

Rumblings

Allison Wildman

Issue 6 - September / October 2014

Field Notes: Goats Return to the Mountain!

By Nathaniel D. Reynolds, Ecologist - Cowlitz Indian Tribe

"Wait, there's one!" Gary called out. We were 40 minutes into our second survey station, sitting under hot sun at the junction of Windy Trail 216E with the Loowit Trail. "It's walking out from behind that ridge!"

"Um, which ridge are you talking about?" I queried. Following his directions, I trained my binoculars on the right spot in time for both of us to watch a nanny goat followed by two kids, then another nanny with two more kids, climb leisurely into view. We recorded these six goats into our survey forms, which were part of the first formal post-eruption survey of mountain goats in the Mount St. Helens area.

Prior to the eruption of 1980, the population of mountain goats (*Oreamnos americanus*) at Mount St. Helens (MSH) was not well-known and is frequently reported as 15, but sometimes as 100.^{1,2} The larger number likely includes goats in alpine meadows of the Mt. Margaret Backcountry. The mountain's violent 1980 eruption is believed to have killed the entire population of goats within the blast zone³, though there is an anecdotal report of a goat being seen on the south side of the mountain as soon as October 1980.⁴ The first reliable post-eruption goat-sightings within the region began in 1987 and have continued since. In 2000, mountain goat

wool and tracks were observed in the crater, and in 2003 a solitary goat was frequently seen at the base of Forsyth Glacier. In 2007, a USGS scientist in a helicopter took photos of 11 goats (4 nannies and 7 kids) in the Step Channel draining the western side of the crater.⁵ Since 2008, anecdotal observations of large herds on MSH are commonplace, with groups of 15-20 regularly reported to USFS staffers or posted on various hiking/trail report websites.⁶ Herds of goats are also frequently

reported from the Mt. Margaret area. Thirty years after the eruption, goats are back on the St. Helens landscape – but no one knew how many.

In my position as ecologist for the Cowlitz Indian Tribe (CIT), I work to ensure habitats and species that comprise the Tribe's cultural history persist on its ancestral landscape. Like many other tribes on both sides of the Cascade Range, the Cowlitz have an ancient tradition of weaving blankets from mountain goat wool. On St. Helens,

known as *Lawetlat'la* ("The Smoker") to the Indians who lived on its flanks, it was

common for wool to be gathered in two ways: when families traveled to the mountains in late summer, and women and girls collected huckleberries and beargrass, men hunted goats for both meat and wool. Young boys, who were not yet old enough to accompany men on the hunts, were sent to gather twists of goat wool caught on branches of alpine shrubs. This wool, whether hides or tufts, was consolidated, cleaned and washed, then spun into yarn, and finally woven into thick ceremonial blankets that are status items of wealth and prestige.⁷



Allison Wildman

Mountain goat lying on a rock face with Mt. Rainier in the distance

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Mission

Mount St. Helens Institute is a non-profit 501(c)(3) organization that advances understanding and stewardship of the earth through science, education and exploration of volcanic landscapes.

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Contact Information

Website: mshinstitute.org
 Telephone: (360) 449-7883
 Email: info@mshinstitute.org
 P.O. Box 1208, Vancouver, WA 98666

The *Rumblings* newsletter is produced by the Mount St. Helens Institute. Please submit articles by the 8th of the month to Luke Wakefield - lwakefield@mshinstitute.org

We depend on your contributions. Thank you.

Please Welcome MSHI's New Leadership

By Tom Wolverton, Board President

The summer of 2014 has been a record season for the Mount St. Helens Institute! We aim to keep expanding our capacity for [volunteer programs](#), [field seminars](#), [youth education camps](#), [climbing programs](#), science research and the other great things MSHI does into 2015 and beyond. In order to move MSHI forward, we need both a Director of Operations and an Executive Director in our leadership structure. I am excited to announce the two leaders that we feel will help grow and expand MSHI, while continuing to deliver the quality programs you are already familiar with.



Ray Yurkewycz,
Director of Operations

Ray has worked for the Institute since 2011, serving in many capacities, including Science Programs Director and Interim Executive Director. He is passionate about all things Mount St. Helens. Before working at the Mount St. Helens Institute, Ray was a biologist on the mountain and earned his Master's degree from Washington State University - Vancouver studying the interaction of pocket gophers, plants and soil at Mount St. Helens.



