

COM(P)ADRE News

Quarterly newsletter for **COMPADRE** and **COMADRE**

SPRING 2020

FROM THE COORDINATOR

Looking ahead: COM(P)ADRE in 2020 and beyond

If you're like me, you like a good story—maybe a good story about a wolf, or, if you're here, maybe a good story about a demographer and a wolf—but *telling* good stories doesn't always come easy to those of us with research-oriented backgrounds. Maybe rightfully so given that we are trained to condense our writing into concise, quickly digestible packets following the standard Introduction - Methods - Results - Discussion format. Nonetheless, as communicators of science, we *should* be telling our stories, and not just stories about the organisms and systems with which we work, but also stories about ourselves—our successes, our struggles, and why we come back to it every day.



We've got many exciting changes coming to COM(P)ADRE in 2020, and one of those closest to me is the way we communicate with you, our dear users, and our community of demographers. Our newsletter will still provide the same updates it has in the past—lists of recent publications, upcoming workshops, and announcements—but we will also spend more time highlighting the amazing work folks are doing with these data, as well as highlighting the people who make our endeavors worthwhile. In the time between issues, we'll be posting more regular updates to our social media and engaging with users there, so be sure to follow us!

I hope to meet and engage with many of you in the coming year, and, most importantly, I look forward to hearing your stories.

Cameron C. Thomas, Research Coordinator



The ways in which demographic rates in mammals respond to climate change are complex and highly variable, which will affect assessments of population viability for species threatened with extinction. Learn more about what our Core and Science Committee members and their collaborators are working on in their preprint on [bioRxiv](#)!

(Photo: Cameron C. Thomas, Lincoln Park Zoo)

Have a knack for plant and animal photography? We'd love to showcase your photos in the newsletter! Contact news@compadre-db.org for details.





FAREWELL AND BEST WISHES

Haydée Hernández-Yáñez

Our former Research Coordinator, Haydée Hernández-Yáñez, has moved into a new position as the eMammal Data Manager at the Smithsonian Conservation Biology Institute in Virginia. Haydee served as our coordinator from 2018-2019 during the start of the Excel-to-SQL database migration, working closely with members of our Core Committee, our website/database developers, and other members of our team responsible for digitizing and error checking data. Her efforts in this endeavor, as well as her punctilious compiling of training materials and notes, expedited the process of completing the database transition this spring.

In addition to overseeing our database transition, Haydée trained new members of our digitization team, including our Featured Team Member for this edition, improved our training materials, digitized—and oversaw the digitization of—many species into the databases, and held workshops on COMPADRE and COMADRE here in the US and internationally.

Haydée's current role involves outreach, IT support, maintenance, and overall improvements for SCBI's eMammal program, which manages and archives camera trap data collected by researchers and citizen scientists all over the world. These data help address important conservation questions about imperiled mammals. To find out about ongoing camera trap projects or to get involved, check out the SCBI's eMammal project page [here](#).



Haydee giving a presentation on matrix population models at [NACCB Toronto](#) in 2018.

ANNOUNCEMENT

Public release of new database versions in May 2020!

For more than a year, our team has been working diligently to make major improvements to COMPADRE and COMADRE. Most notably, we've converted our databases from Excel-based to SQL-based objects. Now complete, our new system has significantly improved the digitization process by streamlining data entry, minimizing instances of errors while standardizing error checking and correction, and generating automatic version releases.

Starting in May 2020, new versions of the databases will be released every month, and version numbers will have a new format: X.YY.MM.Z where X indicates the major version, YY indicates the two-digit release year, MM indicates the release month (1-12), and Z indicates inter-release patches to the databases (starting with 0).

[Download COMPADRE 6.20.5.0](#)

[Download COMADRE 4.20.5.0](#)

Older versions of the COMPADRE and COMADRE databases can be found [here](#).

Explore data. Find resources. Connect with us.

The COM(P)ADRE website has been updated! Read about our latest updates below Recent Publications!

compadre-db.org

ANNOUNCEMENT

Online workshops in 2020

Due to the COVID-19 pandemic, we're limiting in-person workshops in 2020, but our team is committed to providing access to training opportunities and materials for COMPADRE and COMADRE users. We plan on developing online training materials which—once complete—will be available on the website. We may also host an online workshop through [ESA](#) or an alternate platform where attendees can interact with us while learning how to navigate the databases and use features in Rcompadre.

Look out for more updates in our [blog](#), social media, and the summer newsletter!

