



**Meeting Minutes
Nisqually River Council Meeting
December 18, 2020
Online Meeting**

Attendees:

NRC Members:

Anne Baxter – Dept. of Ecology
Dan Calvert – Puget Sound Partnership
Amy Cruver – Pierce County Council
Stacey Dixon – UW Pack Forest

Terry Kaminski – City of Yelm
Glynnis Nakai - BFJNNWR
Rene’ Skaggs – Pierce Conservation District
David Troutt, chair – Nisqually Indian Tribe

CAC Members:

Phyllis Farrell
Howard Glastetter
Paula Holroyde

Ed Kenney
Karelina Resnick
Lois Ward

Guests:

Roger Andrascik – NLT/NSS
Jesse Barham – City of Olympia
Jeff Barney – Pierce County
Michele Buckley
Tara Chestnut – Mount Rainier NP
Chris Ellings – Nisqually Indian Tribe
Lloyd Fetterly – NLT/NSS
Sela Kalama – Nisqually THPO
Ed Kolodziej – University of Washington
Cathy Hamilton-Wissmer – JBLM
Daniel Hull - NRNC

Martin McCallum – NLT
Jenifer McIntyre – Washington State Univ.
Kathleen Mix – NLT
Linda Murdfeldt
Jeremy Perkhun – Nisqually THPO
Julie Rector – City of Lacey
Pete Stoltz – CalPortland
Brian Sullivan – NLT
Maya Teeple – Thurston County
Ashley Von Essen – Nisqually Indian Tribe

Staff:

Jeanette Dorner – NLT
Julia Fregonara – NRF
Justin Hall – NRF

Maya Nabipoor – NRF
Emily McCartan – NRF
Sheila Wilson – NRF

1. Call to Order, Introductions, Approval of Minutes and Agenda

David called the meeting to order at 9:02am. Minutes from the November 20 meeting were approved, as was the agenda for the day. The NRC acknowledged the passing of Fred Michelson, a longtime CAC member and a great partner and friend to the watershed. He will be much missed.

2. Committee Reports and Updates

Advisory Committee Reports:

Citizens Advisory Committee – Lois Ward

The CAC met on Tuesday. Justin provided an update on the Community Forest. Members discussed ongoing concerns about RAP. Members believe that testing under current RAP piles elsewhere in the county would provide valuable data for local decisions and for international research on whether RAP leaches, and are preparing a request to the NRC to call for studies at new and current RAP sites. Ed gave an update on the restoration plans for Sequalitchew Creek and the CAC is looking forward to a future presentation to the NRC. The CAC has requested an update from the City of Yelm on wastewater treatment. The Olympian is exploring options to hire a local environmental reporter, which is of interest to the group.

Chair Report – David Troutt

David is working through a UW-led process on developing legislative recommendations for revisions to the Growth Management Act. Builders and developers have many proposed changes, and Tribes have been successful in increasing assurances for consultation and notification of tribes, but momentum for environmental concerns is less certain. David is advocating for improvement in baseline environmental conditions, along the lines of a green infrastructure improvement plan, in consultation with tribes and watershed groups and salmon recovery efforts as well as other ecosystem function considerations. Those projects would be funded by 3% set aside from major state capital investments. A dedicated funding source would help address the gap between approved environmental and recovery plans and the lack of funds to implement them and achieve needed benefits. David also met with the state League of Women Voters about the Shoreline Management Act, presented in several online college courses and testified on behalf of the NRC about our position on RAP to the Thurston Board of County Commissioners.

Staff report – Emily McCartan

In between salmon tossings, Emily is preparing an end-of-year newsletter for the NRC and River Foundation, recapping our activities in this extraordinary year and where we hope to go in 2021. She is also finalizing the NWSP updates and corresponding updates for the website. The 2021 NRC meeting schedule has been shared via email and on the website at <http://nisquallyriver.org/who-we-are/nisqually-river-council-meetings/>. As always, contact Emily with requests or suggestions for presentations.

Thurston County Subarea Plan – Maya Teeple

The BOCC made decisions on RAP and Mineral Lands this week. Commissioners voted 2-1 to approve RAP with BMPs in the Nisqually Subarea. Commissioners noted and appreciated input from the NRC during the process. Mineral lands decision was also 2-1. Contact Maya for details on the approved policy. Legal notice and appeal period will begin next week. Lakeside is expected to apply for a RAP permit in the near future, which will go through separate review.

