Restoration at Tulalip: Shoring Up a Damaged Ecosystem

The Tulalip Tribes’ Fisheries and Natural Resources Commissioner, Terry Williams, is succinct in describing the environmental crisis that his and other Northwest U.S. tribes face: “We’ve lost 90% of the salmon population.” For some 4000 Tulalip tribal members—2500 of whom live on the tribes’ 22,000-acre reservation on the eastern shore of Washington’s Puget Sound—as with other Northwest U.S. tribes, that population crash is much more than an assault on their economic lifeblood—it is a cultural and spiritual threat to their identity as a people.

Subsistence is just one aspect of the tribes’ relationship with salmon, but it has been crucial to a people who have shared a give-and-take relationship with the fish for thousands of years. That relationship continues, in diminished form, even after a catastrophic population crash that began in the 1980s. Disruption to the salmon’s life cycle, says Williams, hits at the core of Tulalip’s sense of balance as earth-dwellers and spiritual beings. Just one example: the Salmon Ceremony, held each spring, puts tribal members in direct touch with their ancestors. Other ceremonies and practices centering on the fish represent an important part of who Tulalip tribal members are as a people, and losing the fish is a cultural and spiritual threat to their identity as a people.

Native America Loses a Distinguished Leader

Fort McDowell Yavapai Nation in Arizona, and all of Native America, lost a dynamic leader on July 5 when tribal President Clinton Pattea passed away at age 81. President Pattea helped to lead his Nation for close to six decades, serving as a tribal council member for over 40 years and as tribal president for 25 years. During that period, the small tribe on the edge of Phoenix moved from poverty to economic vigor, and President Pattea deserves much of the credit for that transformation.

He was born to modest circumstances on Nov. 11, 1930, to Lillian Shenah and Felix Pattea, on his ancestral land of Kwoyokopaya-Yavapai, now known as the Fort McDowell Yavapai Nation. His great-grandfather was a Yavapai chieftain in the 19th century.
Greetings. I begin this column on a sad, but also a celebratory, note. On July 5, we lost one of Native America’s great leaders when Clinton Pattea, President of the Fort McDowell Yavapai Nation, passed away at age 81. (For more on President Pattea, please see the article in this issue.) He was a bright light in Indian country, a powerful leader and an inspiration for all of us—a wonderful model of who we might become. President Pattea devoted his long life to service, fighting for decades for tribal rights and sovereignty with great wisdom and skill. I want to extend my sympathy to his many loved ones, and I thank his family for everything he gave us.

The profile in this issue of the Tulalip Tribe’s work to restore their natural habitats is one reflection of the serious impacts of climate change, particularly on those who live close to the land and rely on the bounty of Mother Earth for physical and spiritual sustenance. Restoring your traditional food source is restoring your life source. I salute the tribe’s environmental staff, community and leadership for their foresight and tenacity in dealing with this issue. We wish Tulalip all the best in this important effort.

In recent years ITEP has increased our focus on climate change, developing classroom training, support, and our climate website (www4.nau.edu/itep/climatechange), and helping to bring Indian people together to learn more and exchange ideas on the issue. Here at Northern Arizona University in Flagstaff, our Climate Change Program Manager, Sue Wotkyns, hosted tribal sessions at the 12th Biennial Conference of Science and Management on the Colorado Plateau, Sept. 16–19th. The event brought together resource managers and scientists to share information on protecting natural and cultural resources on the Colorado Plateau. For this event, Sue helped to arrange tribal meetings and symposia. Please visit http://nau.edu/merriam-

powell/biennial-conference/ for forum information and contacts.

Sue has done great work assisting tribes on climate issues, organizing training and resources, co-authoring papers on the topic, and coordinating tribal sessions at a variety of national and regional events. I want to congratulate her for all her hard work. Recently she teamed with several authors to publish an article on climate change and its impacts on tribes. That article appears in the August edition of the journal Climate Change, which you can find at http://link.springer.com/content/pdf/10.1007%2Fs10584-013-0852-y.pdf.

