

CPN Newsletter



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Diversity, Equity, and Inclusion Statement:

The CPN upholds a commitment to diversity, equity, and inclusion as a core value. We seek to build on this commitment by striving to create an inclusive community whose members represent diverse cultures, backgrounds, career stages, and life experiences. This commitment is critical to strengthening our relevance, credibility, and effectiveness within the field of conservation paleobiology and broader STEM community. Through these efforts, we strive to transform the field in practice, while diversifying the face of conservation paleobiology for the future.



Supported by RCN-NSF
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Introducing Manoomin - Psin - *Zizania* Working Group

Lead Principal Investigator: Amy Myrbo, Science Museum of Minnesota

Led by Native American resource managers, we are convening a working group across 20+ tribal entities in the north-central United States, with the goal of building consensus around the use of sedimentary ancient DNA (sedaDNA) to detect deep-past and recent populations of wild rice (manoomin in Ojibwe, psin in Dakota, *Zizania palustris* and *Z. aquatica*) using lake sediment cores. Wild rice is a valuable traditional food, and is of extremely high cultural and spiritual importance to many Indigenous people of the Laurentian Great Lakes region. For this reason, any research involving wild rice must be tribally led, and outcomes designed to benefit the tribes. We will provide specific guidance from these sovereign Nations to other stakeholder groups, academic researchers, and agencies on any agreed-upon restrictions on the utilization of sedaDNA of wild rice, as well as tribal priorities for the application of this technique.

Wild rice is threatened by environmental degradation due to industrial processes and agriculture, so its protection can be a contentious regulatory and political issue in Minnesota, Wisconsin, and Michigan, involving tribal, state, and federal agencies. The wild rice paleorecord has tremendous potential for detecting and tracking past changes in wild rice distributions. Until recently, however, proxies for wild rice were either ineffective (pollen, seeds), or low-throughput and thus not scalable to region-wide use (phytoliths). SedaDNA would supplement Indigenous ecological knowledge and Western scientific findings to inform conservation, management, designation for protection, and the enhancement of cultural and historical records.

For more information and updates: <https://conservationpaleorn.org/manoomin-psin-zizania-working-group/>

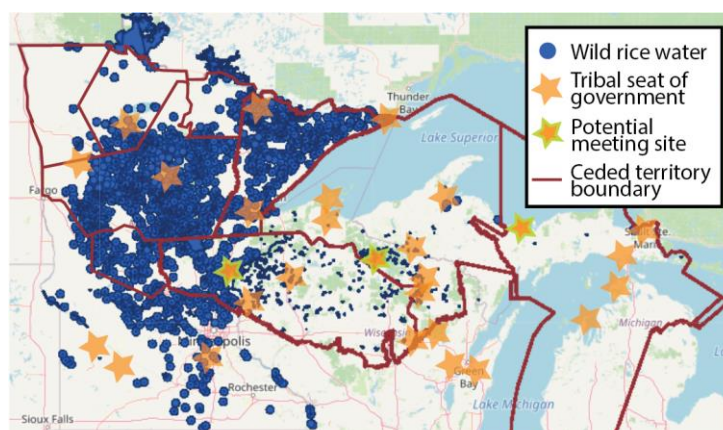


Fig. 1 The remaining region where wild rice grows naturally in the U.S. Stars represent the minimum list of tribes who should be engaged in the meetings proposed here. Basemap and wild rice waters courtesy of the Great Lakes Indian Fish and Wildlife Commission.

What are CPN Working Groups?

The network sponsors Working Groups focused on research questions that integrate conservation paleobiologists, academic partners, wildlife managers, and stakeholders to develop effective strategies for translating products of historical research into conservation and management actions. The Working Group panel oversees solicitation, selection, development, and assessment of Working Groups.

Conservation Paleobiology Research Highlight

By Dr Jyoti Srivastava, Birbal Sahni Institute of Palaeosciences, Lucknow, India

Role of palynomorph assemblages from a mangrove wetland in paleoenvironmental reconstruction