Allied Program Reports:

Nisqually Land Trust – Jeanette Dorner

The NLT's winter newsletter is out. The announcement of the long-awaited Healey acquisition in the Wilcox Reach acquisition has been widely shared on Facebook with over 30,000 views and counting. NLT is completing demolition of structures on the Camp property at risk from flood and bank erosion, and completing other purchases. Stewardship

volunteer events are continuing, limited to 4 people at a time, but volunteers are working hard and getting a lot done. Upcoming events will be working on the first planting at Oro Bay property on Anderson Island, and the annual tree salvage with CNLM in Glacial Heritage Preserve. In the next year, Nisqually Land Trust will update its strategic plan, including evaluating conservation priorities and improving diversity, equity, and inclusion. The traditional auction will not be held in March due to COVID, but hope that an event might be possible later in the spring. Jeanette and Michele Buckley have been appointed to represent the Land Trust on the NCF board, and the Board gave a sendoff for Martin McCallum with thanks for his contributions as a board member.

Nisqually River Education Project – Sheila Wilson

25 teachers are signed up for asynchronous professional development through the NOAA B-WET grant on climate literacy. The training includes a video with Willie Frank discussing treaty rights, an important issue that many people aren't familiar with. Julia will present the water quality Storymap at a statewide OSPI event about virtual environmental learning. NREP is conducting salmon dissections over Zoom with students and starting to plan a virtual Student GREEN Congress.

Nisqually River Foundation and Nisqually Community Forest – Justin Hall

NRF staff have been returning salmon carcasses to the Mashel River this month, since student salmon tossing field trips are cancelled. Justin is working on end-of-year financials and funding reports. We will be requesting budget support for the NRC in the Legislature again, although process and budget outlook is very different this year. The Virtual Nisqually Watershed Festival committee met to review the September event, which is still viewable online: https://www.youtube.com/watch?v=IG_oSgQkmEI. As expected, it has had less reach than the in-person Festivals, but has been viewed 550 times so far. The Committee hopes to hold the regular event next year.

The Nisqually Community Forest has finished harvesting for the year and is now snowed in. Justin will have harvest numbers available next month. The Community Forest is hoping to move forward on new purchases in 2021, both independently and assisting the Nisqually Indian Tribe with a purchase using the Clean Water Revolving Fund Loan. A new hut is planned for the Mt. Tahoma ski trails.

Salmon Recovery Program – Ashley Von Essen

The Tribe's crew has three upcoming plantings: Middle Nisqually, replants at Wilcox Flats, and another year of underplantings with Tacoma Public Utilities. They will plant approximately 13,000 trees at the three sites combined. The Nisqually Lead Entity received four Letters of Intent for the 2021 SRFB grant round. This round's allocation is estimated to be around \$375,000, which is Nisqually's typical annual allocation, but the funding amount greatly depends on the upcoming legislative session. Dan shared the following budget request amounts from the Governor's budget: SRFB-\$40 million; PSAR- \$50 million; ESRP-\$20 million; FbD- \$70 million. Project applications are due to RCO by February 12, and virtual site visits will take place on Feb. 24. The Nisqually Tribe and Long Live The Kings have received grant funding for a pilot project to filter stormwater and capture runoff toxins using bioinfiltration methods in the Nisqually Watershed.