FEATURED COM(P)ADRE USER

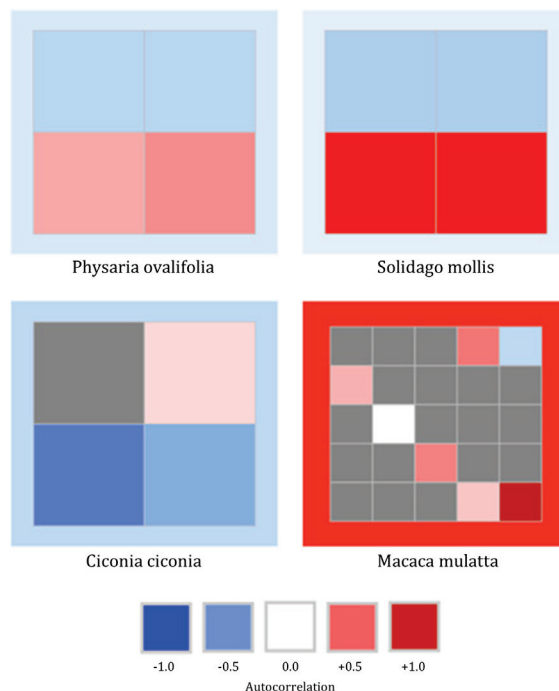
Julia A. Pilowsky

Julia is a PhD student at both the University of Adelaide in Australia and the University of Copenhagen in Denmark. In her joint program, she studies range dynamics of Northern Hemisphere megafauna from the last glacial maxima to the present. Her work involves large-scale population simulation using many datasets. Julia has been interested in geospatial modelling and conservation since her post-baccalaureate internship at the Archbold Biological Reserve in Florida, where she studied spatial dynamics of Florida scrub jays. From there, she went on to study behavior and invasion ecology of the European paper wasp, *Polistes dominula*, at Tufts University,

where she learned a lot about demographic modelling from Elizabeth Crone, a member of our COM(P)ADRE Science Committee! Prior to her current position, Julia participated in the European Doctoral School of Demography program through the Max Planck Institute for Demographic Research, where she met several of our Core and Science committee members!

Her recent *Oikos* publication with Johan Dahlgren debuts a new R package ([colorednoise](#)), which generates stochastic matrix population projections to analyze temporal autocorrelation in long-term demographic data. She and Johan used the COM(P)ADRE databases to demonstrate the utility of their new package.

We tried out *colorednoise* for ourselves, and we loved it! Pulling data from COMPADRE and COMADRE to generate autocorrelation values was straightforward, and the package integrates well with *ggplot2* for creating colored noise figures. The criteria for estimating temporal autocorrelation necessitates a longer time series, so it doesn't work well with many of the shorter studies. That said, it's an incredible tool for longer time series data, and we definitely recommend trying it out for yourselves!



Colored noise in four example species from three taxonomic groups, herbaceous perennials, birds, and mammals.

FEATURED TEAM MEMBER

Caroline R. P. Schuette

Caroline is a member of our digitization team at Lincoln Park Zoo and has been with us since August 2019. She received a BA in Biology and Earth Science from Northwestern University in 2018, and her study focus was on paleoclimate shifts during the Cretaceous period. Caroline's contributions as a member of our team cannot be overstated. Database conversions like the one we've been working through this past year can be fraught with growing pains in the form of missing, erroneous, and otherwise problematic data. In every step of the error checking and correction process, Caroline demonstrated meticulous attention to detail, a

thorough understanding of conversion issues and how to correct them, and a willingness to take the lead on corrective actions. We would not be releasing COMPADRE 6 and COMADRE 4 this month without Caroline on our team.

Caroline remains interested in climatic shifts, especially relative to anthropogenic climate change and its direct and indirect effects on marine mammal populations. She plans on pursuing a PhD in Ecology or a related field, and we're excited see where Caroline's career takes her.



COM(P)ADRE publications since the last newsletter



Paniw M, James T, Archer CR, Römer G, Levin S, Compagnoni A, Chi-Castaldo J, Bennett JM, Mooney A, Childs DZ, Ozgul A, Jones OR, Burns JH, Beckerman AP, Patwary A, Sanchez-Gassen N, Knight TM, Salguero-Gómez R (2019) Global analysis reveals complex demographic responses of mammals to climate change. *bioRxiv* <https://doi.org/10.1101/2019.12.16.878348>

Abstract: Approximately 25 % of mammals are threatened globally with extinction, a risk that is amplified under climate change. Persistence under climate change is determined by the combined effects of climatic factors on multiple demographic rates (survival, development, reproduction), and hence, on population dynamics. Thus, to quantify which species and places on Earth are most vulnerable to climate-driven extinction, a global understanding of how demographic rates respond to climate is needed. We synthesise information on such responses in terrestrial mammals, where extensive demographic data are available⁴. Given the importance of assessing the full spectrum of responses, we focus on studies that quantitatively link climate to multiple demographic rates. We identify 106 such studies, corresponding to 86 mammal species. We reveal a strong mismatch between the locations of demographic studies and the regions and taxa currently recognised as most vulnerable to climate change. Moreover, we show that the effects of climate change on mammals will operate via complex demographic mechanisms: a vast majority of mammal populations display projected increases in some demographic rates but declines in others. Assessments of population viability under climate change therefore need to account for multiple demographic responses. We advocate to prioritise coordinated actions to assess mammal demography holistically for effective conservation worldwide.