Palynomorph assemblages strongly reflect the local/regional vegetation and environmental conditions, providing useful analogs for paleoecological reconstruction in estuarine deposits. On the southeast coast of India, the Coringa mangrove wetlands have surface sediments with modern palynomorph assemblages, which this study characterizes, and correlates to the physicochemical and salinity data that allow observation of relationships between them. The ordination (detrended correspondence analysis) of palynological and physicochemical data indicates an oligohaline trend in Coringa mangrove wetland from 1.1 to 3.0 PSU from north (Ramannapalem) to south (Gadimoga). The mixing of estuarine water during the rainy season along the channel margins produce high palynomorph deposition coupled with lower salinity levels, whereas the mudflats along the transect exhibits lower plant pollen diversity and higher total dissolved solids than is common for a coastal wetland ecosystem. Occurrence of scrubby halophytic plants in the upper saltmarsh and oligohaline-freshwater plants in low tidal salt marshes is the ideal zonation pattern indicating a localized influence of freshwater conditions. The zone spanning Latitude 16°52'26.57" N–16°48'37.06" N and Longitude 82°14'33.36" E–82°19'1.78" E at an altitudinal gradient of 0.5–7m above mean sea level (MSL) spanning 58.7 km² area is an example of a wetland environment with a salinity range of 1.1 to 1.8 PSU and abundance of true mangroves and mangrove-associated plant species. The zone within Latitude 16°47'23.24" N–16°45'57.75" N and Longitude 82°17'02.19" E–82°19'50.51" E at an altitudinal gradient of 3–8m above MSL spanning

23.6 km² area is a standard example of a salt marsh with a salinity range of 2.4 to 3.0 PSU and dominance of salt-tolerant *Suaeda* sp. and mangroves like *Avicennia* and *Excoecaria agallocha*, which reveals restricted influence of freshwater discharges. The Palynomarine Index reveals limited tidal inundation on the southern side of the wetland due to the transformation of mangrove forests to salt marsh and paddy fields. Thus, in coastal wetlands, paleoecological reconstructions from palynological analyses of past sediments needs careful consideration, as distinguishing palynomorph assemblages and surface sediments in salt marsh environments can be challenging.

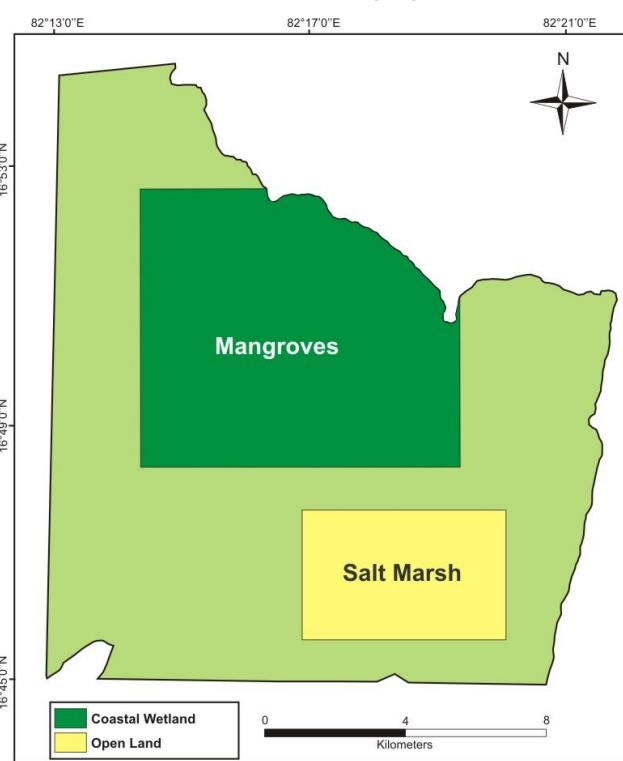


Figure 1. Based on the relationship between palynomorphs and physicochemical parameters such as substrate salinity, sand, silt and clay proportion, the Coringa wetland has been divided into two zones.

For more details see article by Srivastava et al. (2021) in *Wetlands Ecology and Management*: <https://doi.org/10.1007/s11273-021-09803-x>

Practitioner Perspective *Interview by Alexis Mychajliw*

Featured Practitioner: Ellie Armstrong

Ellie Armstrong is a conservation biologist who uses genomic and bioinformatic tools to support the management of mammalian carnivores. She recently completed her PhD at Stanford University and is now a Washington Research Foundation postdoctoral research fellow at the University of Washington School of Biological Sciences, where she collaborates with the US Fish & Wildlife Service (USFWS) on managing brown bears, wolverines, and pumas in the Pacific Northwest. She is also a member of the IUCN Cat Specialist Group's African Lion Working Group. As the Scientific Advisor for the non-profit Tigers in America, she is known for her expertise on tiger genomics and regularly speaks out against captive tiger abuse and trafficking in the United States.



Photo caption: Ellie on field work in Botswana in 2018.