3. A Ubiquitous Tire-Derived Chemical Killing Coho Salmon

Jenifer McIntyre, Washington State University, Ed Kolodziej, University of Washington
Permission was given to record this presentation. Contact info@nisquallyriver.org for a link to the recording. Jen is an aquatic toxicologist and professor at WSU School of the Environment's Puyallup Research & Extension Center. A central research topic for 20 years has been high mortality among Puget Sound coho. Coho in urban Puget Sound streams die at high rates before spawning, becoming disoriented and immobile. Widespread and recurrent issue in the same streams, often at very high rates (60-80%, up to 100% in systems where few fish return). This mortality is predicted to cause extirpation of some runs. Initial research published in 2011 documented the phenomenon and ruled out high temperatures, disease, parasites, and other explanations, and typical water quality parameters were generally normal. Evidence suggested stormwater. Coho are a stormwater sentinel because they are widely distributed in lowland streams where there is a lot of human development, and their lifecycle spends more time in freshwater, so they are more impacted by stormwater quality. As forest streams have become urban streams, stormwater runoff picks up contaminants on roads and impervious surfaces and deposits them in high concentrations in streams, instead of filtering through natural environments to be cleaned. Underwater footage of a stormwater outfall entering Puget Sound shows a visible dark plume of sediment and other contaminants. The chemistry of stormwater runoff is a complicated problem involving thousands of unidentified and untested chemicals, but the known chemicals in typical water quality tests did not appear to cause the observed toxicity for coho, even at high concentrations.

Mapping by NOAA Fisheries and USFWS looked at land use and coho mortality and found that road density and traffic intensity is most predictive of coho death. In experiments, both coho spawners and juveniles exposed to collected road runoff showed the same acute symptoms and died within 24 hours, as observed in streams. (Juveniles are more available to study.) Fish behavior changed within 45 minutes of exposure. Transferring them back to clean water at onset of symptoms did not prevent mortality. Analysis showed their blood chemistry was affected and thickened, consistent with respiratory distress. This study showed that significant dilution (to 2% runoff) was needed to prevent mortality. At 25% stormwater, all the fish died. Urban streams don't get enough dilution to prevent mortality.

Having identified that something in roadway runoff is causing coho mortality, the next phase of the study compared chemical signatures of runoff, creek water, and chemicals coming from cars to identify specific sources. Tire wear particles were the most chemically similar to the waters killing coho. The researchers exposed coho to various concentrations and combinations of ground-up tires and found the same acute mortality and blood response. Chum salmon were used as a control, because chum returning to the same creeks and exposed to the same runoff are not affected. The experimental tire leachate killed all coho and no chum, and coho showed similar pathology in behavior and blood changes to the stormwater.

Summary of findings:

- 1) Chemicals leaching from tires can be acutely lethal to juvenile and adult coho salmon
- 2) At lethal concentrations for coho, chum spawners not affected

- 3) Leachate caused acute blood physiology changes in coho, not chum
- 4) Tire chemicals are present in road runoff in similar concentrations to experimental concentrations in the acutely lethal range for coho.
- 5) Tire particles appear to be an important contributor to the acute lethality of road runoff.

Discussion:

- Field data does not indicate a difference in effects for male vs. female coho, but it hasn't been directly tested in experiments.
- Why aren't chum affected? – Don't know yet. More studies are needed to understand how the toxicity is happening, which might indicate why species react differently.
- What are possible solutions? – Rain gardens (bioretention) is effective in filtering out this chemical, and it has been shown to remove the evidence of acute toxicity in coho. Source control (addressing the chemical at the manufacturing stage) is being discussed with the industry.
- Possible impacts up the food chain are still being studied.

Characterizing the Chemistry of Urban Runoff Mortality Syndrome

Ed is a professor at UW, at the Center for Urban Waters in Tacoma and Civil Engineering in Seattle. Many people contributed to this research, especially recent post-doctoral research from Zhenyu Tian and Kathy Peter, recent post-docs. This study used High Resolution Mass Spectrometry (HRMS), which collects all chemical formulas present in a sample. Because it does not rely on assumptions about what might be there, this method is useful for open-ended toxicology studies like identifying specific chemicals involved in the coho mortality.

Sample water was collected from field settings where coho were dying. Many studies confirmed that tire rubber chemicals were always present in waters where coho died. Chemicals derived from tire rubber are very understudied, but an important component of roadway runoff, up to a third of chemicals detected. Tire leachate contains hundreds of different chemicals, many never studied.

