Newsletter of the Conservation Paleobiology Network

Issue #6
March 2021

CPN Newsletter

Conservation Paleobiology Network

INSIDE THIS ISSUE:

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 Award: EAR-1922562

Announcing the first CPN webinar!

By Karl Flessa and Rebecca Terry, Webinar panel co-chairs

The CPN webinar panel is excited to announce their first video webinar lecture: ***An Introduction to Conservation Paleobiology: The Colorado River Delta***. You can access it through the CPN webinar page (https://conservationpaleorcn.org/webinars/). This 46 minute video briefly covers some of the basic principles, objectives, materials, and approaches used in conservation paleobiology. Narration by webinar panel co-chair Karl Flessa summarizes the work of more than 18 of his colleagues in deciphering the paleobiology of the Colorado River delta and estuary in the era before upstream dams and aqueducts diverted all the water. The webinar concludes with an optimistic review of the delta's riparian zone five years after the start of environmental flows in 2014.

The webinar is accompanied by a worksheet for students to visit the estuary on a virtual field trip with panel member Jansen Smith, calculate past population densities, listen to an indigenous leader from the Cucupá of the delta, and read about why it takes more than water to restore a delta. An Instructor's Guide also accompanies the student worksheet.

This is the first of what will be a series of webinars that can be used individually or as part of a hybrid in-class/on-line course on conservation paleobiology. Some webinars will focus on a particular topic: time-averaging, for example. Other webinars could present instructive case-studies.

We welcome your ideas. What topics would you like to see covered? What case studies would you like to see presented? Who would you like to hear from?

Please go to our website using the link above to respond to these questions. Thanks; and happy viewing!

https://conservationpaleorcn.org/webinars/

Conservation Paleobiology Research Highlight

By Carolina Gámez Brunswick

Insights on species distributions using the canvases of the past

"Information gathered by petroglyphs and pictographs … allowed us to gain a better understanding of changes in the species' distribution over the last 6,000 years."

Ecological Niche Modeling (ENM) has become a popular method for studying the distribution of species. This tool has brought us closer to understanding species distribution patterns through space and time, and the relation of these patterns with different climate variables.

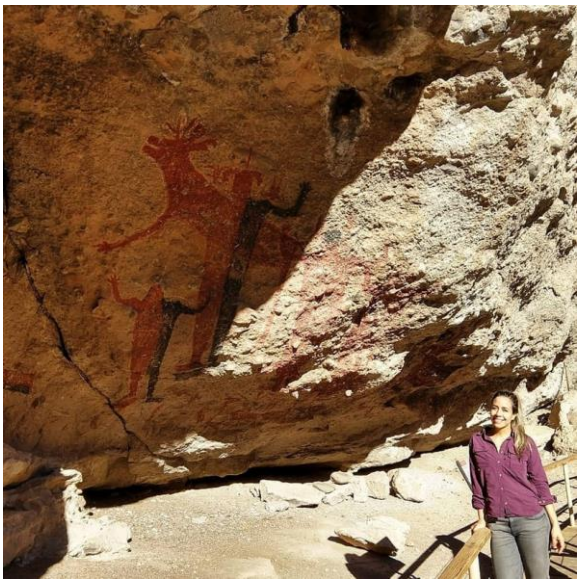
Using computational algorithms (acknowledging their limitations and assumptions) we can reconstruct past climate scenarios, and project future ones, to better understand species distributions over time. However, due to the lack of data about species in the past, we have to play detective and trust that model transferences are enough to obtain reliable hypotheses on past distributions. If we only have scarce data on fossils and traces of species in ancient times, how can we improve our results? This is where rock art can be useful.

We realized that rock art can provide us with valuable information about past distributions of humans and other species. Thanks to the study of these sites by disciplines such as anthropology and archeology, we were able to reconstruct, in detail, the records of species with an estimated date. We selected the desert bighorn sheep for its broad representation throughout the southwestern United States and northern Mexico, and because it is one of the species that can be reliably identified among most mammalian depictions in rock art.