1. A central line of your work is detecting the loss of genetic diversity in carnivores, many of which once had larger ranges and population sizes. How have you incorporated historical collections into this research?

We are using museum specimens from the Smithsonian to contextualize the status of present-day African lion populations in Kenya. From 1909-1910, Theodore Roosevelt led an expedition to eastern Africa with the goal of collecting flora and fauna to fill the newly minted Smithsonian museum, and came back with 59 lions. Using DNA extracted from these specimens, we can compare historical to modern genetic diversity of lion populations in the same geographic area and learn broader lessons about the maintenance of genetic diversity over time.

2. Given the population size reductions, could this historical genetic diversity also be used to inform reintroduction or translocation options?

There currently are reintroductions ongoing for lions and other large mammals in Africa, with most of the individuals coming from semi-captively managed metapopulations in South Africa. But enacting these reintroductions within a historic context is something we all struggle with from a conservation standpoint: what is the baseline we are trying to return to, and is it even feasible from a modern standpoint? We also need to ask ourselves whether we should be reintroducing individuals from genetic lineages similar to historic populations or whether individuals from these metapopulations are suitable given the risks of genetic homogenization. That's why the historic context is so important: it helps us ask these questions in the first place.

3. What other techniques from ancient/historical DNA have translated for wildlife management?

There are actually more overlaps than you might think, because the key characteristic of ancient and historical DNA is that the DNA is fragmented, and from a non-invasive wildlife monitoring perspective, we also deal with a lot of fragmented DNA in the form of feces, trophy hides, saliva, and other degraded samples. We have been developing a genetic panel similar to what 23andMe uses for humans to query your ancestry, except in this case we are assigning ancestry for captive tigers in the United States of unknown lineages and to determine the source of items confiscated by USFWS. Panels are great for degraded DNA since you are targeting specific regions, rather than trying to amplify the whole genome.

Practitioner Perspective continued...

4. Using these new tools, what have been some of your favorite discoveries?

My continuous favorite discovery is being able to tell big cat sanctuaries more about the ancestry of the animals they have rescued. These individuals are rescued from situations where we don't know what subspecies of tiger they are, or even whether they are related to the other individuals rescued from the same facility. While this is not an academic output per se, it is a meaningful discovery to me and to the people who care for these cats.

5. What has it been like working with Tigers in America while completing your PhD?

The non-profit organization Tigers in America focuses on rescuing big cats from situations like (or, exactly from) the TV series "Tiger King". I use the genetic data I generate to help inform decisions about tigers in captivity. This has been an important experience for me as a developing scientist to learn how to navigate emotionally difficult situations. There is a lot of emotion around these cats given the terrible situations they come from, and while there is a tendency in science to try to divorce ourselves from the welfare of any individual animal, it is not necessarily always possible in reality. As a scientist I've been continually learning how to marry scientific analyses with the real-world impacts of the data on these animals.

6. You've been interviewed for many popular news articles about Tiger King. What is one of the most important takeaways about tigers in captivity you want us to know?

If you see captive tigers, there are really some obvious signs that something wrong is happening that you can look for, such as an excess number of cubs or contact with the cats/photo ops. Don't be afraid to reach out if you see a problem or think there is an animal in distress.

7. What is your favorite fossil?

There is a cluster of unidentified big cat (genus *Panthera*) fossils in Europe and I like the set of them because we just can't tell what they are. People have gone back and forth – are they jaguars, lions, this, or that? Because of this ambiguity, the origins of the big cat clade are shrouded in mystery, and we can't yet calibrate that part of the tree. Also, those fully intact Siberian cave lions are pretty amazing too!