To identify the specific chemical in the tire leachate, researchers did “fractionate” study, passing water through filtration columns to isolate different chemicals and expose juvenile coho to the results to determine which are toxic. HRMS was then used to identify chemicals remaining in the toxic water. This is one of most comprehensive studies of its kind, taking over two years to narrow down from 2,216 chemicals to 4 that were creating the effect. In the final fraction, one unknown formula ($C_{18}H_{22}N_2O_2$) was not found in any literature. It was determined to be a “transformation” product created by breaking down a tire preservative 6PPD, designed to interact with ozone. The parent compound did not kill juvenile coho at low concentrations and was slightly toxic at high concentrations. However, when exposed to ozone, it created the chemical found in stormwater, $C_{18}H_{22}N_2O_2$ or 6PPD-quinone. This derivative 6PPD-quinone was lethal to coho at extremely low concentrations (LC50 value is .79 micrograms per liter). The pure chemical exposure and complex roadway runoff mixture had very similar mortality rates, suggesting this one compound is the culprit. 6PPD, the parent chemical, is abundant in tires – can be 2% of tire mass. It is designated a toxic chemical, and known to be acutely toxic to fish at only slightly higher concentrations as the transformation product. 6PPD is in tires specifically to react with ozone and prevent it from

cracking the tire rubber, but this research has found that the ozone reaction produces 6PPD-quinone which causes acute coho mortality. Subsequent environmental tests detected 6PPD-quinone in runoff from 18 of 18 roads, at levels above the LC50 concentration, matching the dilution results from Jen's experiments. During coho mortality events in streams, found concentrations near or above the LC50. 6PPD-quinone was detected in runoff in Seattle, San Francisco, and LA. Symptoms in the field and in 6PPD-quinone lab studies are very consistent.

Key observations:

- Tire rubbers are sources of complex mixtures of emerging organic contaminants.
- It should not be surprising when products of known toxic compounds are themselves toxic.
- 6PPD is designed to react with ozone to preserve tires, but we need to better understand its impacts on environment.
- Underscores the need to think carefully about areas where busy roadways intersect sensitive habitats – there may be other chemicals in roadway runoff affecting other organisms, and they need to be treated.

Discussion:

- This is one of the most important presentations the NRC has ever had.
- Is this mortality associated with the first rain event, or about successive rains? – The first seasonal storm event is always most impactful for water quality overall. Some effects may take a few storms to move from roadways into stream systems. Some coho mortality is observed in early December storms in suburban creeks, probably from this chemical. Controlled experiments with roadway runoff support the observation that highly traffic roads produce enough of this material that safety is not guaranteed just because it has been raining a lot.
- How effective are source control vs. treatment as solutions? Are there other options for tire manufacturers? Can it be treated in stormwater and how? – Tire manufacturers don't provide public lists of ingredients. Understanding is that a large number of compounds exist that could perform the ozone reaction function, which manufacturers need to meet safety, fuel efficiency, and other requirements. Chemists should be able to figure out a solution, if there is motivation. Treatment for this particular contaminant is now being discussed. Previous work focused on the sum total of toxicity in complex mixtures, showing that "green infrastructure" stormwater treatment through bioretention is sufficient to treat the toxicity. The next question is how much bioretention is needed to prevent the chemical from reaching the creeks. Other chemicals may also have toxic impacts, so ideally, all chemicals stay out of creeks in general – green infrastructure is important to do this.
- NRC stakeholders are participating in conversations about GMA and rapid Puget Sound population growth, which translates to more vehicles on the road. Can research and modeling create a level of safe vehicle densities to manage growing population? Unrealistic to assume that limiting road traffic can solve the problem without also having green infrastructure. This research should be important for policymakers to consider in prioritizing green infrastructure when making urban planning decisions. It is harder to retrofit for green infrastructure in built-up environments, so it's even more important to

build into areas of expanding development. With time and more research, we will learn more about mass balance and should be able to better predict the chemical levels in different times and locations. Bob McKane, with the EPA and OSU, is working on VELMA modeling for urban watersheds to do this.

