. L. Survival of the fittest: how body fat and migration influence survival in highly seasonal environments. *Functional Ecology*.
- Graham, C. L., & McWilliams, S. R. (2022). Body composition of American Woodcock during fall staging: A validation of the non-invasive deuterium dilution method. *Journal of Ornithology*, 163(1), 213-222.
- Griffin, L. L., Haigh, A., Amin, B., Faull, J., Norman, A., & Ciuti, S. (2022). Artificial selection in human-wildlife feeding interactions. *Journal of Animal Ecology*.
- Hayes, F. P., Millsbaugh, J. J., Bergman, E. J., Callaway, R. M., & Bishop, C. J. (2022). Effects of willow nutrition and morphology on calving success of moose. *The Journal of Wildlife Management*, 86(2), e22175.
- Hogan, H. R. H., Hutzenbiler, B. D., Robbins, C. T., & Jansen, H. T. (2022). Changing lanes: seasonal differences in cellular metabolism of adipocytes in grizzly bears (*Ursus arctos horribilis*). *Journal of Comparative Physiology B*, 192(2), 397-410.
- James, N. L., Bond, M. L., Ozgul, A., & Lee, D. E. (2022). Trophic processes constrain seasonal ungulate distributions at two scales in an East African savanna. *Journal of Mammalogy*.
- Monzingo, D. S., L. A. Shipley, R. C. Cook, and J. G. Cook. (2022). Factors influencing predictions of understory vegetation biomass from visual cover estimates. *Wildlife Society Bulletin*, e1300.
- Moore, S. E., Clarke, J. T., Okkonen, S. R., Grebmeier, J. M., Berchok, C. L., & Stafford, K. M. (2022). Changes in gray whale phenology and distribution related to prey variability and ocean biophysics in the northern Bering and eastern Chukchi seas. *PloS one*, 17(4), e0265934.
- Pierrat, J., Bédier, A., Eeckhaut, I., Magalon, H., & Frouin, P. (2022). Sophistication in a seemingly simple creature: a review of wild holothurian nutrition in marine ecosystems. *Biological Reviews*, 97(1), 273-298.
- Priyadarshini, K. V. R., Gort, G., Rice, C. G., & Yoganand, K. (2022). The reproductive phenology of blackbuck: influence of seasonal nutritional resources and flexible lactation as an adaptive strategy. *Journal of Zoology*, 316(1), 11-23.
- Robbins, C. T., Tollefson, T. N., Rode, K. D., Erlenbach, J. A., & Ardente, A. J. (2022). New insights into dietary management of polar bears (*Ursus maritimus*) and brown bears (*U. arctos*). *Zoo Biology*, 41(2), 166-175.
- Roelandt, C. M., Roth, A. M., McWilliams, S. R., & Witt, J. C. (2022). Measuring circulating triglycerides in free-living birds: evaluation of a field-usable point-of-care analyzer for American woodcock. *Journal of Ornithology*, 163(1), 235-241.
- Shamon, H., Boyce, A. J., Kunkle, K., & McShea, W. J. (2022). Unique utilisation pattern responses of five sympatric ungulates to local phenological gradients. *Wildlife Research*.
- Shepstone, C. A., Meissner, H. H., Van Zyl, J. H. C., Lubout, P., & Hoffman, L. C. (2022). Metabolizable energy requirements, dry matter intake and feed selection of sable antelope (*Hippotragus niger*). *South African Journal of Animal Science*, 52(3), 326-338.
- Smiley RA, LaSharr TN, Abernathy HN, Shakeri YN, Levine RL, Rankins ST, Jakopak RP, Rafferty RT,...& Monteith K.L.(2022). Biomarkers of Animal Nutrition: From Seasonal to Lifetime Indicators of Environmental Conditions. *Life*, 12(3):375.
- Smiley, R. A., Wagler, B. L., LaSharr, T. N., Denryter, K. A., Stephenson, T. R., Courtemanch, A. B., ... & Monteith, K. L. (2022). Heterogeneity in risk-sensitive allocation of somatic reserves in a long-lived mammal. *Ecosphere*, 13(7), e4161.
- Smith, T. S., Derocher, A. E., Mazur, R. L., York, G., Owen, M. A., Obbard, M., ... & Amstrup, S. C. (2022). Anthropogenic food: an emerging threat to polar bears. *Oryx*, 1-10.
- Snobl, L. A., Proffitt, K. M., & Millsbaugh, J. J. (2022). Wildfire extends the shelf life of elk nutritional resources regardless of fire severity. *Ecosphere*, 13(7), e4178.
- Vales, D. J., R. M. Nielson, and M. P. Middleton. (2022). Black-tailed deer seasonal habitat selection: accounting for missing global positioning system fixes. *Journal of Wildlife Management*, e22305.

**Have you recently published on nutritional ecology? [Send us a link](#) to your article to be included in the next newsletter!**