With information gathered by petroglyphs and pictographs as an alternative source of ancient records, we used ENM to directly and independently reconstruct the Mid-Holocene distribution of the desert bighorn sheep. This allowed us to gain a better understanding of changes in the species' distribution over the last 6,000 years. We also modeled the niche of the species in the present with its current records and transferred it to the Mid-Holocene climate scenario (as we usually would without independent information) to measure their inter-predictability.

Our work suggests that models generated from rock art allow a consistent reconstruction of the species' ecological niches, and present and past distributions. Therefore, we consider rock art to be a valuable but hitherto largely ignored source of information for this species. These analyses also revealed how the species have responded to past climatic changes. We hope that our example opens a new door for using this information with other species to improve the understanding of their distribution dynamics over time.

Photo captions: Bighorn sheep depicted in Sierra de San Francisco, Baja California Sur (top). Carolina standing near Archaic Great Mural Rock Art panel at Cueva La Pintada in Baja California Sur (bottom).



For more details, please see the article by Gámez-Brunswick and Rojas-Soto in the Journal of Biogeography: https://doi.org/10.1111/jbi.13975

First published online: March 2021

Practitioner Perspective *Interview by Alexis Mychajliw*

Featured practitioner: Christina Morrisett

Christina Morrisett is a PhD candidate at Utah State University and holds an MS in Aquatic and Fishery Sciences from the University of Washington. Growing up in an Alaskan commercial fishing community inspired her to study natural resource management. She is also a Doctoral Research Associate at the Henry's Fork Foundation (HFF), an organization "whose sole purpose is to conserve, protect, and restore the unique fisheries, wildlife, and aesthetic qualities of the Henry's Fork and its watershed". HFF contributes scientific insight to help conserve wild trout fisheries for recreational use on rivers and streams throughout the 3,200 square-mile Henry's Fork watershed (Idaho, USA) and develop win-win collaborations between farmers and anglers.

Photo caption: Christina electrofishing with the Idaho Dept of Fish & Game last fall. She notes: "I don't actually squeeze fish for my research!" (fisheries students are often called 'fish squeezers').

1. How do you navigate the demands of being a graduate student while also working for a non-governmental organization?

I am fortunate in that it is baked into my contract: HFF is responsible for fundraising to pay for my research assistantship, and I am expected to be up in Idaho at least every summer.

2. Let's talk about baselines. What information about the past do you normally incorporate, and what new sources might you explore?

HFF focuses on water management and navigating the needs of farms, fish, and the fishing experience. One example is studying how climate is impacting water availability, both annually and seasonally. We track snowpack records, streamflow, reservoir storage, and the timing of demand for irrigation over the last 80 years, but are somewhat limited by what is publicly available. HFF is also considering a future student project to take a sediment core from the reservoir, which is about 90 years old. We are particularly interested in considering the history of climate and reservoir management.

Our key baseline for agricultural practices is the early 1900s. Farmers were mostly using flood irrigation. Because we exist on an unconfined aquifer, when you flood irrigate, there is a lot of groundwater return that actually benefits the fish because water that is diverted in April will come back in July when flows are otherwise low. This flood irrigation created a wet ecosystem for the fish, but now we have moved towards more "efficient" sprinkler applications that result in much less water returning (known as the irrigation efficiency paradox). This changed the angling experience. This also plays into the life history of the native and non-native trout species: the native trout benefit from cool groundwater returning to the river in July, but the warmer water is favoring the expansion of non-native trout.

Practitioner Perspective continued…

Other sources of baselines include the landowners themselves. One landowner I work with in his 70s can actually describe what the river looked like under these different irrigation practices. Beyond that—I know in Utah, there are trees that live long enough to look at historical hydrological information in the rings, but we don't have the right species in the Henry's Fork. I have also wondered whether there is a way to study past invertebrate populations to understand the health of the river over time? We regularly conduct benthic macroinvertebrate surveys today.