Paniw M, Childs D, Armitage KB, Blumstein DT, Martin J, Oli MK, Ozgul A (2020) Assessing seasonal demographic covariation to understand environmental-change impacts on a hibernating mammal. *Ecol Lett* 23:588-597. <https://doi.org/10.1111/ele.13459>

Abstract: Natural populations are exposed to seasonal variation in environmental factors that simultaneously affect several demographic rates (survival, development and reproduction). The resulting covariation in these rates determines population dynamics, but accounting for its numerous biotic and abiotic drivers is a significant challenge. Here, we use a factor-analytic approach to capture partially unobserved drivers of seasonal population dynamics. We use 40 years of individual-based demography from yellow-bellied marmots (*Marmota flaviventer*) to fit and project population models that account for seasonal demographic covariation using a latent variable. We show that this latent variable, by producing positive covariation among winter demographic rates, depicts a measure of environmental quality. Simultaneously, negative responses of winter survival and reproductive-status change to declining environmental quality result in a higher risk of population quasi-extinction, regardless of summer demography where recruitment takes place. We demonstrate how complex environmental processes can be summarized to understand population persistence in seasonal environments.



Pilowsky JA, Dahlgren JP (2020) Incorporating the temporal autocorrelation of demographic rates into structured population models. *Oikos* 129:238-248. <https://doi.org.proxy.cc.uic.edu/10.1111/oik.06438>



Abstract: Population dynamics are typically temporally autocorrelated: population sizes are positively or negatively correlated with past population sizes. Previous studies have found that positive temporal autocorrelation increases the risk of extinction due to ‘inertia’ that prolongs downward fluctuations in population size. However, temporal autocorrelation has not yet been analyzed at the level of life cycle transitions. We developed an R package, colorednoise, which creates stochastic matrix population projections with distinct temporal autocorrelation values for each matrix element. We used it to analyze

long-term demographic data on 25 populations from the COMADRE and COMPADRE databases and simulate their stochastic dynamics. We found a broad range of temporal autocorrelation across species, populations and life cycle stages. The number of stage-classes in the matrix strongly affected the temporal autocorrelation of the growth rate. In the plant populations, reproduction transitions had more negative temporal autocorrelation than survival transitions, and matrices dominated by positive temporal autocorrelation had higher extinction risk, while in animal populations transition type was not associated with noise color. Our results indicate that temporal autocorrelation varies across life cycle transitions, even among populations of the same species. We present the colorednoise package for researchers to analyze the temporal autocorrelation of structured demographic rates.



Podolskiy D, Avanesov A, Tyshkovskiy A, Porter E, Petrascheck M, Kaeberlien M, Gladyshev VN (2020) The landscape of longevity across phylogeny. *bioRxiv* <https://doi.org/10.1101/2020.03.17.995993>

Abstract: Lifespan of model organisms can be extended by genetic, dietary and pharmacological interventions, but these effects may be negated by other factors. To understand robustness of longevity interventions within and across species, we analyzed age-dependent mortality of yeast, fruit flies, nematodes and mice subjected to thousands of genetic, pharmacological or dietary interventions, and applied the principles learned to other organisms. Across phylogeny, the accessible space of lifespan distribution functions, the “landscape of longevity”, has a distinct structure of a fiber bundle, with individual fibers given by Strehler-Mildvan degeneracy manifolds. Within species, most interventions perturb parameters of survival curves along particular degeneracy manifolds. Transitions across manifolds are difficult to achieve, but they may lead to robust lifespan-modulating effects. Analyses of intraspecific degeneracy manifolds revealed soft bounds on achievable longevity. For humans, this bound is ~138 years.

Did we miss you?

We're proud of the amazing work our users are doing with COMPADRE and COMADRE. If we missed your publication or presentation, please reach out to news@compadre-db.org to be featured in our upcoming newsletter!

ANNOUNCEMENT

COM(P)ADRE website updates

Our [website](#) has had a makeover! While the overall structure of the site should be familiar to our regular users, we have made some minor tweaks to many of the pages as well as our navigation scheme. Our [blog and social media](#) feeds are now condensed into one page, where you'll be able to find updates on the databases, important announcements, and news about upcoming website features. We've also updated the text for most of the site and added a resources tab with a helpful users guide, the Rcompadre package, and Iain Stott's ShinyPop webapp for visualizing matrix data and projections from COM(P)ADRE.

We're especially excited about our upcoming features! Starting mid-2020, users will be able to upload their own data to COMPADRE and COMADRE!!! The process will be similar to the [protocol](#) used by our digitization team. Our team is also putting together online training materials to teach fundamentals of working with the databases and the Rcompadre package. Once complete, these materials will be available to users under the resources tab. Follow our social media to be notified as soon as these features are available.



(Photo: Cameron C. Thomas, Lincoln Park Zoo)



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Doing cool stuff with COM(P)ADRE?

We'd love to promote your
projects in the newsletter!

Let us know what you're up
to at news@compadre-db.org

