



The Rising Voices Center for Indigenous and Earth Sciences



Virtual Rising Voices 8 (VRV8) Workshop

Phenology Sessions

May 2020

BACKGROUND INTRODUCTION

The [Virtual Rising Voices 8 Workshop Series](#) (VRV8) Phenology Sessions took place in May 2020. The virtual sessions offer the opportunity for everyone to speak, engage, and ask questions in smaller group formats similar to what would occur in person at the Rising Voices annual workshops.

VRV8 is possible due to the technological broadcast network capacity developed by [Lomikai Media](#) and the [Olohana Foundation](#), who had the foresight to develop this capacity over the last few years to prepare for the very situation we find ourselves in with the novel coronavirus and COVID-19. This type of disaster preparedness has enabled our ability to be socially connected while at a physical distance. Much of this capacity was developed through collaborations within the Indigenous Phenology Network (IPN). IPN emerged out of conversations at Rising Voices, which led to starting the VRV8 working group thematic months with phenology. Phenology considers attention to the timing of natural events in relation to climate and plant and animal life cycles.

[The Rising Voices Center for Indigenous and Earth Sciences](#) facilitates intercultural, relational-based approaches for understanding and adapting to extreme weather and climate events, climate variability and climate change. The program brings Indigenous and other scientific professionals, tribal and community leaders, environmental and communication experts, students, educators, and artists from across the United States, including Alaska, Hawai'i, and the Pacific Islands, and around the world, to assess critical community needs and to pursue joint research aimed at developing optimal plans for community action towards sustainability. Rising Voices acknowledges the inherent value of Indigenous knowledge systems and Indigenous science, adaptive practices and processes, honoring them equally with Earth sciences. At its core, Rising Voices aims to advance science through collaborations that bring Indigenous and Earth (atmospheric, social, biological, ecological) sciences into partnership, supports adaptive and resilient communities through sharing scientific capacity, and provides opportunities for Indigenous students and early career scientists through scientific and community mentoring. Further, it helps Western-trained scientists expand their observational skills, research paradigms, capacity to apply and translate findings, and ultimately their science.

[The Indigenous Phenology Network](#) (IPN) is a grassroots organization open to anyone; the network has an active listserv for any who would like to join their monthly calls. It is a coalition of the willing, as Rising Voices co-founder Bob Gough said, for people who are interested in understanding phenology on lands and species of importance to Native peoples. IPN focuses on building relationships and the process of doing so, with the goal of ensuring benefit to Indigenous communities and through a combination of Indigenous and Western knowledge systems. Several projects have emerged from and worked in partnership with IPN over the past few years, such as the Olohana Foundation's [VICTree Gardens \(Virtually Interconnected Community Tree Gardens\)](#), which can provide food for a family of four for 4-6 days in the event

of a natural disaster, and the [College of Menominee Nation's Indigenous Phenology Learning Path](#).

The VRV8 Phenology sessions considered what emerged from the recent [IPN survey results](#), and themes from last year's [7th annual Rising Voices workshop](#) phenology group sessions.

The IPN survey looked at where the network has been and where it is going. The IPN is guided by a set of ideas that are set out in the doctrine of relationship that prioritizes connections between people and responsibility to our non-human relations. People reported that connection and collaboration and respect were what they appreciated most about being a part of the IPN; this is a good starting place to build projects together and to find ways to actively engage, connect with new collaborators and develop something tangible together. In the future, they would like to see the network work towards more projects and forms of sharing, including social media, a website, and a directory to make more pathways for collaboration on specific projects. From these suggestions, so far an [Indigenous Phenology Network Facebook page](#) was created and a directory is being developed for people to voluntarily share contact information.