I’ve recently taken on a new role as a member of the Dept. of the Interior’s Advisory Committee on Climate Change and Natural Resource Science (ACCCNRS), a group that reports directly to Secretary Jewell and the department’s top leadership. In that role, I will contribute a tribal perspective on ways the various agencies under the DOI umbrella—U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, and a number of others—might address climate change within their agencies. I will not be speaking “on behalf” of tribes, but I can share information and concerns of individual tribes who wish to be heard. Please contact me if you have a concern you would like for me to relay to the leadership. For my own part I will express, among other issues, the need for increased funding and assistance to tribes.
TULALIP - from front page

blow that strikes at their core.

The plethora of challenges that threaten to eradicate NW salmon can seem overwhelming. They include overharvesting off Alaska and Canada, habitat loss throughout the region, and the presence of dams and other water structures that restrict or block the migration of this anadromous species (salmon begin life in fresh water before adapting as a saltwater species by the time they move downstream from inland waterways and enter the sea). Pollution assaults the fish from birth to old age, and the multifarious impacts of climate change disrupt the population by changing weather patterns and creating conditions that damage the chemistry and temperature of water, from high country rivulet to ocean floor.

But just as few family members would deny a close relative support in time of need, tribal members continue working to sustain a being that has sustained them in so many ways from time immemorial.

The Law vs. the Natural World

Treaties the tribes signed with the U.S. government were designed to guarantee the relationship between tribes and salmon would remain viable. But government violations of those treaties have been pervasive, and a long struggle has been necessary for Northwest tribes to regain a fraction of what was promised on paper. The Boldt Decision in Feb. 1974—following a painful period of demonstrations, protests, arrests and other disruptions collectively known as the “Fish Wars”—was the first modern victory in a series of wins that promised Northwestern tribes their fair share of salmon after non-native consumers depleted the populations, backed by laws that flew in the face of tribal rights and needs. Declaring that tribes were entitled to half the population of Chinook Salmon in their traditional, off-reservation fishing grounds, Federal District Judge George Boldt’s ruling, for the first time, made the tribes co-managers of the fish with the state of Washington.

Tribes were buoyed by the ruling and mounted renewed efforts to regenerate their traditional, salmon-based lifestyle. For awhile it looked like they might be successful. More-recent rulings, such as one by Federal Judge Ricardo S. Martinez, have bolstered the tribes’ position (a related suit was decided in the tribes’ favor last April, requiring the state to alter water structures that interfere with salmon migration). For the first time in a century, the law has leaned toward the primacy of tribal members as stewards of their salmon brothers and sisters.

However, forces far more powerful that judges and legal codes have continued to deplete the salmon population and erode their health and that of other natural resources on which the tribes depend. Coping with a dizzying array of large-scale stressors on the ecosystem is now the primary challenge.

An Ecosystem in Chaos

Assaults on salmon come at all levels of their development. After hatching upstream, salmon (and steelhead, a trout that also migrates to and from the sea) fry travel down freshwater courses and enter the sea hours to years after hatching. In brackish estuaries, the fry make the change from freshwater to saltwater species in a process called “smoltification.” Just two percent of salmon survive to adulthood in the best of circumstances.

Despite the promise of justice on the legal front, the salmon’s ecosystem in and around the Puget Sound has all but unraveled. The reasons are many. Stresses begin in Earth’s atmosphere, where air warmed by carbon and other greenhouse gases create a lethal web of disruptions. Patterns of glacier melt that for millennia created a welcoming environment for salmon along the Puget Sound have changed
dramatically in recent decades. “We did our first climate assessment for the Snohomish Basin about ten years ago,” Terry Williams says. “That told me spring flows, because of warming, were coming two to three months early.” Tulalip Watershed Policy Analyst, Preston Hardison, adds, “Fall is longer and winter is delayed. Then when spring comes, it comes rapidly, one and a half to two months early. It throws everything off.”