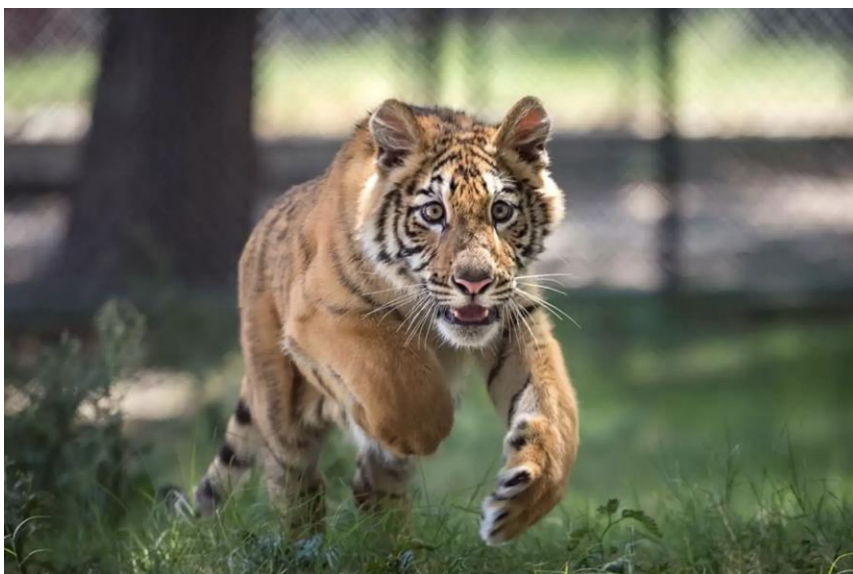


Photo caption: "The Duffel Bag cub" also known as Kenobi from In-Sync Exotics. A great profile of his story from the Dodo is here: <https://www.thedodo.com/in-the-wild/rescued-tiger-cub-kenobi-animal-friendship>. Photo Credit: In-Sync Exotics.

Student Section

Introducing the Student Panel's newest members!

The Student Panel would like to thank Jonathan Cybulski, Niklas Hohmann, Hannah Kempf, Meaghan Efford, Sage Vanier, Alessandria Testani, Gabriela Serrato Marks, and Kristin Oliver for their service and valuable contributions to developing student activities within the network over the past year and a half. Their hard work has helped grow the both panel and broader student community. In particular, we'd like to recognize Jonathan Cybulski, who helped lead the panel as co-chair, and welcome Broc Kokesch as the new co-chair.

The panel has now transitioned to an application-based system to recruit new members. If you are interested in joining our team, there will be a call for applications twice per year in the fall and spring. There are also opportunities to assist with panel activities in a supporting role. We will have periodic calls for volunteers as needed, so keep an eye out for those opportunities or contact students.cpn@gmail.com if you're interested in getting involved.

Finally, we'd like to extend a big welcome to the three new members who joined the Student Panel this January:

Jay Cooney (he/him) – Science Communication Committee Chair, MS Student, University at Buffalo

I am trained in interdisciplinary conservation science, with my current research focusing on noninvasive methods for monitoring deer. My interests revolve around the spectrum of human-wildlife relationships throughout time, and the restoration of those fractured by colonialism. As a passionate writer, I aspire to develop a career in science communication related to social-ecological systems, especially to support Indigenous land reclamation. In my free time, I enjoy hunting, birding, and backpacking. Please contact me (jaycoone@buffalo.edu) if you have ideas for the CPN student blog!



Julia Schap (she/her) – Student Networking and Conference Activities Chair, PhD Student, Georgia Institute of Technology

My research focuses on understanding the varied responses of past small mammal communities to prolonged drought events over the last 25,000 years in an effort to better understand how modern communities might respond to current and future droughts. I am passionate about conservation and showing young girls that there is a place in the sciences for them. Outside of the lab, I enjoy fitness, hiking, visiting local coffee shops, and hanging out with friends. I am excited to join the team as the new student networking and conference activities chair! If you have any questions or suggestions, you can reach me at jschap3@gatech.edu or on Twitter at [@juliaschap](https://twitter.com/juliaschap)!



Student Section continued...

Xavier Jenkins (he/him) – Working Groups Panel, PhD Student, Idaho State University

I am interested in macroevolutionary forces driving the evolution of early reptiles, and in particular how ecological and functional transitions may have influenced their diversity in the Permian and Triassic. I am also the Senator of Graduate Studies in Idaho State University student government. In my spare time, you can find me playing tabletop games with my friends or hanging out with my six-month old daughter. I am super excited to work as the Working Groups student representative this year!



Paleo Proxy Spotlight – Shark Tooth Isotopes *by Darja Dankina*

In this feature of our newsletter, we shine the spotlight on one type of paleo proxy in each issue.

What is a proxy?

Understanding past life on Earth is of great interest and importance to humanity. Since we cannot travel back in time to see what really happened, we must rely on proxies to measure past temperature and other paleoenvironmental conditions. Proxies allow us to “read” these conditions using the ancient geological material. A proxy is something that can serve as a substitute for another thing which is absent or cannot be measured directly. In any discipline involving researching the past, proxies can be used to reconstruct something long after the original thing is gone. The most widely applied proxy in studying paleoenvironment or past climate change are stable isotopes.