Tod Thayer,
Executive Director

Tod comes to MSHI with over 20 years of nonprofit management and development experience. Prior experience includes the Muscular Dystrophy Association, United Way and American Red Cross. A lifelong resident of the Northwest, Tod enjoys long weekends at the beach with his wife Joy and their four-legged child, Zoey, the wonder dog! Tod and his wife also enjoy hiking,

antiquing, collecting blown glass, volunteering for many organizations serving children and animal causes and time spent with good friends. Tod is passionate about enhancing understanding of the Mount St. Helens area and the recreational, educational and scientific opportunities MSHI provides to the community.

The Board of Directors is very excited about the skills, passion and experience that both leaders bring to the Institute. We hope you will get to know both well in the upcoming months.



save the dates
November 15th

Dinner and Auction Fundraiser

Benefiting: Mount St. Helens Institute

By Kate Richardson

We invite you and your friends to join us in celebrating over 18 years of education, research and stewardship at the Mount St. Helens Institute (MSHI).

Who: Friends and businesses who share MSHI's enthusiasm for the Pacific Northwest's youngest and most active volcano.

What: At MSHI we like to do things differently. It starts with the attire for the evening—a refined and rugged combination of cocktail attire and outdoor gear! Ideas include mud boots and dresses, tuxedos and toe clips, gowns and gaiters...still stumped? Consider harnesses, helmets, sunglasses, hiking boots, running apparel, fishing vests and headlamps to heat up any outfit.

Where: Hilton Vancouver Washington | 301 W 6th Street

When: Saturday, November 15th, 2014 | 5:30pm – 8:00pm

We will be hosting a Silent Auction and Cocktail hour from 5:30pm to 7:00pm, followed by Dinner and the Event Program. The Live Auction, starting at 8:00pm, will wrap-up the evening.

Why: MSHI serves over 100,000 children and adults annually through our youth education programs, hiking and climbing adventures, and volunteer / stewardship efforts. We need your help to continue to provide programing that continues to enrich people's experiences at Mount St. Helens.

How: *Join us!* Event tickets are \$75.00 per guest. To register for the event visit: [Registration Page](#)

Donate an auction item! To make an item donation visit: [Item Donation Page](#)

Serve as an event Sponsor! Contact MSHI by calling (360) 449-7883

For More Event Information: Call (360) 449-7883 or email info@mshinstitute.org

Riddles

????????

Answers on page 9

1. My start is a song without moving a lip.
We're the children of the summit's slip.
We carried along heavy seeds of peas.
And now between us grow lush green trees.
What are we?

2. As my kind go I'm still a child.
I changed when landslide stopped and piled,
From small and trickling to deep and wide.
My cool body lies between ridges on either side.
What am I?

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Our Rivers: substrate, fish, trees

By Abi Groskopf

Every summer the Mount St. Helens Institute clads youth in waders and wading boots, bush whacks through salmonberry thickets and stumbles up slippery streams to monitor salmonid habitat. Sound like fun? It is and it's a small but significant contribution to habitat restoration efforts throughout the region.



A Vancouver youth measures pebble sizes on the dry bank to find out if restoration projects are capturing smaller spawning gravels. (East Fork Lewis)

Restoration Background:

Like many watersheds throughout the region, salmonid populations are in decline due in part to loss of habitat. Habitat loss is result of former forestry practices that removed timber along stream banks, of stream management practices that included removing large woody materials from instream channels and from hydroelectric dams that displaced habitat and formed barriers to upstream migration.

U.S. Forest Service, the land manager for much of the upper East Fork Lewis River basin and the North Fork Lewis River basin is committed to restoring degraded habitat. In addition, as part of the Lewis River Hydroelectric Projects Settlement



A Vancouver youth measures pool depth of a side channel pool. Pools are important for rearing salmonids. (Clear Creek)

Agreement, PacifiCorp provides dedicated funding to improve habitat including for bull trout – a unique and threatened species in the North Fork Lewis River basin.

The Mount St. Helens Institute assists with monitoring the effects of restoration efforts throughout the forest. USFS designs and installs engineered log jams – essentially large channel spanning log piles – that alter the flow of water thereby creating gravel

spawning beds and rearing pools for young salmonids. MSHI surveys the channel form and the substrate size before and after restoration to determine whether or not desired effects are achieved.