Rapid spring warming, on top of a shorter winter that each year diminishes glacier buildup, causes runoff that once came in gentle pulses down the mountain to descend oftentimes in a torrent. Warming impacts, aggravated over the past century by forestry practices that have stripped the high country of old-growth trees and absorbent duff (litter that coats the forest floor); lacking its earlier absorption capacity, the forest releases more water more quickly, leaving less for the immediate ecosystem and for underlying aquifers.

“All this is destroying salmon habitat in the river systems,” Hardison says, “carving out channels and destroying side habitat where salmon go to get out of the main channel. So they don’t have that resting, foraging, and predator-protection.” The spike in runoff also carries more sediment into streams, interfering with salmon development. Warming, along with forestry practices, impacts mountain streams large and small by denuding their banks of vegetation. This warms the water and creates barren banks whose soil can be swept downstream by heavy flows. Quick runoff prevents adequate aquifer recharge, and so streams once fed by cool subsurface water more conducive to the salmon’s needs now average higher temperatures, further stressing the fish.

Changes in the water cycle also impact the health of salmon. Whereas slower runoff once allowed fry to gradually make the transition to saltwater, now they’re rushed through the freshwater system and dumped into the sea too soon in their development, making them more susceptible to illness and predators. Estuaries have been damaged by runoff and chemical changes, and hiding and feeding habitat have been denuded in areas where young salmon once found protection as they made the change to sea-going creatures.

Pollution adds to this toxic mix, not the least being the million tons of human and animal waste that enter the Puget Sound each year. Only partially treated, that waste stream includes all the poisons of modern society along with fertilizer that feeds the overgrowth of algae and other ocean vegetation, which strips the Sound of oxygen during decomposition.

“It’s a messed-up system,” Hardison sums up. “We’ve really created havoc.”

Small Steps, Big impacts

The magnitude of these combined problems can seem too pervasive for any effective response, but that hasn’t stopped regional tribes from acting where they can. Tulalip’s approach could be described as “top-down.” To respond to disruptions in the timing and rate of runoff, the tribe is now in discussions with high-country land managers that include the U.S. Forest Service, U.S. Army Corp of Engineers, and Washington’s Department of Natural Resources. One “high-level” approach they’re exploring: creating upper-elevation snow reservoirs to capture glacier and snowmelt rather than allowing it to rush quickly down to sea. “One of Preston’s contacts with the Convention on Biological Diversity,” Williams says, “sent us Scientific American articles and photos of a similar project they did in the Himalayas. Over 5000 feet up they put in a dam to catch water instead of ice. It’s working there, and we think it can work here, too.”

“If we create high-elevation snow catchments,” Hardison explains, “when snow melts, instead of just rushing down the mountain it’s captured in the reservoir as water,
Whenever a tribe works with outside entities on a project that might reveal traditional ecological knowledge (TEK), control of that knowledge is often an issue. Tulalip Vice Chairwoman Deborah Parker says, “Tribes are trying to hold onto their medicinal plants, their stories, their songs. Northwest tribes have been the leaders in helping to preserve the salmon fisheries, our land, our sacred waters along the coast. Those are our traditional pathways to life, and they go hand in hand with our traditional belief systems.” Ecological threats are pervasive, she says, and they must be addressed by those who can best address them, which sometimes includes nontribal scientists and researchers. But the cultural risks in such cooperative work are pervasive, too. “I think most tribes throughout North America are trying to ensure that their private knowledge remains respected,” she says.

Protecting cultural knowledge is an ongoing challenge, on many levels. Parker relates a local issue that illustrates one part of the problem. “We have a place where people like to go fishing. It’s a place where human remains have been found. The tribe has put up signs—‘Private Area, for Tribal Members Only’—but others come in and constantly tear down the signs. It’s really been a battle. They have no idea of sacred areas, places that need to remain untouched.”

This lack of respect for a location that is sacred to the tribe represents the most obvious kind of abuse. But the problem can rear its head in more subtle ways as well. Traditional knowledge—such as awareness of where a medicinal plant grows, which tribal family holds possession of a particular sacred song, or how a ritual is conducted—represents a crucial part of a tribe’s identity. Losing control of such knowledge is oftentimes a cultural, if not a spiritual, affront to the tribe.