Photo caption: Shark's teeth. Free domain image

Importance of isotopes as a proxy in conservation

paleobiology: It is very common to use isotope analysis in geochemistry, petrology, sedimentary geology and other disciplines. How can we use isotopic dating to address questions about life in the past? Below are two examples:

Fischer et al. (2013) answered some questions about paleoenvironment and paleoecology by dating the oxygen and strontium isotopes from Late Palaeozoic shark teeth.

The oxygen and strontium isotopic composition of biogenic fluorapatite in the fossil shark remains (*i.e.* teeth, scales, and spines) were used as ecological tracers for the freshwater or euryhaline ichthyofaunal inhabitants.

Also, it is possible to adopt U-Pb dating for analyzing the fossil teeth of paleosharks. According to Sano and Terada (1999), dating the dentine of fossil teeth using the Sensitive High Resolution Ion Micro Probe (SHRIMP) instrument could indicate U-Pb isochron age and suggest an early diagenetic age of the fossil in its sedimentary sequences.

References: 1) Fischer, J., Schneider, J.W., Voigt, S., Joachimski, M.M., Tichomirowa, M., Tütken, T., Götze, J. and Berner, U. 2013. Oxygen and strontium isotopes from fossil shark teeth: environmental and ecological implications for Late Palaeozoic European basins. *Chemical Geology*, 342, pp.44-62. 2) Sano, Y. and Terada, K. 1999. Direct ion microprobe U–Pb dating of fossil tooth of a Permian shark. *Earth and Planetary Science Letters*, 174(1-2), pp.75-80.

Postcards from the Field

In this feature of our newsletter, we showcase members' research in the field, lab, or other setting.

Please submit your "postcards" with approximately 100 words of text to us at conservationpaleo@floridamuseum.ufl.edu

Submissions might also be featured as blog and social media posts. Thank you in advance for your contributions!

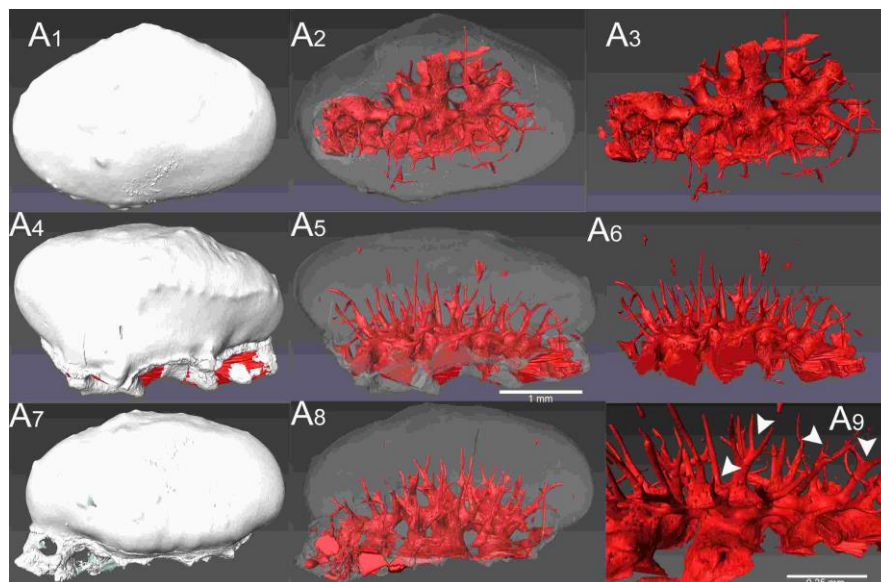
Dr. Darja Dankina, Vilnius University, Vilnius, Lithuania

I am Darja and I recently successfully defended my PhD dissertation "Late Permian Fish from Baltic States and Poland: Taxonomy, Palaeoecology, and Biostratigraphy" at Vilnius University.

The novelty of the present study are the detailed taxonomic analyses of late Permian fish from the easternmost part of the Zechstein Basin. Palaeoecological features of the distribution of fish abundance revealed water level microfluctuations in the eastern part of the Zechstein Sea. The current results showing the favourable conditions for fish living in the study area during the first and strongest Zechstein transgression.

The detailed analyses of fish from the Kūmas, Karpėnai and Nowy Kościół quarries were distinguished during the biostratigraphical study of the Latvian-Lithuanian-Polish Upper Permian sedimentary sequences that will enable the taxonomic correlation of regional sections with the central and western part of the Zechstein Basin with the information about global distribution of fish in other European and Chinese Basins.