The previous Rising Voices workshop phenology group sessions (the full summary is on pgs. 22-24 [here](#)) discussed how Western academic research struggles to deal with the structural problems that come from a colonial science system that was not built for respectful intercultural collaborations. Respect, responsibility, and reciprocity are all essential values in Native communities but aren't typically taught in Western institutions. Indigenous communities are often disadvantaged in Western academic research because of this hierarchical structure of scientific communities and power dynamics baked into the whole system, into grant proposals, into privilege of written word over spoken. We discuss these inequalities in words that perpetuate discrimination and know that there is no one word in Indigenous languages that translates into phenology and that can capture the full set of values or meanings to Indigenous peoples. Suggested actions include to share and promote Indigenous-led science and research, train non-Indigenous scientists before they enter communities, change the funding structures and make proposals to include a focus on process. Enacting this work requires active pushback against the established system. We can use the IPN to connect many groups together and spark the movement.

PHENOLOGY PANEL SESSION

The VRV8 Phenology Panel Session took place on May 14. The full recording of the session can be watched [here](#). The session focused on learning from IPN members about what they're experiencing, witnessing, and concerned about related to phenology (the timing of natural events, in relation to climate and plant/animal life cycles), and any actions they propose or are taking, as well as how their phenological observations might connect to what is unfolding with the novel coronavirus.

The panel session was organized by IPN leads Maraya Ben-Joseph, Katie Jones, Brian Miller, Alyssa Rosemartin, and Kalani Souza, in partnership with Rising Voices co-directors Heather Lazrus and Julie Maldonado. The participants included Hank Fergerstrom (Na Kupuna Moku O Keawe), Ava Hamilton (Native American Producers Alliance), Lesley Laukea (University of Hawaii), Mia Lopez (Wishtoyo Chumash Foundation), Melonee Montano (Great Lakes Indian Fish and Wildlife Commission), Hannah Panci (Great Lakes Indian Fish and Wildlife Commission), Bob Rabin (National Oceanic and Atmospheric Administration), Elena Sparrow (University of Alaska), and April Taylor (South-Central Climate Adaptation Science Center).

Rev. M. Kalani Souza (Olohana Foundation/IPN) opened the session with a prayer and blessings in remembrance of Kris Marwitz, who was NCAR's lead administrator for Rising Voices. Kris worked with grace, compassion, and her heart forward, prioritizing relationships as highly as any other aspect of her work. The Rising Voices family will continue to honor her legacy and teachings and all she gifted to the community over the past decade.

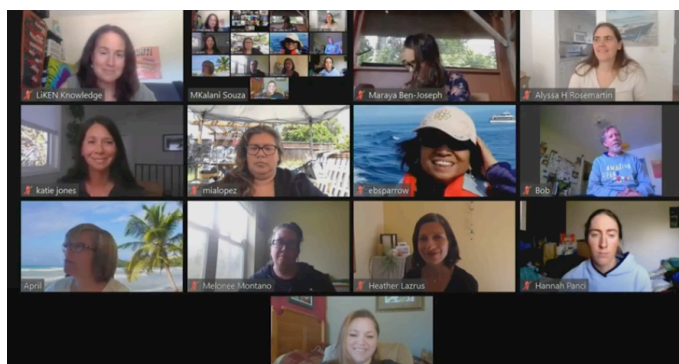
Everything around us is looked to for answers

Dr. Samantha Chisholm Hatfield (Siletz, Cherokee)
Research Associate, Tribal Liaison
Oregon Climate Change Research Institute, CEOAS
Oregon State University

An introduction to Native approaches to phenology was provided by Samantha Chisholm Hatfield (Oregon Climate Change Research Institute); she gave permission to include her talk that was part of the [National Conservation Training Series on Indigenous and Western Approaches to Phenology](#) series, as part

of this panel. She described how everything around us is looked to for answers. In Native systems, in traditional ecological knowledges (TEK), the land and food are integral to Native identities and histories, there is no separation; that's how phenology is established. TEK is a holistic discipline; phenology is a vital piece of what TEK documents and observes. Phenology is relied upon heavily in TEK systems. Samantha shared a story about growing up always calling carpenter ants, eel ants because when the carpenter ants came out in late spring it was an indicator that the Lamprey eel (a traditional food source) were running in the Siletz River. There's no Western scientific correlation between these two species, but people know and are aware of the timing of events. One of the aspects of timing for phenology is not only species and events but also cultural landscape markers, such as the timing of year certain stories can be told.