Youth build a sand slope and learn about erosion. (Yale Reservoir)

Youth Stream Team:

Our fisheries program began with taking groups of Vancouver urban youth – the Youth Stream Team - to wild rivers and streams in the North Fork Lewis River and East Fork Lewis River tributaries. For many youth this is their first opportunity to walk through the woods off trail, slip into waders and step into cool clean water of foothill streams. The program also provides youth an opportunity to learn about monitoring channel morphology using survey equipment and to understand the need for the restoring fish habitat.

Watch our 2011 video

Youth Career Development:

Over time, MSHI and USFS realized that we needed higher quality data so MSHI hires early career and undergraduate students to survey streams. Youth learn key career skills: leadership, problem solving, data entry and analysis and learn about working with MSHI diverse partners. Fisheries staff also recruits and trains volunteers. We are building a wader clad workforce who intimately know and care about streams and their fish inhabitants.

Partnerships:

All the restoration efforts are partner-driven projects. With PacifiCorp and Ecotrust's Whole Watershed Restoration Initiative funding, MSHI strategically works with the USFS, Lower Columbia Fish Recovery Board, Cowlitz Tribe and WDFW to build habitat pebble by pebble and log by log.

Species Spotlight

Huckleberry (Vaccinium spp)

Huckleberries at Mount St Helens are ripe! There are three common species around Mount St. Helens. Traditionally huckleberries were collected by Native American and First Nations people for use as food or medicine. Regardless of use, huckleberries have found their way into slang. "I'm your huckleberry" is a way of saying that one is just the right person for a given job. No matter the variety, huckleberries are delicious and are consumed by many animals, including bear, birds and humans.



Keir Morse

International Training Program Comes to Mount St. Helens

By Sonja Melander, Science Educator

In any given week, typically over a dozen volcanoes around the world show signs of new or ongoing unrest. Scientists, technicians, and civil agency workers at volcano observatories play a crucial role in keeping watch to ensure that those living in the shadow of these volcanoes remain safe.



For 23 years, the Center for the Study of Active Volcanoes (CSAV) at the University of Hawaii, Hilo, with support from the United States Geological Survey (USGS)- USAID Volcano Disaster Assistance Program, has run an annual International Training Program for volcano observatory workers. The program has usually taken place only at Hawaii, but last year the program was expanded to include a trip to the USGS Cascades Volcano Observatory and Mount St Helens. The Mount St. Helens Institute hosted the participants in this program at our field camp and I was fortunate enough to be able to take part in some of the program. This year's participants came from Chile, Colombia, Costa Rica, Indonesia, Italy, Korea, Papua New Guinea, Peru, Philippines, and Republic of Congo to observe and learn from the volcanic deposits at Mount St. Helens. An explosive stratovolcano like Mount St. Helens shares many similarities with the volcanoes in participants' home countries. This trip provided an excellent opportunity to see firsthand what these deposits look like and how to glean information from them to learn about a volcano's past.

After arriving at our field camp and settling in, participants immediately began looking at deposits from the 1980 blast. Extremely powerful and dangerous volcanic phenomena, like the 1980 Mount St. Helens blast, leaves little trace in the geologic record, yet it can still be detected with a sharp, trained eye. Blast deposits often appear as only an extremely thin (several millimeters thick) layer of angular rock fragments. Sometimes blasts leave no evidence but an eroded surface. CSAV participants learned to identify subtle clues recorded in the rocks to identify what type of volcanic activity produced it.

Less deadly, but more widespread effects of volcanoes like ashfall were also investigated by CSAV participants. Participants learned field techniques for determining the

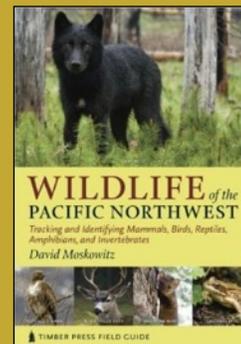
minerals in ash and pumice, which helps them to match ashfall deposits from location to location. Together with other clues in the ashfall deposits, like the size of the ash and rock in the deposit and how thick the deposits are, investigators can find out how large eruptions were in the past.

After long days in the field, we returned to field camp and enjoyed dinner and a warm, crackling campfire. With a brain fresh with new information, ukele sing-alongs, pumice-juggling, gooey s'mores, and the stunning star-studded night sky, it was an experience I will not soon forget. I wish the participants all the best and look forward to another year of working with the CSAV International Training Program!