- Do these results extrapolate to crumb rubber? – 6PPD and the lethal derivative are found in crumb rubber. Still researching the differences between crumb rubber and tires on the road. More research is needed on the process for toxicity in humans.
- There is no data right now on whether 6PPD is present in asphalt being used to repave road surfaces or roofing, and artificial turf for sports fields, but it's potentially there. We don't know how much tire is present in RAP. It would be interesting to study, perhaps if Thurston County sites are tested.
- Has the recent failure at Electron Dam caused mortality events? – The Puyallup Tribe provided Ed's lab a sample to analyze. Don't know if there was mortality associated with crumb rubber, although there was a lot at the site. Sediment in Puyallup may help mitigate the impact.
- Are there studies being done for impacts to other species, like steelhead? – This is on Jen's research docket. They have tested stormwater with chum, Chinook, coho, steelhead, and sockeye. Will be looking to find out if there are different species sensitivities across species. Road runoff can cause steelhead mortality at lower levels than coho, but there are other concerns about sublethal effects.
- Are there efforts to limit or redirect untreated storm runoff? – Public-private partnerships with Seattle companies has been very successful in installing green infrastructure to treat runoff from all 7 Seattle bridges.
- Do WQ parameters like pH, hardness etc. affect the toxicity of 6PPD-quinone? – It's too early to know.

4. Monitoring Rare Carnivores in Mount Rainier National Park

Tara Chestnut, Mount Rainier National Park

Permission was given to record this presentation. Contact info@nisquallyriver.org for a link to the recording. Mount Rainier and partners monitor Cascade red fox, Pacific fisher, and wolverine at the Park and surrounding areas in the South Cascades. There are similar research questions for all three species, including presence, reproduction, occupancy, population size, behavior, range size, diet. Strategies include noninvasive monitoring (scat surveys, remote cameras, winter backtracking, traditional ecological knowledge) and invasive monitoring requiring capture and handling of animal (GPS collars and implants).

*Cascade Red Fox (*vulpes vulpes cascadenis*)*

This is the most genetically unique red fox subspecies, unique to the Cascades. It has been genetically isolated for 15,000 years. They are not listed because they were not really studied until the 1980s, although similar California species is highly endangered. Monitoring is hoped to determine if it meets the criteria for Washington state listing. Historically, they ranged from southern BC to Southern Cascades, but are now mostly found in Mount Rainier and Mount Adams forests. Fewer than 10 reports in North Cascades in recent years – hopeful I-90 wildlife bridges will help connect across their range.

Threats include climate change impacts to mountain ecosystems, creating different prey ranges and populations, seasonal change, increasing presence of competitors like coyotes and bobcats because more frequent rain-on-snow events make subalpine region more accessible. Habitat connectivity is critical for genetic diversity. Hope that research will help understand how connected these small populations are. I-90 disconnects North and South, which makes small populations more vulnerable to diseases and genetic inbreeding. Food conditioning is also a threat as they can become accustomed to eating human garbage, putting them in danger of being roadkill.

Research objectives for Cascade red fox are managed with partners at Cascades Carnivore Project, Oregon State, Colorado State University, including population estimates/relatedness, reproductive ecology, important prey species, disease risks, interactions with other carnivores like coyotes. Alisa Woodruff, a Skokomish researcher at NWIC is studying traditional ecological knowledge to understand historic carnivore distributions and interactions.

Pacific Fisher (pekania pennant)

Fishers are being reintroduced to Washington, after being extirpated in the early 1900s due to overtrapping. Their habitat and prey base remained intact, allowing partners to trap fishers in BC and Alberta, fit them with radio transmitters, and release in Cascades and Olympics. 81 individuals of a “founder population” have been released to the South Cascades from Dec. 2015-Jan. 2020. This year’s releases were postponed due to COVID-19 risk (fishers can carry and transmit the virus).

Threats to fishers include survival in new habitat, predation, rodenticide (rat poison and forestry products). Exposure to rodenticides from illegal marijuana growing in OR and CA has been a big problem for carnivores – it reduces their wellness and reproduction. NPS, in collaboration with WDFW, Conservation Northwest, zoos, USFS, and Tribes are monitoring success of fisher reintroductions to learn about where they’re establishing home ranges, how they’re reproducing, diet preferences, and mortality. Phase II of monitoring uses hair snares and camera trapping, funding starts next year. Recovering mortalities gives important data. Radio transmitters are implanted and work for about 2 years. Use data to determine their distribution, estimate home range size, and find den sites and evidence of reproduction.