A major legal obstacle in TEK protection, says Tulalip Watershed Policy Analyst Preston Hardison, is that U.S. copyright law presently does little to protect tribal rights in the matter. “In U.S. society,” he says, “generally the only time people want to protect knowledge is when they want to make money off it.” A significant dilemma for tribes seeking such protection, he adds, is that “if they don’t share their knowledge their values may not be protected, whether that be about the land, an important animal, or an ecosystem. But if they do share the knowledge, they’ve lost control.”

Hardison is presently involved in an effort with Tulalip and other Pacific Northwest tribes to craft rules-of-use for the possession and use of traditional knowledge. The rules they shape will help ensure that individuals exposed to private knowledge have a clear understanding, and clear responsibilities, regarding how they traditional information to which they are exposed. “Essentially,” says Hardison, “the guidelines will be high-level rules that say, ‘Here are the kinds of things the tribes will expect from you if you come to us seeking this kind of information. It’s essential to understand you have to come to the tribal authority and get consent before you get access. And you have to respect the tribe’s authority regarding the rules you agree to.’”

Chairwoman Parker is confident that tribal “medicine carriers doing this work will know how that protection can be achieved.” She offers general guidelines that she believes could help decrease TEK abuses: “I believe [those given access to traditional knowledge] should ask the person who is sharing the knowledge how it should be shared. Some knowledge is private, but other knowledge should be made public—we might need people to know we’re protecting this or that plant. Typically you consult with the elders who carry the traditions. [Those exposed to TEK] should ask, ‘Can I record this? Can I share this?’ And they should keep asking, to make sure each piece of information received is acceptable to share.”

Parker believes such rules will be a great help. But she adds that there is another angle to consider: While the Western-science approach can be valuable in restoration efforts, it isn’t the only lens through which to view traditional knowledge. “The four-legged, the winged, the finned—we call them our brothers and sisters of the earth. For some that’s an unacceptable, unscientific explanation. But not everything has to be defined the way you’re taught to define it. Sometimes you don’t have the words to protect what you’re looking at—you just have the thoughts and feelings. That’s okay, too. I can appreciate researchers and others trying to have that understanding. But sometimes we have to accept that it’s not for us to understand but simply to protect.”

To view a 2010 interview with Preston Hardison on an international effort to protect indigenous rights, visit: http://www.youtube.com/watch?v=rLqdWsOvXI
Stay Calm and Carry On: EPA’s Forum on Environmental Measurements

by Melinda Ronca-Battista, ITEP/TAMS Research Associate

The US Environmental Protection Agency’s Forum on Environmental Measurements (FEM) is implementing a policy requiring organizations that generate or use environmental data under certain EPA-funded assistance agreements to submit documentation of their competency before the agreement is awarded. If that is not practicable, submission should be made before any work is performed involving the generation or use of environmental data under the agreement.

When EPA first announced this policy, members of the tribal air community expressed dismay about what appeared to be yet another set of paperwork and requirements that tribes must complete. Even the title, “Proof of Competency,” has an unfortunate ring to it! After talking with Laura Phelps, EPA's Senior Advisor for the policy, we learned that this policy imposes no additional burdens or paperwork—it is merely a restatement and reminder of existing policy that has been in place for over ten years.

Everyone who has taken ITEP courses or has worked on a quality assurance project plan (QAPP) with us knows that we always stress quality assurance (QA) from a common sense perspective, emphasizing the need for an approved QAPP that actually reflects the work you do. An approachable QAPP includes documentation of the organization, personnel training, audits, data management, and schedule and specific content of regular reports to EPA.

A Question & Answer document has been assembled from webinar discussions about the policy (available at www.epa.gov/fem/lab_comp.htm). One answer states, “The policy is not intended to be burdensome or to require actions beyond what already was being done to ensure competency. The policy is intended as a check to ensure that entities are in fact doing what they have promised to do. Quality systems and Quality Management Plans (QMPs) already were in use; this policy is designed to ensure that they are being followed and updated as needed. Systems are to be in place up front and then followed at regular reporting intervals.” In other words, keep calm and carry on. Determine a few areas that could be improved (see below) and add other pertinent items to your regular communication with EPA. If you have an approved QAPP and are doing what it describes, just carry on and continue to follow your QAPP.