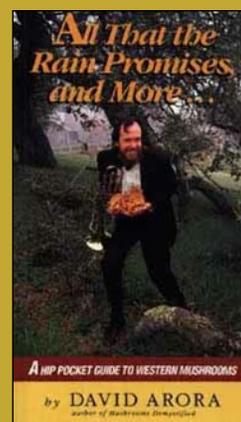
Ray's Book Picks

"Wildlife of the Pacific Northwest" by David Moskowitz and "All That the Rain Promises and More" By David Arora

If you are an enjoyer of the outdoors in the Pacific Northwest, then you probably have a bunch of field guides. If you do not have these two books, head to the book store directly and pick them up. These are both must-have field guides. As a connoisseur of field guides since age 5, I do not make that statement lightly. "Wildlife of the Pacific Northwest" not only discusses the identification and ecology of our wildlife, but also in-depth info about their track and sign. All of this is accompanied by David's excellent photography.



Though "All That the Rain Promises and More..." is emblazoned with a whimsical cover, this book is seriously one of the most useful field guides I own. In this book, Arora's comprehensive 1000+ page tome, "Mushrooms Demystified", is distilled into a pocket sized 250 pages of the most useful edible and poisonous mushrooms, plus recipes, stories and some hilarious pictures of the wide variety of characters that find mushrooms interesting.



Hiking the Loowit Trail: Not for the Faint of Heart

By Sam Dussel, Guided Programs Coordinator / Lead Guide

Circumnavigating any volcano can be an inspirational experience, but hiking the 30 miles around Mount St. Helens exposes you to the most beautiful and raw terrain the mountain has to offer including the blast zone, waterfalls, and deep canyons. The Loowit trail is usually backpacked in two or three days and can be accessed from many locations around the mountain via other trails. There are no trailheads or parking lots along this trail making the experience all the more remote. Most hikers access the trail from the June Lake trail.

On the north side of the mountain the trail goes through the Pumice Plain, where the force of the 1980 eruption was the most direct, and views of the immense crater and lava domes are excellent. There is no camping allowed on the Pumice Plain, so plan to go through this 9 mile section during the day. Continuing clockwise around the mountain, Windy Pass roughly marks the eastern edge of the blast zone and the beginning of the Plains of Abraham. The Plains look like a landscape often found much further to the east. The vegetation is

sparse and the pumice has a satisfying crunch under foot. Camping is possible near Pumice Butte where there is usually a snowmelt fed creek in the late afternoon and great views of Mt. Adams.

After the Plains, the trail traverses several deep canyons carved by small ice cold creeks before crossing lava fields that are nearly as rocky and hot as when they erupted. On the southeast side of the mountain the trail dips below treeline where old-growth trees stand tall and birds call to one another high up in the canopy. Chocolate Falls marks the south side of the mountain and the crossing of the winter climbing route. Shortly west of the falls is the summer climbing route along Monitor Ridge. There is a backcountry toilet located just above this junction of the Loowit and Ptarmigan Trail junction. The lava fields continue for several miles on the southwest side of the mountain before reaching the South Fork Toutle River. This several hundred foot deep canyon is a great example of the force of water on the loose volcanic deposits.

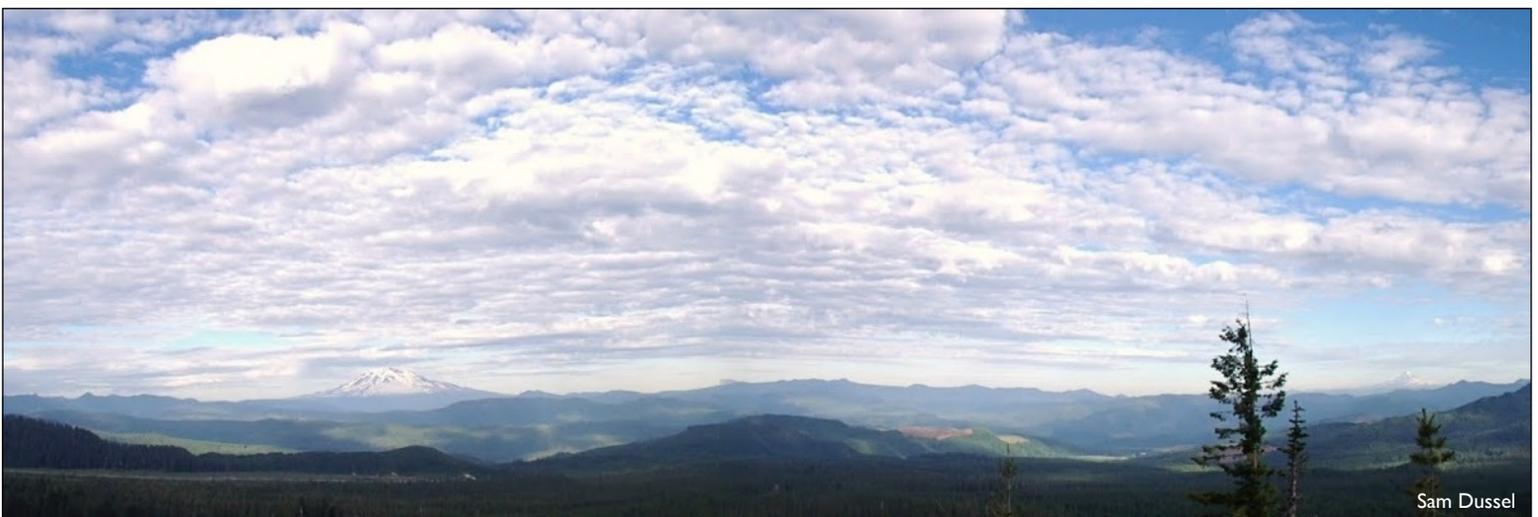
Many of the smaller creeks coming from the mountain can dry up overnight when the snowfields freeze, so be sure and get water for the next day in the evening. Campsites can be hard to find on the south side but finding a spot with a view will top off your days on the trail with a sunset in every shade of orange.