3. We keep coming back to the 1900s as a baseline. But what was the watershed like before irrigated agriculture?

We don't know much. One thought I personally have is… how did beaver impact water on the landscape? It would be great to explore this somehow…

4. How does HFF employ science-based collaboration to work with resource users who might not otherwise see eye to eye?

HFF stands out for the quality of our data; the data earn us a seat at the table. For example, we participate in watershed council meetings with other stakeholders. At the beginning of each meeting we have 1-2 minutes of silence. Thirty years ago, these minutes were used to bring the temperature down because farm and fish interests were pretty adversarial. Now, we use those minutes to reflect on how much progress has been made – it is really special. Everything HFF does is rooted in science and our strong monitoring and modeling approaches, and we are ultimately effective because of our collaboration with managers and partners at this table.

Photo caption: Henry's Fork researchers measuring flow on the river.

5. What advice would you have for students seeking to conduct PhD research in a community-engaged context?

Building these partnerships from scratch can take more time than we have allotted for our entire degree programs. Instead, you might choose to look for PhD advisors who already have solid relationships with community partners that you'd be interested in working with.

In general, I think you need to show up with a genuine interest. You should listen and be willing to contribute to whatever conversation is already happening—let folks approach you and bring you into their space.

6. What is your favorite fossil?

The sabertooth salmon!

Student Section

Cpnr: A community-maintained platform for interactive learning

By Gregor Mathes

Photo: Gregor Mathes, cpnr developer.

The Conservation Paleobiology Network (CPN) now offers free and open-source tutorials! These will cover a variety of quantitative topics starting at an introductory level that aim to show students and researchers how to process geo-historical data.

Conservation paleobiology is an interdisciplinary science. It crosses traditional boundaries, providing new opportunities to explore the Earth System in a more comprehensive way. However, researchers are suddenly faced with the task of keeping up with even more disciplines and their different types of data. To facilitate this, the members of the student panel have developed an open-source platform for interactive learning. This platform consists of tutorial documents that can be loaded and run using the R software (https://www.r-project.org/). Each tutorial covers a new topic relevant to conservation paleobiology and teaches concepts via quizzes and interactive exercises based on a variety of coding languages.

“It became clear during our panel meetings that the Conservation Paleobiology Network needed a platform where we can exchange easy-to-digest pieces of information and share concepts across subdisciplines within our broader community”, explains Erin Dillon, current co-chair of the CPN student panel. “We wanted a communication tool that takes away all the distracting parts and allows the user to focus on the important bits”.

To accomplish these features, the tutorials are pre-compiled and deposited in the free and open-source R package cpnr that was launched in late January of this year. Having all tutorials bundled in a package streamlines knowledge transfer and allows users to customize their learning experience.

The tutorials include the most relevant programming languages such as R, Python, Julia, or bash. A webpage accompanying the package (https://ischi94.github.io/cpnr/), which was already accessed by more than 400 visitors, explains in detail how to access and run the tutorials. Additionally, a short YouTube video showcases the first steps with the cpnr package (https://bit.ly/3c1QQhC). The workflow consists of choosing a desired tutorial, loading the dependencies for it, and then loading the tutorial. “With interactive tutorials, users can learn whenever and wherever they want”, adds Gregor Mathes, the developer and current maintainer of the platform and the website. “You can even stop whenever you want and when you return to the tutorial later you can pick up right where you left off”.

There is currently one tutorial available, presenting the divDyn R package and its applications to data from the fossil record, but many more are currently in the making. This first tutorial serves as an introduction to the platform, showing the possibilities provided by an interactive tutorial document. Building on this, new tutorials can be initiated by anyone from the conservation paleobiology community. Ideas for new tutorials as well as contribution requests can be either send to Gregor Mathes (gregor.mathes@uni-bayreuth.de) or can be directly added to the source code (https://github.com/Ischi94/cpnr/), as the cpnr learning platform is developed using open-source software concepts. Gregor Mathes is also willing to show upon request how to build your own interactive tutorial, as well as how to build an interactive learning platform such as the cpnr package for e.g. university courses.