Why was this policy issued? Public information is available on air monitoring agencies that have approved QAPPs. As it turns out, there are agencies—including many outside the tribal environmental community—that do not adhere to EPA policy (and common sense, as well as international ISO guidance) for keeping updated and approved QAPPs that include all required elements, such as training and audits. EPA updates a list of agencies with approved QAPPs; that list is available on the EPA Air Quality System (AQS) website, at https://aqs.epa.gov/agswcodes/data/QAPP.html.

The link to this list was posted in the informative QA Eye newsletter published by Mike Papp in the Office of Air Quality Planning and Standards. Please sign up to get these newsletters, as they contain useful information (http://www.epa.gov/tnn/amtic/qanews.html). As you can see from the list, many agencies operate without approved QAPPs or follow outdated QAPPs. There are many reasons for this practice, two being the poor economy and triple-booked EPA Regional officials.

Producing valid, up-to-date quality documentation is one example of how tribal air agencies can stay ahead of the curve on quality assurance. A small agency, such as a tribe, might have the same person conducting routine data-gathering and writing the QAPP. This means the QAPP will describe work actually being done and the site operator will know of the need for routine quality control (QC) checks and external audits; the site operator will be familiar with equipment and data and will tend to notice anomalies right away.

Phelps stressed that this policy is designed to assist Regional EPA staff in assessing QAPPs, QMPs, and other quality documents; it is not intended to be adopted into new checklists or forms that tribes would have to complete. In addition, she and her colleagues emphasize that EPA strongly encourages Regional consistency in the implementation of this policy.

EPA policy stresses the need for documenting several aspects of a well-run program. This is an opportunity to revisit your QAPPs and, when they are up for revision, to make sure a few emphasized elements provide a thorough description of your work. These emphasized areas are:

1. Demonstration of the “Independent QA function.” Small agencies, such as tribal air programs, must be resourceful in allocating the QA function to someone removed from the line of authority for field data collection, a person who has adequate scientific literacy to review QC and summary data and can provide an educated review of the data. In some cases this person will be from a sister agency, such as the water program. This QA function should never be held by a supervisor of the site operator or anyone in that line of authority; however, this function must be held by someone who is merely a restatement and reminder of existing policy that has been in place for over ten years.
with adequate authority to question the data and have those questions addressed by the air monitoring agency management. A description of the ideal QA Manager, which might be unrealistic for small agencies but does describe the requirements, can be found at: [http://www.epa.gov/ttnamti1/qaqcrein.html](http://www.epa.gov/ttnamti1/qaqcrein.html). The role of the QA Manager should be documented in your QAPP, and a summary of their activities should be included in regular reports to EPA.

2. Audits and other performance assessments. Although budgets are stretched thin, it is vital to describe the number and type of assessments required for the type of data you are collecting. This includes comparable data for National Ambient Air Quality Standards (NAAQS); EPA regional Technical Systems Audits every three years; participation in the performance evaluation program (PEP) for PM2.5; participation in the National Performance Audit Program (NPAP); and annual assessments. More information on the number and types of audits required for different data uses can be found at the Tribal Air Monitoring Support (TAMS) Center website: [http://www4.nau.edu/tams/tools/](http://www4.nau.edu/tams/tools/).

3. Results of such audits and assessments. Reports should include descriptions of how your agency is responding to audits and demonstrating continuous improvement.

4. Reporting of training, both formal and informal. In quarterly and annual reports, include descriptions of training that occurred since the last report. Include on-the-job training, online courses, and any other educational activities that contribute to your understanding of the work done in the air quality program. Informal training, such as collaboration with nearby agencies on trouble-shooting equipment, can be classified as informal training as long as it is documented and has measurable outcomes.