Histological and tomographic analyses together with 3D models implemented the late Permian fish detailed inner structure from the easternmost part of the Zechstein Basin for the first time. Also, here was revealed the morphological significance of osteichthyans and chondrichthyans dermal denticles and teeth, which demonstrated fish diet and their body functional characteristics.



Postcards from the Field continued...

Emma Norton, Middlebury College, Vermont USA

I'm Emma and I am an undergraduate researcher working in Dr. Alexis Mychajliw's HEDGE (Holocene Ecology, Global Diversity, and Extinctions) Lab at Middlebury College. Currently, I am conducting a project comparing environmental DNA (eDNA) metabarcoding to camera trapping for mammal diversity in Vermont (VT). Here I am, along with fellow Middlebury student Lucia Snyderman, taking soil samples at the Watershed Center Conservation Area in Bristol, VT. Throughout the fall, we enjoyed the crisp air, the colorful foliage, and maybe even a little rain, as we collected soil samples from areas directly adjacent to 16 camera traps. These cameras, which were placed in early September, serve not only as a learning tool for Dr. Mychajliw's undergraduate Mammalogy Class, but also as a part of Snapshot USA, a collaborative project aimed at sampling mammal populations across the US, and as a source of data for my project. I aim to compare the mammal species identified on the images collected by these cameras to the species whose DNA is found in corresponding soil samples. eDNA is quickly establishing itself as a viable and robust tool for biodiversity monitoring. Species detection via eDNA analysis is particularly pertinent when it comes to detection of small or rare mammals that may be overlooked using more traditional sampling methodology. Our hope is that the results of our eDNA analysis will serve as a complement to the camera trap data and provide comprehensive insights into the mammalian composition of the Watershed Center ecosystem.



Welcome Mollie Mills!



Mollie Mills is the newest member of our CPN Newsletter team. She is interested in how fossil records (particularly those of mammals) can be used within modern conservation, mainly through species distribution models. She is based at Royal Holloway, University of London, and the Institute of Zoology (London Zoo). Her PhD is using the modern and fossil occurrence records of the Dhole (*Cuon alpinus*) to assess niche variation, distribution dynamics and future conservation actions.



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Are you interested in:

- ...contributing to **Postcards from the Field?**
- ...sharing a recent publication as a **Research Highlight?**
- ...being featured in a **Practitioner's Perspective** piece?
- ...providing other content suggestions for this newsletter?

If yes, please email us at conservationpaleo@floridamuseum.ufl.edu

Invite Your Colleagues to Join our Network!

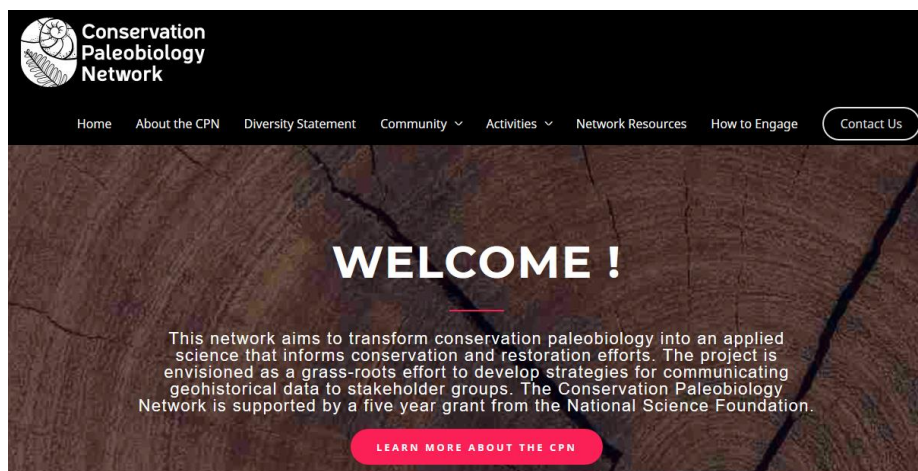
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

By joining the network, you become a member of our Community of Practice. The membership does not impose any obligations, but enables participants to engage fully in network activities. Members will be able to:

1. Participate in the CPN mailing list
2. Nominate and self-nominate for committees and panels
3. Submit announcements for publication in the CPN Newsletter
4. Apply to participate in the CPN activities such as Field Courses
5. Submit proposals for CPN field courses and CPN working groups
6. View CPN webinars and submit proposals for webinar modules

To join please go to our website and select "Join the Network".

Visit the website! <https://conservationpaleorcn.org/>



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