CROW CANYON
ARCHAEOLOGICAL CENTER

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Dear Faculty and Staff, Department of Society and Conservation:

I am requesting a research faculty appointment in the W.A. Franke College of Forestry & Conservation Department of Society and Conservation (SoCon). Since the fall of 2017, I have been a research associate of the Montana Climate Office, where my work has focused on expanding the technical capacity of the MCO and Montana Mesonet, collaborating on several USDA and NOAA funded research projects including the *Montana Drought & Climate* project directed by Drs. Laurie Yung and Libby Metcalf, and mentoring undergraduate and graduate students. I have recently accepted a position as the new Director of Climate Extension for the MCO (starting January 1, 2021), and am eager to engage more meaningfully with SoCon and the College through a faculty position with research, teaching, and service responsibilties.

I am an archaeologist who specializes in cross-disciplinary, computational approaches to studying resilience in socio-ecological systems, with a focus on high-elevation agricultural systems on the Tibetan Plateau in Asia and the Colorado Plateau in the United States. I completed my PhD in anthropology at Washington State University in 2014, and was a post-doctoral researcher at WSU as part of an interdisciplinary, National Science Foundation-sponsored project to make paleoenvironmental data more widely available to researchers and the public. I am currently the Director of the Research Institute and William D. Lipe Chair in Research at the Crow Canyon Archaeological Center, a non-profit research and education facility in southwestern Colorado; research affiliate with the Montana Climate Office; and hourly assistant research professor with the Division of Earth and Ecosystem Sciences at the Desert Research Institute. At Crow Canyon, I managed a roughly $500,000-per-year research portfolio funded through grants, endowments, and private donations; helped lead a financial turnaround of the Center and navigate the Covid-19 pandemic; and launched Crow Canyon's postdoctoral fellowship program. My time at Crow Canyon gave me experience in non-profit administration, project management, and institutional advancement. I developed and lead several archaeological research and agriculture extension projects on which I will continue to collaborate in my new position at UM.

As the Director of Climate Extension for the MCO, I will be responsible for fostering relationships with users of climate data and information in Montana, including outreach supporting agriculture, forestry, recreation, and urban and rural climate resilience planning. In particular, I aim to develop new partnerships with Native nations and Tribal colleges in Montana related to climate and drought monitoring and education. I will also serve as the Montana Mesonet Data Coordinator, providing technical expertise and leadership on data services as we dramatically expand Montana's weather, snowpack, and soil moisture monitoring network. I designed and implemented the current Montana Mesonet database and web data services, and will lead development of its next iteration. As research faculty in SoCon, I will maintain an active (and funded) research and outreach program on topics relating to human-environment relationships, and develop and teach courses to complement existing offerings in the department and College.

In my archaeological research, I use computational analyses of ecosystems, landscapes, and climate to help understand cultural transformations and resilience in prehistory.[1–3] My past research projects are diverse: assessing landscape and site defensibility on the Northwest Coast of North America to study prehistoric warfare;[4] developing a new method for reconstructing high-resolution spatiotemporal climate fields

from networks of regional tree-ring chronologies, with applications across the Southwestern US;[5–9] statistical downscaling of global climate models to understand agricultural changes across Asia;[10–13] exploring the importance visual connectedness in the Chacoan world using region-scale view-shed analysis;[14,15] and telling the fascinating story of turkey domestication in the southwestern US.[16,17] In studying these topics, I shamelessly borrow ideas from fields as diverse as quantitative genomics, evolutionary psychology, complexity science, phenomenology, and quantum physics.

My current research focus is on the resilience of traditional agricultural systems, and traditional ecosystem management and niche construction more generally. I am particularly interested in the coevolution of cultivar landraces and the selection contexts in which they arise—both natural and cultural. In one of my current projects I am using phenological simulations to model the potential yields of over one hundred varieties of Indigenous corn across the Southwest US under modern and simulated past climate/weather scenarios. I hope to identify the environmental conditions under which each of these modern varieties will thrive—and, by extension, the conditions in which each may have evolved. I manage Crow Canyon's *Maize Database Project*, a collaboration with the Hopi Cultural Preservation Office to build the first-ever comprehensive, publicly-accessible database of curated ancestral Pueblo maize. Through a series of workshops and museum visits, our team of Hopi scholars and archaeologists is assessing connections between ancient maize and contemporary Pueblo varieties, and determining criteria that ancient maize must meet to be viable for future genetic, morphological, and dietary analyses. I am also mentoring several graduate students—at Washington State University and the University of Colorado—who are building on aspects of my research to better quantify agricultural production in the ancient Southwest.

All of my crop modeling research honors the phenological diversity among contemporary traditional cultivars—diversity that is a key to the resilience of small-scale agricultural communities, and diversity that will likely be useful to future populations in light of projected climate change. This research has brought me into collaboration with Native producers, agronomists, agricultural modelers, maize geneticists, and climatologists. In recent years, I have increased the outreach to and collaborations with Native farmers and ranchers across the West on projects that aim to increase agricultural resilience in Indian Country. In 2016, I joined *Native Waters on Arid Lands* (NWAL), a USDA-funded project led by the Desert Research Institute and the University of Nevada, Reno, Tribal Extension program. NWAL partners researchers and extension experts with Native communities in the Great Basin and American Southwest to collaboratively understand the impacts of climate change, and to evaluate adaptation options for sustaining water resources and agriculture. As part of NWAL, I have helped organize and lead climate adaptation workshops with Native communities across the Southwest, and annual Tribal Climate Summits in 2016–2019. I am a Co-PI on several funded NWAL-derivative projects, including *All Climate is Local*, a series of virtual webinars culminating in an in-person workshop focused on leveraging multiple ways of knowing to enhance resilience of Native agroecosystems to droughts, floods, and rising temperatures; the *Covid-19 Toolkit project*, which will create cyberinfrastructure to support Tribal Extension agents serving Native communities during the pandemic; and *Teaching Native Waters*, which partners with Native educators to create communities of practice focused on place-based environmental education. I look forward to completing these projects and expanding on them in my position at UM, especially in collaboration with other faculty in SoCon and the College of Forestry. I'm especially interested to continue to develop research with the Drs. Metcalf and the *Human Dimensions Lab*, and Dr. Yung and her students focusing on agricultural communities in the Northern Rockies; and to build new relationships with Dr. Chaffin, whose work on the dynamics of contemporary socio-hydrological systems has clear implications for understanding and characterizing these systems in the past.