Wolverine (Gulo gulo luscus)

Wolverines are naturally recolonizing Mount Rainier after being removed in early 1900s. They have very large home ranges of hundreds of square miles, slow reproductive cycles, and low density. They were functionally extinct (not known to be reproducing) in Washington from 1930 to 1990s. Their habitat is still present, and they are now recolonizing from Southern BC into North Cascades. A lone male around Mount Adams from 2006-2016. In 2016-17, a male and female pair were photographed near Mount Rainier in Okanogan-Wenatchee National Forest, with a den found in 2018. Four individuals were spotted inside the Park in 2020. The return of the wolverines is very exciting for the Park: 10 sightings were reported this year, 8 verified with photos or videos. Rare for such an elusive animal. All 4 wolverines (parents and two kits) visited a monitoring station in 2020. Young wolverines will often stay in their home range until 1-2 years old, so this is a great opportunity to study behavior of breeding pair and their offspring.

Threats to wolverines include climate change (loss of spring snowpack important for reproductive success), increasing disturbance from backcountry recreation, poor connectivity between isolated habitats, and natural low-density populations. Research, in collaboration with Cascade Carnivore Project and USFS, is focused on identifying what parts of the Park they're using, especially to evaluate winter recreation effects on wolverines. Paradise skiers have found wolverine ski tracks this year. Monitoring is mostly done with remote baited camera traps, which photograph the wolverines' unique chest patterns and collect hair samples. NPS has found and photographed den site and will produce a tracking guide soon. If you track animals, do so responsibly: don't risk your safety or the animals, and report observations/photos to Mount Rainier Wildlife Database or Cascade Carnivore Project.

Discussion:

- Are there concerns about niche sharing between carnivores and potential unintended consequences of fisher reintroduction? – Fishers are supposed to be part of the ecosystem. Other species may have filled in in absence of fishers, and need to adjust. North and South Cascade reintroductions give a natural experiment to see how fishers recover, because wolves are present in the North Cascades and not in the South.
- Could fishers drive red fox to extinction? – Fishers' habitat appears to be lower in elevation. One fisher is frequently reported along the Paradise road, but generally below sub-alpine. Diet analysis could help inform overlap. Fishers eat primarily snowshoe hares and mountain beavers, while foxes eat voles and gophers. Tara observed interesting interactions on baited camera traps looking for an injured fox – every mammal except the fox came by, and a fisher took all the bait and ate it, then a barred owl came in and stole the midden pile. Need to study interaction of barred owls with other species besides spotted owls.
- What is the population size of Cascade red fox? – Effective population size is specific and complicated, don't have a good estimate. Estimate that 20 families are reproducing each year in terms of genetic diversity.
- With visitor centers closed and people eating in parking lots, are we ripe for a habituation problem with foxes? – It is an issue. Whitefoot is a female red fox who is frequently seen around Paradise. She is about 10 years old and still reproducing. Don't know if her offspring are surviving, but they aren't visibly habituated in the same way. New funding has become available to track fox family trees through genetics, wondering if habituated foxes are offspring of other habituated foxes. The fox population is in a concerning place.
- Estimates of survival for fisher introductions? – NPS's annual report on the fisher program is available now at <https://irma.nps.gov/DataStore/Reference/Profile/2283466>, with estimates for animals with transmitters, but won't have estimates of long-term survival until Phase II monitoring comes in. Landscape may make radio signals harder to detect in the North Cascades.
- There are no restoration efforts for Cascade red fox because it has no listed status. The current effort is to convince people that the Cascade Fox are a major conservation concern. Uplisting opens up funding mechanisms through NPS and other entities to help conserve them.

5. For the Good of the Order

Pierce Conservation District is the first Conservation District to offer a carbon credit program. City Forest Credits will provide funding for riparian restoration and urban forest restoration projects. <https://pierced.org/543/City-Forest-Credits#:~:text=City%20Forest%20Credits%2C%20a%20501,trees%20through%20carbon%20offsets%20and>

Howard shared that public data shows TPU appears to be managing Alder Dam differently since spring. The reservoir level was at or above FERC minimum over the summer, and appear to be making efforts to stay above minimum in winter.

The NRNC has created a fun video for the holiday which will be on their Facebook page this afternoon.

The NRC is one of the bright spots of 2020. Thanks for adapting and meeting all year.

*Next Meeting: January 15, 2021
Online via Zoom*