Participants shared several examples of phenology-related projects. Elena Sparrow, for example, leads the [Arctic and Earth SIGNs](#) (STEM Integrating GLOBE and NASA) Project, which brings together formal and informal educators and community members through climate education workshops. She also talked about the [Winterberry project](#), Citizen Science for Understanding Berries in a Changing North, which includes, in the context of shifting seasons,



trying to see how many berries are damaged, rotten, dried up, or ripe; this affects animals who eat them during this time. There are 1,500 volunteers (including after school programs for students) across Alaska with 15,183 observations across tundra, coastal, and boreal landscapes. Communities are welcome to do additional analysis of relevant berries for their particular area.

Dennis Longknife participated via a pre-recorded video walking through a in the Fort Belknap Indian Community, and shared the recent initiation of a 5-year agreement with the Bureau of Land Management for a grasses restoration study project on the prairies of northern Montana, that will include native grass surveys and seed collection, and teach tribal students how to do the work. Hannah Panci discussed the [Great Lakes Indian & Wildlife Commission's phenology study of treaty harvested plant species](#). The project is in its fifth year and includes ten different plants and two different sites. They have been seeing a ton of variability from year to year as far as fruits and timing goes, and considering the indicators for when to harvest certain plants. Bob Rabin reminded the group about the [Indigenous Speaker Series](#) organized by Michelle Montgomery (University of Washington-Tacoma) and Ciarra Greene (Northwest Indian College) that has included presentations about local knowledge of native plants and medicinal uses. Across these project examples, one commonality included the importance of incorporating storytelling and oral histories, and their convergences with the fieldwork.



Some of the main themes shared during this session, in reflecting on the connections between phenology and COVID-19, focused on that despite health disparities, poverty, and other inequities, Native communities are continuing to thrive by sticking together, sharing food resources, prayers, and stories, caring for elders, and maintaining their spirituality. While several participants voiced how COVID-19 is causing much anxiety and uncertainty, having community, and as Mia Lopez emphasized, responsibility, and purpose is extremely uplifting.

With the current public health crises there are less tourists in places; Lesley Laukea shared that in Hawai'i there is an embrace among the Kanaka of a decrease in tourists, and also recognition of the economic and job losses usually comes with the visitors. Native people are able to reconnect with sacred spaces that are usually overrun with people, such as in Waikiki because there are less disrespectful bystanders and their sacred ceremonies are not on "display". Because of beach closures all across the islands, the ocean is slowly recovering, especially in areas that usually see a high volume of tourists who often wear harmful sunscreens.

The importance of gathering seasonal medicines right now in preparation for fall and winter "sick season" is all the more important, as Mia Lopez talked about, due to COVID-19. It is important to pass down plant knowledge from one generation to the next, about where to gather from, how

to acquire a diverse range of plants, and when the plants need to be gathered. Mia described how increased heat has caused an early bloom of plants so they now have to act fast in gathering.

Ava Hamilton shared how community involvement is key to surviving COVID-19. She has been listening to younger generations, so many of whom live in urban settings, talking about being curious about their roots and elders' knowledge. There are actions that can and are being taken. For example, she is collaborating with Heather Lazrus (NCAR) to work with the Wild Bear Nature Center in Nederland, CO for resources for Indigenous youth about education, history, and language. Ava pointed to the importance of strengthening connections to land and history; through the traumas of racism, it is important to find community that fosters love and relationships. And as Lesley Laukea raised, what Native knowledges can teach others about "how we're having our management plans that focus around agriculture or also fish ponds, but also the spiritual belief in the Native foundation, how do we incorporate that together. So it's really a spotlight for us to show the world how we do it and how having our knowledge and our collaboration can really help with the future more than ever today...This is the time. It's our time to shine."