Introducing the Student Resources Database

By Erin Dillon & Sage Vanier

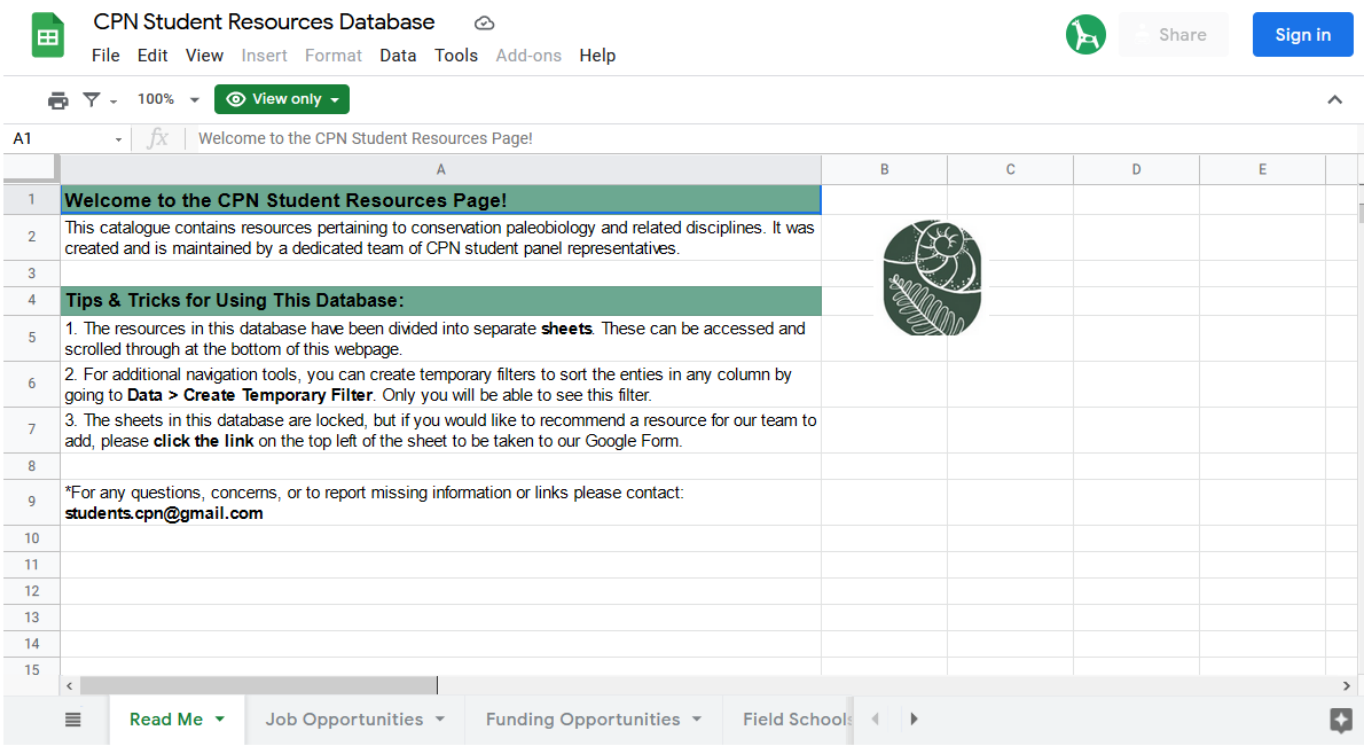
The Student Panel of the Conservation Paleobiology Network announces the launch of the Student Resources Database.