The erosive force of water can be witnessed in the many large canyons carved out since the 1980 blast



Alpine Lupine sprouting from an ocean of Pumice at Windy Pass



Mt. Hood and Mt. Adams stand tall in their cordial positions to the south and east

“Some People Walk in the Rain...”

Others just get wet” ~ Roger Miller

By Ray Yurkewycz

Boy, I sure do love summer. Then again, I am not a native North-wester. I grew up in the Chicago area, so I am no stranger to questionable weather. However, the 9 months of rain gets to me. By the time June-uary is over, I need some sun, warm temperatures and sandal wearing. We all know the consistent sunny weather starts to wane in September with the decline beginning around Labor Day. When October rolls around, we get some pretty torrential storms on Mount St. Helens, enough so that our field camp at Windy Ridge has gotten pretty mangled if we don't take it down in time. So the fall rains have tended to leave me sad to see summer gone. However, some of the Mount St. Helens Institute programs I've been a part of during the past 4 years now get me excited about the fall rains. I'm talking about our programs that explore animal tracks and edible mushrooms! There's nothing like fall rains to create the perfect medium for detecting animal tracks and to spur on the emergence of the most delectable mushrooms in the world.

We spend lots of time on the trails in the summer, yet there's not a lot of muddy and wet areas to give the tell-tale clues of

what creatures had recently passed through. There are other sign to look for in the summer, like huckleberry filled scats of the occasional black bear or coyote, but there's nothing that gets me excited like a fresh bobcat track in the mud. There's no better way to hone your tracking skills than to come along on our "[Wildlife Track and Sign Certification](#)" on October 25th and 26th with famed author,



Mount St. Helens Institute

Two students observing an elk carcass

photographer and biologist, David Moskowitz (davidmoskowitz.net). This field seminar gets you looking for animal sign around Mount St. Helens in an environment that emphasizes open, honest dialogue and real learning. You will be genuinely in awe of the hidden world that opens up once you begin to hone your tracking skills.



USGS

Bear tracks in the ash from Mount St. Helens

There's another world that is hidden from many of us... the world of mushrooms! These main mass of these creatures exists underground as mycelium (thread-like structures). What we think of as "mushrooms" are fungal reproductive structures that pop up aboveground seemingly overnight, especially with fall rains. And boy, can these things taste good! The Pacific Northwest is home to high densities of



Ray Yurkewycz

Participants enjoying the harvest of wild edible mushrooms

some of the most sought after edible mushrooms, like chanterelles and shitakes. Mushrooms can also be fatally poisonous. Most fall somewhere in between these two extremes... not very tasty and likely to give you G.I. problems. With chanterelles going for over \$25/lb, the tasty mushrooms found around Mount St. Helens are more than worth learning how to identify. If this is something you'd like to learn about, you are in luck! We are offering two edible mushroom identification field seminars this fall, [October 11th](#) and [October 18th](#). Come learn your mushrooms, tasty and poisonous, and hopefully fill your basket with the tasty kind.