PHENOLOGY WORKING GROUP SESSION

Building from the [Phenology Panel Session](#), the VRV8 [Phenology Working Group Session](#) on May 22 was designed to focus on sharing interests, projects, and/or lessons learned in collaborative, phenology-related work between Indigenous and Earth sciences; questions about phenology in general or related to an existing or future project; and action items and collaborations moving forward.

The session started with a tribute to some of the Rising Voices ancestors who continue to guide, mentor, and shape who we are as a community and the actions we collectively pursue. Rev. M. Kalani Souza (Olohana Foundation/IPN) and Hank Fergerstrom (Na Kupuna Moku O Keawe) opened the session, reflecting on the commonalities the human race now shares in going through COVID-19 and being under quarantine, and the connections to, as Kalani articulated, "the old cultures understand the connectivity of life, in every version of the culture there is a medicine wheel or something that applies to the four directions, four seasonalities, four faces of womanhood. These are all merely lessons about the water cycle and the cycle of life so we thought we would start with our version, a prayer. So, those old prayers present in all of our old societies, these old roots follow the old seasons."

SEASONAL REPORTS

Several Rising Voices participants shared seasonal video reports about their experiences of seasonal changes and phenology. The video reports can be viewed at the beginning of the

Phenology Working Group Session [video](#). We encourage all to watch as a way to learn from each other's experiences in different places and regions, where there are commonalities or differences, and questions or actions that their experiences might bring to the forefront.

Paulette Blanchard (Absentee-Shawnee/University of Kansas/UCAR) talked about how phenology has always been a key indicator for her as a Native person for knowing when to plant, have ceremonies, harvest, or hunt. Where she lives in Oklahoma, they grow a garden and hunt every year but with COVID-19 they have been even more conscientious about planting their garden. "One of the challenges was it got really warm early so it bloomed and then it got cold and we had frost so things were stunted or had problems with the flowers freezing or seedlings freezing or not growing very well or at all. So when things did finally start to grow in the outdoor garden it rained heavily, we have intense downpours where we can get an inch of

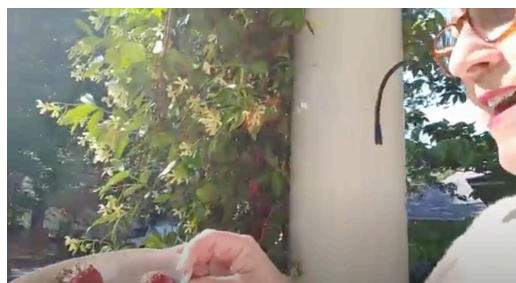


rain in an hour, we also had the wind and the temperature extremes and swings...There is no consistent weather or temperature pattern." The winter did not bring a long enough freeze to kill some ticks; now, in her local area there are three tick-borne diseases. This results in it being hazardous to people's health to go out in the woods

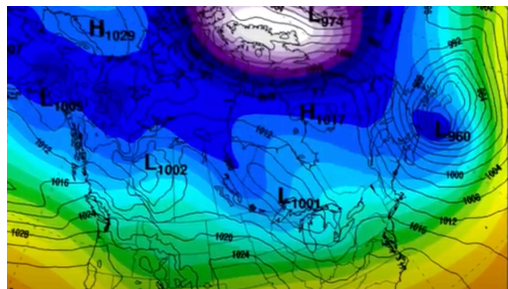


and collect plants, along with the unpredictability of the humidity and precipitation that have to be a certain way for harvest. Now, "things bloom when they would not normally." Extreme weather events and coinciding tornadoes have led to her being more intentional with building an indoor greenhouse to manage temperature variation so as to have food security. "You can't depend on the weather or precipitation because we had one of the driest Aprils. There's been a lot of shifts and changes here. Extremes are more extreme, precipitation comes in downpours not slow soaking rains, so erosion and runoff...our plants and trees bloom early and then it gets so cold so some trees get stunted; it's really hard to predict anything in Oklahoma anymore."