The multidisciplinary, multicultural, and fundementally computational approach I have taken in my research has greatly informed my approach to mentoring students in the classroom and lab. As a graduate student at WSU, I was fortunate to have many opportunities to teach. I designed *ANTH 331: The Americas Before Columbus*—an upper-level undergraduate review course about North and South American prehistory—

as a course on model-based social science. I presented students with archaeological data from the Americas and various interpretations (models) that might explain those data, and challenged my students to take a goodness-of-fit approach to choosing between different explanations. In lieu of a final exam, I asked students to make academic-style, collaborative research posters, and hosted a two-day research symposium where students were invited to engage with and critically assess each other's work. As an instructor for *ANTH 101: General Anthropology*, I emphasized a four-fields approach to anthropology that sought to break down barriers between the sub-disciplines and make all of anthropology relevant to my students' experiences, and focused on how diverse cultures and knowledge systems can present compelling solutions to contemporary problems. And in *ANTH 490: Themes in Anthropology*—a fifteen-student senior capstone seminar—I challenged students to engage their anthropological training by confronting significant ethical issues today. I received exemplary student evaluations in each of these courses, with students commenting particularly on my engagement and enthusiasm in the classroom.

As a post-doctoral researcher, I co-taught a graduate course in exploratory data analysis in *R* where I helped students develop testable hypotheses for complex data. The course also emphasized reproducible and robust computational methods. Students were required to script all of their analyses as executable papers, such that data, analysis (code), and interpretations were all available in a single document. I currently run a weekly virtual "social coding" session with several graduate students. I thoroughly enjoy working with students and colleagues on their research projects, and helping people do science that is more open and reproducible. My strengths in the classroom are most apparent when challenging students to critically assess their own biases, and when working through statistical and computational reasoning with students. I tend to prefer informal, small-group, and activity-based learning settings where students are challenged to engage deeply with one-another, either in conversation about a course topic or to complete a particular task. I care deeply about empowering students to generate new knowledge through the learning and application of empirical (particularly computational) methods. I feel strongly that students need to learn *tools to think with*, and I value statistical literacy and a basic understanding of evolutionary theory as key foundations of that toolkit.

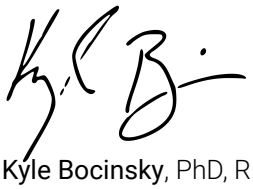
I am prepared to teach several of the courses currently offered in SoCon and FCFC programs, especially those pertaining to climate and society, geographic information systems (GIS), or quantitative analysis. Courses that caught my interest include NRSM 326 (Climate and Society), NRSM 373 (Wilderness & Civilization), GPHY 284 (Intro to GIS and Cartography), and GPHY 488 (Applications of GIS). I would also enjoy teaching freshmen seminars for SoCon. My MCO colleague Zach Hoylman and I have also discussed developing a new course for the College that would be an introduction to scientific computing for environmental research, tailored for upper-level undergraduate and granduate students. I have also had the pleasure of participating in two CoLabs in the College as part of the UM BRIDGES program, and I will look forward to joining future teams. Finally, knowing several of the faculty and research strengths of the UM Anthropology department, I would like to pursue developing cross-listed courses with Anthropology faculty that take a multicultural and historical approach to understanding socio-ecological systems. While I am willing to participate in any of the FCFC's academic programs, the *Environmental Science and Sustainability* and *Climate Change Studies* programs seem to most closely align with my interests and expertise.

As I said above, my time at Crow Canyon has given me experience in non-profit management, strategic planning, and financial advancement, and I would enjoy using these skills in service to the SoCon department and the College. I am interested in serving on the FCFC's Impact Advisory Board, especially in its task considering the advancement and welfare of the College. I currently serve on the Bylaws Committee and as chair of the Investment Committee for the Society for American Archaeology (SAA), and will be able to bring that experience to service roles in the College. I am committed to ensuring diversity, equity, and inclusion in my home organizations. Recognizing the need for LGBTQ community and support in my professional organization, I helped launch the Queer Archaeology Interest Group in the SAA. In SoCon and the College, I will work

to demonstrate that forestry, conservation, and natural resource management fields are welcoming places for those who identify as LGBTQ. I also will work closely with Native communities in my new position with the MCO, and I would like to extend that outreach to SoCon, especially where my work has me interfacing with forestry, hydrology, environmental science, agriculture, and natural resources departments at MT Tribal colleges. I envision enhanced collaboration between the FCFC and Tribal colleges—in research, course offerings, experiences for undergraduate and graduate students, and pipelines from Tribal colleges to UM that meet the diverse needs of Native students.

I am very excited about the opportunity to join the Department of Society and Conservation as a research faculty member. Thank you for considering my request.

Sincerely,



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