5. Documentation. QAPPs and standard operating procedures (SOPs) should be periodically reviewed and updated to reflect changes in operations, staff, sites, and equipment.

In our continuing mission to provide support and training to tribal environmental professionals, the TAMS Center is issuing a new and updated version of the TurboQAPP program in the fall of 2013. This program can be used to write a QAPP; as a reference for example text for various sections of QAPPs for criteria pollutants; as guidance on content for each section of a QAPP; and as a source for links to EPA resources. 🌐

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**CONTACT**

melinda.ronca-battista@nau.edu

if you would like our assistance or wish to be added to the mailing list for the new version of TurboQAPP

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and the flow can be regulated and released in a more natural way."

Although that project remains theoretical for now, the tribe is much closer to actually constructing a series of wetlands farther down the mountain that will provide habitat for young salmon while helping to buffer torrential runoff from the high country. “We’ve done the feasibility study on this already,” Williams says. “We’re looking at 250 acres, a small lake. What it finally got down to was talking with federal, state, and local agencies to get permission to have a sand-and-gravel operation come in and dig holes for wetlands. We’ll sell the sand and gravel to pay for it. Over a seven-year period this should produce about ten million dollars. That money will help us pay for construction of other wetlands throughout the basin. We need a whole basin full. This first one will be a kind of bank for the rest of the basin.”

The wetland buffer will help support salmon fry as they make their way to the sea. The wetlands will help, but other challenges will continue, including warming water, pollutants, lack of cover and foraging habitat, and sedimentation from eroding shorelines.

Williams says the tribe is talking regularly with local developers to find ways to ease pollution in the region. Revegetating streamside banks will help improve riparian habitat while also easing the sedimentation problem. The wetlands, and possibly the high-elevation impoundments if realized, will help ease snowmelt back into the aquifer. The emergence of groundwater will help cool the streams it feeds, returning them to salmon-friendly temperatures closer to their historical levels.

**Planet-Scale vs. Local Action**

Ocean acidification is an international-scale issue that threatens the health not only of salmon but of plankton, the foundation of the ocean food system, and of shellfish, such as butter clams, on which the tribes also rely. “There are episodes of highly acidified water at times,” Hardison says, “and it actually dissolves the shells. But even at lower levels you get interference with development, and some shell erosion. It’s especially harmful to the youngest critters, before their shells have hardened.”

Caused by increased carbon-loading from the atmosphere, acidification tends to draw less attention than the more-general, but closely related, issue of climate change. “You can argue all you want about global warming,” Hardison says, “but the fact that the ocean is getting more and more acidic is not open to debate; proving it is a matter of measuring the chemistry. Carbon is just raining down...
After more than twelve years on the job as Administrative Associate for the Tribal Air Monitoring (TAMS) Support Center in Las Vegas, Nevada, Lee Rose has retired. Lee began her work at TAMS just after its launch and has been there through a number of changes in personnel and operation.

She remembers the Center’s humble beginnings and ITEP’s first course there, PM Monitoring, as well as changes in managers and the addition of new courses and services over the years. But her fondest memories, she says, involve “seeing participants getting so much out of what we do, their faces lighting up when something clicks, whether it’s hands-on with equipment or in presentations—those are such positive memories for me.”

Lee was responsible for most of the logistics for TAMS training courses, and she served as the “communications center” for much of the contact tribal members have had with the TAMS Center staff. She says the challenges at TAMS over the years included “working in partnership with a federal agency, with its processes and security needs, and making sure things keep going. That was hard at times, but it’s a worthy challenge.” She adds, “What TAMS does is so valuable. Glenn, Melinda, Farshid, Angelique and Chris all work extremely hard, and they really offer the best. It’s incredible what they’ve done, and it’s been so rewarding working with them.”

Lee will be doing very little couch-surfing in her “retirement.” Among her plans: volunteering (“giving back to my community”), refocusing on piano (“Music was my major in college, and I really haven’t kept up”), traveling with her husband, Larry, and spending time with family.