Aranzazu Lascurain (Southeast Climate Adaptation Science Center) described how in Raleigh, North Carolina she went strawberry picking about a month ago, which seemed too early, so went to check the phenology network visualization maps and it was the earliest spring on record for the region. The result was an additional 13 growing days and spring came about 20 days earlier this year. Even though it has seemed like a temperate spring for the area, but there haven't been those pulses of Arctic air coming down, making it remarkably early springtime weather.

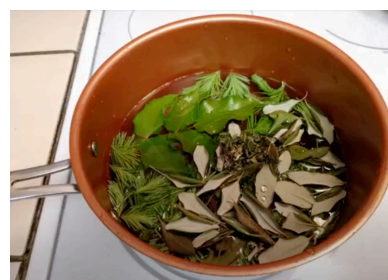


Bob Rabin (National Oceanic and Atmospheric Administration) shared that there was a really strong polar vortex this winter that finally broke down in the spring, occasionally sending cold air down into the US, primarily in April and May. Despite very warm sea surface temperatures south of Alaska there has been more ice cover this winter than has occurred in the last few winters.



There was full coverage of ice, with good conditions for the bowhead whale hunt this spring. Temperatures were considerably below normal in February and late April. In Oklahoma, after a fairly mild winter it's been a relatively cool spring with a prolonged period for growth for some plants. The mulberries have bloomed and are producing berries, and the pecan trees have also bloomed.

Stefanie Krantz (Nez Perce Tribe Water Resources) shared that where she lives in the southeast corner of Washington at the Idaho border, her family is actively working on planting a food forest with 30 fruit trees and many Native shrubs including gooseberries, currants, thimbleberry, and hopefully soon an elderberry because they're trying to increase their resilience as a family and learn how to eat wild plants and ornamental plants like big leaf maples, guided by respect for the Nez Perce and their knowledge of Native plants and resilience in this landscape.



Hannah Panci (Great Lakes Indian Fish and Wildlife Commission) reported from the Chequamegon-Nicolet National Forest in Northern Wisconsin on one of their two phenology study sites to highlight the diversity of plants in one spot, including wild leeks, Zhigaagawanzh in Ojibwe, spring beauties, trout lilies, spring flowers, and sugar maple buds.

Katie Jones (Blackfeet/National Ecological Observatory Network/IPN) gave her seasonal report from Colorado, the traditional lands of the Arapaho and Cheyenne peoples. "One of the efforts I have made recently to decolonize my thinking about science and the world is to learn the Blackfeet names for the calendar months. May is Otsikssts'otsitaitshpi and that means 'when the Buffalo flowers bloom.'

In Blackfeet tradition the Buffalo flower was the marker of the beginning of the migration of the buffalo, and indicator of time to prepare for the return of buffalo. The western name for buffalo plant is *Thermopsis rhombifolia* and this plant here is the local relative of that plant, *Thermopsis divaricarpa*. I first noticed it blooming on May 4 so perhaps similar timing to what we see historically in Blackfeet territory. But it makes me happy to see it and to think about it as a marker of cultural practices of my people even though I'm not on my historic lands and it makes

me excited to talk to all of you and think about actions that the Indigenous Phenology Network can take together to continue to build relationships with place and one another.”

Retrospective look at Rising Voices, Phenology, Where We Have Been, and Where We Are Going

Session participants joined smaller breakout groups for an interactive discussion together to share interests, projects, and/or lessons learned in collaborative, phenology-related work between Indigenous and Earth sciences and ask questions about phenology in general or related to an existing or future project, with the idea of learning from what emerged to develop action items and collaborations moving forward.



While the breakout groups were meeting, the session also continued in parallel with a retrospective, historical look back at Rising Voices. One of the first [introductory videos](#) about Rising Voices was shared, during which Rising Voices co-founder Bob Gough discussed how the United Nations had posed four questions to thousands of scientists around the world: is climate change real? Is there a human fingerprint on it? Can we mitigate causes? And how do we adapt to changes we can't mitigate? The answers to the first two are purely scientific. For the third, that gets very political because there are vested interests of those in the production of greenhouse gas emissions. The last question about how we will adapt to it – they went back to the United Nations and said you need to go home and talk to local and Indigenous peoples to see how we can begin to adapt to a rapidly changing world.