The CPN Student Panel has created a database of student resources tailored to conservation paleobiology, which includes a list of current job openings, funding opportunities, field schools, workshops, short courses, conferences, and open access resources. The database is hosted on Google Sheets to facilitate access, filtering, and navigation. The database will be curated and maintained by the Student Panel, but anyone from the broader community can contribute resources. We hope that this collaborative platform will encourage community-building and the sharing of information between network members about upcoming opportunities. While the initial framework is now available to peruse, the Student Panel is also actively seeking recommendations to expand the list of resources. If you have any suggestions or are interested in getting involved, please contact Sage Vanier (students.cpn@gmail.com), who is spearheading this effort.

To view the database, please visit our resources page: https://conservationpaleorcn.org/resources/.

To contribute resources, please fill out this form: https://forms.gle/aMD1WDfrRkWgXUmH6.

Any questions can be directed to students.cpn@gmail.com



First published online: March 2021

Postcards from the Field Compiled by Fernanda Cabrera and Jaleigh Pier

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 Fernanda Cabrera, fcabrera@fcien.edu.uy, and cc us at conservationpaleo@floridamuseum.ufl.edu. Note that if we run out of space to fit your postcard into the upcoming newsletter, it will be included in a subsequent newsletter. Submissions might also be featured as blog and social media posts. Thank you in advance for your contributions!

Dr. Ryan S. Mohammed, University of the West Indies, St. Augustine

Trinidad and Tobago is possibly the most industrialized island within the Caribbean. It has a rich biodiversity due to its close proximity to South America, but this can be impacted by development. Biological inventories become increasingly important in this regard, however, capacity and funding for such surveys can be a limiting factor for such states. Three students of The University of the West Indies, St. Augustine Campus opted to do their masters thesis on spatial and temporal changes in the crustacean and icthyofaunal biodiversity in Trinidad. Shirley-Ann Ramphal, Renata Ramoutar and Samantha Ramnarine are completing their MSc. in Biodiversity Conservation and Sustainable Development in the Caribbean. Here the lucky ladies are doing their last field sampling event, one day prior to COVID-19 lock down back in March 2020!

Shirley-Ann Ramphal, Renata Ramoutar and Samantha Ramnarine opted to do their masters dissertation on spatial and temporal changes in the crustacean and icthyofaunal biodiversity in Trinidad

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Supported by RCN-NSF Award: EAR-1922562

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!

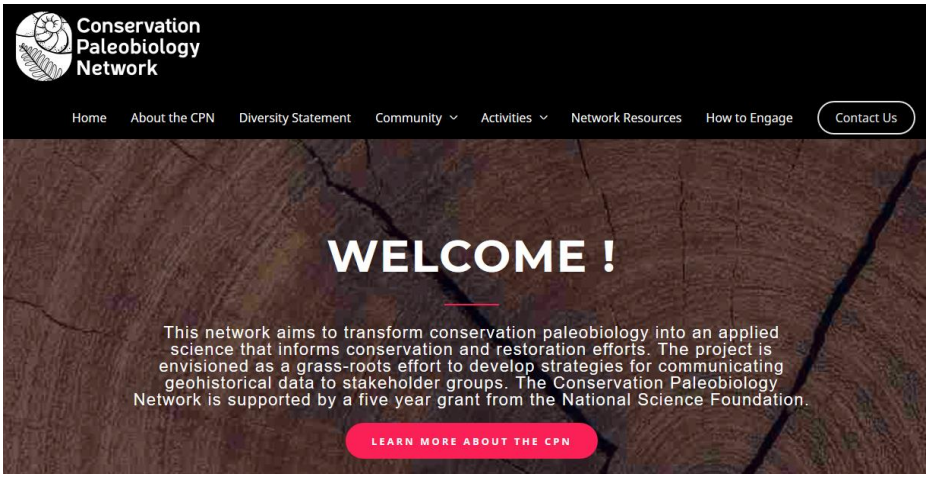
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

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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First published online: March 2021