Chris Lee, ITEP/TAMS Co-Director: In all the time that I have worked with the TAMS Center, Lee has been the consistent and professional face for the organization. Her professionalism, strong support, and friendship will be greatly missed. I wish her all the best as she embarks on this phase of her career and life.

Melinda Ronca-Battista, ITEP/TAMS Research Associate: Lee has brought more than her thorough and organized mind to assist us at the TAMS Center; she has brought caring, understanding, and a focal point for communication and friendship.

Farshid Farsi, EPA/TAMS Co-Director: Lee is a very knowledgeable, kind person with a lot of attention to the details. Her people skills are the best, and she shows a real genuine care for the work she performs. She will be greatly missed.

Laura McKelvey, Group Leader, EPA Community and Tribal Programs Group: I will miss Lee’s smile, her hugs and her husband’s cookies. I will miss trying to make her laugh. I always appreciated her willingness to keep everyone on track and keep things running smoothly.

Jed Harrison, EPA Sr. Tribal Advisor & former Las Vegas Lab Director: Lee has been the face for many tribal environmental professionals and Steering committee members who have attended trainings or meetings. TAMS owes much of its success to the contributions of special people; for over a decade, no one has been more special than Lee.
who are grappling with climate change impacts.

A close link exists between climate and energy practices and policies. Recognizing that link, last year we launched ITEP’s Tribal Clean Energy Resource Center. We would like to welcome Nikishna Polequaptewa to the ranks of our TCERC team. Nikishna, a former Director of the American Indian Resource Program at UC Irvine, is a member of the Hopi Tribe and belongs to the Badger clan from Kykotsmovi Village. In the fall of 2013, Nikishna joined Northern Arizona University to begin his Ph.D. program in the School of Earth Sciences and Environmental Sustainability. He will be assisting TCERC with program development and partnership opportunities. We’re pleased to have this talented individual on board.

The TCERC program exists to help tribes explore their energy options, transition from conventional to clean-energy development, and otherwise utilize their energy resources in the cleanest, most efficient way possible. Over the coming year, we enter an important phase in the program’s development, and we’re hoping to expand our list of supporters and benefactors to continue carrying forward this important work. If you would like to partner with the program, provide other support, or learn more about TCERC, please contact me at ann-marie.chischilly@nau.edu.

In June, ITEP was awarded a grant from EPA Headquarters to establish an Environmental Workforce Development and Job Training program to help Navajo Nation tribal members develop job skills that will contribute to safe, effective cleanup of uranium contamination on Navajo land. ITEP has worked on uranium issues on the Navajo Nation in the past, but workforce development represents a new focus for us. We’re pleased to be a part of this important program and look forward to working closely with Navajo Nation EPA and others to begin our efforts. For more information, contact Roberta Tohannie at Roberta.Tohannie@nau.edu.

Finally, I would like to offer a fond farewell to Lee Rose, our long-time Administrative Associate with ITEP’s Tribal Air Monitoring and Support (TAMS) Center in Las Vegas. Lee retired in August after 12 years with the program. During her time at the TAMS Center, she helped tremendously in advancing the professional development of tribal air staff who have used TAMS services. As you’ll see in the tribute to Lee in this issue, her retirement will include very little in the way of couch-surfing. Lee has been a great part of the team and a good friend to all of us. We’ll miss her.

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on the ocean, and lowering the pH. Right now we have a 50-year ocean-wide carbon debt, meaning there will be 50 more years of acidification even if we waved a magic wand and got all the [carbon sources under control]. And we know that won’t happen, so we’re looking at a minimum carbon debt of 70 or 100 years.”

Despite the magnitude of the problems, Tulalip tribal members are not willing to sit back and watch the clock. There is a way, Williams and Hardison agree, to mitigate the worst impacts of acidification on salmon and other sea creatures, at least on the local level. That strategy involves restoring seaweed, kelp, eelgrass and other marine vegetation to coastal reaches. Doing so not only will provide shelter and foraging areas for young fish and other marine creatures—including the plankton and forage fish that provide a crucial early link in the food chain—but can create microhabitats of lower pH in which salmon and other marine creatures can get a relatively healthy start for what will be a long, difficult struggle. Restoring vegetation can also help to reduce shoreline erosion, which is stealing away coastal reaches and threatening to devastate the land base of their more-exposed neighbors to the north, the Swinomish Tribe, who face a potential 20% loss of their reservation land from such erosion.