Ramsay Taum (Life Enhancement Institute of the Pacific) also raised in the video, “When you look at the definition of science, our ancestors have been practicing science for thousands of years. We would not be here today if we weren't able to transfer that knowledge, duplicate, experiment.” Dan Wildcat (Haskell Indian Nations University) elevated the point, “If we could reconnect the biological, ecological diversity of the planet with the cultural diversity that we need so that we can live well in those places, we could address many of the most pressing problems we face on the planet today. We're trying to create a new vocabulary that brings western and Indigenous knowledge together on the same playing field and develop together a language that allows us to communicate shared knowledge. We move in different paths and different streams but guess what? Those streams merge, they converge, and when they do something new can emerge out of that.”

Coming back to the live session, Hank Fergerstrom (Na Kupuna Moku O Keawe) shared, “I am so glad we are starting to look at the past, it is from our past we can see forward. I really like these evaluations of the climate on different coasts...what you see is coming this direction.”

Kalani pointed to the difference in how the National Weather Service is reading patterns coming across the Pacific Ocean impacting the West Coast and moving across the continent following

the jet stream, whereas Indigenous people are looking at it as what you see on the East Coast you later see in the Central region then West Coast. There is something behind us reading it coming from both directions. Katie Jones reflected on this being one of the ways in which Western Science has an opinion of what is right and true, and once it finds details that corroborate an Indigenous story that they change their model. How do we start getting that kind of attention given now and “use this information to develop our worldview instead of waiting for Western science to disprove itself to believe an Indigenous story.”

Considering the differences between Indigenous and Euro-Centric knowledge systems, Paulette Blanchard reflected, “The science that is considered the standard by which all others are judged is Euro-Centric settler colonial science and we need to remember that science is one of the pillars of colonization and assimilation and recognize that it’s one perspective that has been co-opting other peoples knowledges and appropriating it for generations. To be cognizant that the current science system, the methods, are based in a world view that does not allow outliers because they’re so busy trying to find the pattern whereas Indigenous knowledge is the opposite. We look to the outliers as evolution, diversity, these are where things happen in the environment or in a species where an adaptation, as science calls a mistake, that anomaly could be the difference between life and death for a species. Nature does not necessarily make mistakes but it creates opportunities for diversity and the diversity is where survival happens...No one is better or worse but both are subjected to a certain extent. The difference for me is that Indigenous science allows for other ways of seeing, knowing, and doing where Euro-Centric science dispels it...Indigenous knowledge systems are not commodified knowledge but relational. That’s another important thing to bring into the current system of science now, is this idea of not only reciprocity but exchange in a fair and respectful and transparent manner.”

Hank explained that the chant that was shared at the beginning of the session was “to describe that in the back of all of us we have foundational knowledge that science does not quite have. Science is slowly but surely learning that ours does not change. The present changes to where they can see ours. All of our cultures have that in us, in our pasts and it’s important to understand fundamental things. If you understand the pathway of water you can understand everything. That’s what we’re protecting.”

Kalani articulated that “Life is changing, we are understanding science differently and institutions such as NCAR are really trying to get a new handle on science and how it’s impacted...We definitely have to find new ways to tell a story, to communicate our science learning and that’s what RV is about.” Transitioning to another part of the [RV introductory video](#), in which Karletta Chief (University of Arizona) shared, “Rising Voices is different because knowledge is shared across a wide range of Indigenous communities. It’s an opportunity for people from many different backgrounds to have a conversation about how they might build partnerships. We’re learning about what’s happening from the people that it’s happening to and it makes you want to do more, to be more engaged...We are talking to each other and starting to understand both sides, and both sides are learning. All adaptation is local and having it done

on the micro-scale in backyards and in communities, that is where the greatest resilience comes.”

Kalani and Hank’s dialogue following this clip speaks to much of what the Rising Voices collaborative is working to do:

Hank: What’s good to understand is there’s really not that much difference; just a 180-degree turn, it’s the same thing we’re looking at.

Kalani: This makes sense, as someone looking from the opposite direction would see a different way from you, which brings us to the desired impact of efforts like Rising Voices, to recognize that everybody is within the closed loop system, everybody is living within the atmosphere on this planet.

Hank: It’s really refreshing to see young scientists, especially women, out there in the front, it’s really important.

Considering the transition to internet and related technology, particularly relied upon during the current public health crises, Hank reflected about the major problem in our communications, “We want to bridge that gap, and also allow our younger people to view the Kupuna (elders) that are foundational...What we really need is for our younger people to take the time to come teach us older people how to utilize these tools...What we’re trying is to bridge between the older and the younger, where information can transfer back and forth.”



Ideas were shared around what collaboration really looks like and the need for reciprocity, respect, responsibility, accountability, and relatedness:

Paulette: A lot of younger Native generation is taking charge to bring back some of these traditional ways because we’ve got several generations of elders that were abused and went through boarding school and the violence of that whole process of forced assimilation...the trauma is still there, but we have had a little bit of time to heal...There’s so many spaces on the inside that we need to be to affect change...So it’s important to get into those spaces but not be the system and that’s hard. That’s why groups like this are so important because we are allowed to be who we are and talk about work that is relevant and important and find ways to collaborate to fund these issues and implement changes that need to happen. Diversity doesn’t happen without really creating space for multiple diverse peoples...Diversity is more than just lip service, it’s actually intentional and nature teaches us that. How beautiful is it so see species that are related but different? Phenology has been great at sharing, showing how places that are diverse have similarities and how can some of these different solutions transcend place and space and be implemented for another problem.

Hank: The more diversity we have the better our garden will grow. We're moving away from western monocropping even in our minds. It takes a village, and why? Because you need all those types of inputs. 360-degrees to a circle can't be only your view. This is really important to understand and welcome the difference. I've always leaned on this idea that you don't want to run to a conclusion because that's an end point, leave that door open.

Kalani:...as my grandfather would say, the past should always inform us, but never control us. The past should always have a voice and never have a vote because the factors are changing...This is the journey of life: the connectivity of the wisdom of the elders to the enthusiasm, the ideology of the youth, to the plotting, laborious day to day support of the parents, to the aging wisdom of the elders and this cycle just continues. And this framework of interrelated cycling, it's a framework understood by Indigenous and Native cultures playing out in our leadership, relationships, and not played out in the dominant culture.

Returning to the [RV introductory video](#), voices of students and youth who have been part of Rising Voices over the years shared about the importance of connections and collaborations. As Lea Kekuewa reflected, "In ancient Hawai'i we have this notion that we are all 'ohana, we are all related, we're in this together, and we are connected. Only by caring about each other can we survive." An example highlighted in the video of bringing together diverse knowledge systems and collaborative research was an NSF-funded INCLUDES project that emerged from collaborations and relationships built through Rising Voices between representatives from NCAR and GLOBE/UCAR and participants from four communities in Hawai'i, Wisconsin, Arizona, and Alaska; the collaboration was focused on enhancing hydrologic understanding. Community members from each of the four communities were responsible for collecting, monitoring, storing, and sharing their data with tools and other assistance from NCAR. Through this process, Native students are trained to do Western science without being forced to separate their culture from their research, and Western scientists are trained on how to work with Indigenous groups. Sage Nishida and Sarah Purgus (Olohana Foundation) are shown in the video measuring for gardens at the Love Farm, and installing soil moisture probes at different depths.

Coming back to the live session, Kalani reflected on the real community work happening on the ground. Referring back to the last image shown in the video, "For those of you that noticed the circle in the last shot as it's rising, that's within an agroforest, a food forest, and a learning garden. That particular circle is a moon calendar that also has the annual seasonal climate pieces built into it. So, we're using the information as you saw from modern science and soil probes with satellite link-ups with our monitoring coupled with Indigenous knowledge about seasonality, about phenology, about differences. We're using this to also teach social values and skills and different religious and cultural expressions...This is what phenology and the awareness of phenology brings to our learning community: that everything changes. There is nothing static, so the reductionist model of science that keeps pulling us into Leonardo's

mechanistic universe limits our ability to understand the phenomena we're actually observing. What we need to do instead is...apply the spiritual aspect to scientific learning."