“Time is the enemy,” says Hardison. “We believe we have to move quickly on all this.” The reasons are many: legal, political, cultural, and spiritual. “The tribes are fixed by treaty, by their ancestors, and by their relationships to the land. They can’t move. If species move away from tribal territories, they’re lost to the tribe. This is why we have to act quickly to restore the health of the ecosystems, to keep as many species at home as possible in the face of this major event of climate change. We’re also concerned about ‘tipping points,’ or thresholds. If the ecosystem is stressed beyond normal parameters, it can collapse.”

True North

Some argue that tribes bear an unfair burden in the climate change fight because little of the greenhouse gas that fuels the problem is generated by tribal communities. Williams says, “I’ve heard that argument for 30 years: ‘Why do we have to do this?’ Well, because it’s in your teachings. We were taught that we’re the caretakers of the land. The U.S. took it away, but it’s still our land. I tell our people that if nothing else we can set the example, a bar that people will recognize. Through our history we’ve maintained a high moral standard. We didn’t need contracts; we knew what the rules were, and we stood by them. We are the compass.”
NAU’s Tribal Clean Energy Resource Center’s
TRIBAL PHOTOVOLTAIC (SOLAR ENERGY) WORKSHOP
November 12-13, 2013
NAU’s Native American Cultural Center, Flagstaff, AZ

NAU’s Tribal Clean Energy Resource Center (TCERC) invites all tribal members and employees to attend this two-day workshop taught by TCERC’s PV expert Deb Tewa in NAU’s new Native American Cultural Center. Deb will walk through all aspects of PV Technology and lead lively discussions with industry leaders. TCERC’s PV Workshop will include hands-on work on photovoltaic solar energy including the basics of solar energy, system design, siting, and rooftop installations. Also included:

Day 1, 8am-5pm
- Lab work with PV Modules and Meters

Day 2, 8am-1pm
- Tour of NAU’s 160 kW PV array and Coconino Community College’s Mobile PV System
- Discussions with solar energy leaders:
  - Ann Marie Chischilly
  - Ken Lomayestewa
  - Aaron Gillmore
  - Derrick Terry

Workshop Instructor: Deb Tewa
Deb Tewa has over 30 years experience working to bring solar energy to diverse communities. She managed NavajoSUN, worked with Sandia National Labs Tribal Energy Program and the Arizona Energy Office. Tewa also taught Basic and Advanced Photovoltaics at Central Arizona College.

Workshop Partners:
- Coconino Community College
- Hopi Tribe
- SolarCity
- The Hopi Tribe

Sponsored by Northern Arizona University’s Tribal Clean Energy Resource Center (TCERC)
For registration and agenda: http://www4.nau.edu/itep/tcerc/tcerc_newsevents.asp

For questions, please contact Nikishna Polequaptewa at nikishna@nau.edu

$20 Registration Fee covers lunches, parking fees, and workshop supplies

ITEP Energy Resource Center Welcomes New Staff Member

ITEP’s Tribal Clean Energy Resource Center welcomes a new member to its team. Nikishna Polequaptewa is a doctoral fellow at Northern Arizona University, pursuing his degree in Earth Sciences and Environmental Sustainability. He joins the TCERC team to assist with development and tribal partnership efforts.

Nikishna is a Hopi tribal member of the Badger Clan from Kykotsmovi Village on Third Mesa. He earned a Bachelor of Arts in Environmental Analysis & Design from the University of California Irvine and a Master of Science in Resource Management from Central Washington University. Nikishna’s academic honors include a 2008 Chancellor’s Living Our Values award, a 2009 “Native American 40 under 40” award from the National Center for American Indian Enterprise Development, and a 2009 Sequoyah Fellowship Medal. You can reach him at nikishna@nau.edu.