Highlighting the connections between phenology, food forests, and disaster preparedness, a short video was shared about the Olohana Foundation's [VICTree Gardens \(Virtually Interconnected Community Tree Gardens\)](#), which can provide food for a family of four for 4-6 days in the event of a natural disaster.

BREAKOUT GROUP REPORT-OUTS

In the breakout session, it was promising that a number of both Indigenous and non-Indigenous people in academic environments shared steps they are taking to put Indigenous knowledge and non-western knowledge systems in the forefront in their work and incorporating it in a way that is on equal footing with the Western knowledge systems.

One of the groups started off with the questions of "What local observations can we correlate with some of the regional and global scale observations that we're hearing about diminished greenhouse gas emissions during the last two to three months? How is local phenology changing alongside these regional and global trends that we're seeing?" Native approaches to ecosystem services are relational and giving before taking is emphasized; the ecosystem is treated as a group of relatives, which is vital to sustainably managing our behaviors around the relatives that are really our true lifelines, particularly in the context of food. Some of us are eating more locally, supporting more local food efforts; how do we think about that in the context of phenology as well?

What do we hold on to when our dominant colonial settler structures and systems try to come back after COVID-19-driven quarantines lift? How can we maintain those food systems that we can think about especially in the context of phenology when the "business as usual" and "back to normal" starts to come back? Some of the things raised were mutual aid networks, open-source sharing, regenerative practices, and new approaches to infrastructure that are less energy intensive in buildings and transportation and in food systems, and about intergenerational knowledge, the importance of having really different perspectives whether they be Indigenous, generational, or both that allow us to think about options to these dominant structures.

Some of the long-term considerations raised in where and how we move forward include really giving attention to the issues with and importance of language, like the word "phenology", decolonizing the study of phenology by including Indigenous, Local, and Traditional Ecological Knowledges, which includes reconciling language used in TEKs and Western-oriented language around phenology; and removing barriers for working better together. Youth are an important entry point to develop this area of work/training.

Bill Thomas (National Oceanic and Atmospheric Administration) emphasized that we need to consider the importance of protocol and processes, informed by foundational principles based upon sustainable cultural practices that must find pathways to not be hindered by structural institutions (for example, considering permission and who information belongs to). We recognize that addressing these kind of structural issues is the long-view; at the same time, we can consider what we can implement now that will be most supportive to all living beings in the long-term.

We need to bring people together to address the impacts of and overlaps and convergence between, for example, medical and atmospheric research, such as tracking changes throughout the pandemic, and phenology, climate, health, and relocation, and the relationships with all organisms. For example, what happens when the plants we rely on aren't there? How do we maintain connections when we've relocated? And how do we welcome invasive species while maintaining traditional, native ones considering the interactions between species and the cascading effects.

Some of the questions we must be asking as this work continues and we develop new collaborations include considering if the benefits in phenology research are reaching Indigenous communities? How can better understandings of phenology help with food security, particularly in the current pandemic situation? How do we capture lessons from the changes we are seeing now and carry them with us into the future; how do we ensure that we don't go "back to normal"? And what is the emotional place of phenology?

A lot of emphasis throughout the session was on storytelling and the role of storytelling and passing knowledge on across generations, disciplines, and knowledge systems. The existing platforms of IPN and RV are ways to share these ideas and foster and develop further collaborations for both near-term projects and long-term paradigmatic shifts.

To close the session, Hank shared a prophecy chant that "talks about this time right now, the Huli. So it was calling our ancestors from above and those from below, we'll all gather together, will lock arms, and will raise a nation." Kalani, "Raise the globe! Raise our families, raise your hands in celebration. We'll see you guys in the next RV. Blessings on us all!"