* Check out the book reviews for two excellent and pertinent field guides on page 5

Goats Return to the Mountain *From page 1*

By Nathaniel D. Reynolds, Ecologist - Cowlitz Indian Tribe

Returning to 2014, on the morning of Saturday August 2nd, a group gathered at Chelatchie Prairie Ranger Station for training. Staff from MSHI, USFS, WDFW and CIT shared expertise with MSHI members, Mountain Stewards and Volcano Naturalists, who received a 3-hour session on the long history of goats on St. Helens, including Indian history of wool collection and weaving, accounts of early explorers and climbers who sighted goats, and the fact that two smaller peaks near MSH are named Goat Mountain; one to the southwest and one to the north. The session also included a primer of mountain goat ecology, specifics of survey protocols, technical refreshers with GPS and compass, and an overview of glassing techniques for binoculars and spotting scopes. Detailed maps of topo lines over aerial photos were handed out to 6 teams, each composed of 2 or 3 surveyors. Teams were encouraged to draw compass bearings and other goat observation notes directly on maps, as well as recording sighting numbers and information on data sheets.



Mountain goat exploring the Mt. Margaret Backcountry

As the Saturday training concluded, teams deployed out to their starting points. Each team would survey for one hour at each of 3 unique stations, at 8 AM, 10 AM and 12 PM Sunday morning, with hour-long hikes between stations. Some lucky teams hiked into the Mt. Margaret Backcountry, overnighing Saturday at Bear Camp and Panhandle Lake; other lucky teams spent a plush night (with Sam's famous peach and berry cobbler) at the MSHI base camp before hiking to Windy Pass and Plains of Abraham early Sunday morning. In all, six teams and 2 USFS climbing rangers were on unique stations at 8 AM Sunday morning, scanning rocky slopes and cliffs, trying to discern surefooted shaggy white beasts from small patches of snow or reflective rocks.

Across Washington State, mountain goat numbers have declined roughly 70% from 1961 to today.⁸ Scientists believe the principal cause of decline is over-hunting. Unlike elk and deer, goat populations are slow to recover, as birth rates are low and it takes several years for kids to become reproductively eligible. In addition, populations are increasingly fragmented by both roads and development blocking lowland dispersal routes, and by forest fire

suppression in highlands, which allows forest succession and loss of alpine habitat on ridgelines. In particular, goat abundance in the Snoqualmie area of the Cascade Mountains has declined by as much as 90 percent. Lack of population connectivity increases risk of inbreeding within isolated populations. Future connectivity and dispersal may be threatened by climate change; the future Pacific Northwest looks to be warmer overall, with less precipitation falling as snow, likely leading to a general loss of alpine habitat area.

In 2012, the population of mountain goats in the St. Helens/Mt. Margaret complex was reported as 20 (range 15-25) based on expert opinion and anecdotal reports received by USFS and WDFW.⁹ In comparison, our 2014 ground count documented 65 unique goats. Our opportunistic methods were not systematic enough, however, to develop a precise population estimate. Our number is an index that will allow us to compare year-over-year data that is expected to identify general population trends. 65 sightings probably underestimates total goat

numbers in the St. Helens/Mt. Margaret area because of many factors. There is high likelihood that some goats were obscured by terrain. It is known that single goats (billies are often solitary) are harder to discern than groups and hence are more likely to be overlooked. Aspects of goat behavior affect sightability: goats tucked in a cool, shady crevice during the heat of the day are far harder to spot than those out foraging in the early morning or late evening. Finally, we did not examine all suitable habitat; goats are known from areas in the Bean Creek and Clearwater Creek drainages that we did not survey. A robust sightability correction model for mountain goats has been developed for helicopter surveys,¹⁰ but those statistics are not transferrable to our ground count methodology. Our result does demonstrate the need to apply higher-precision efforts, such as aerial survey, to develop a population estimate. The helicopter method is expensive, though, and in the best case scenario, ground count index surveys should continue to be annually implemented, supplemented every 5 years or so by intensive but expensive aerial surveys. Implementing these two methods in concert would allow efficient and robust monitoring of goat abundance.

Continues on page 9

In an ecological sense, Mount St. Helens is an island. The 1980 eruption created a large area of suitable goat habitat with steep cliffs and pseudo-alpine grassy meadows (“alpine” is commonly the area above tree-line, but tree-line elevation on MSH was dramatically altered by the lateral blast of the 1980 eruption). Although the habitat is suitable, dispersal from other source populations has likely been the principle factor controlling return of goats to the mountain. If the burgeoning population on MSH derives from only a few colonizing individuals, then it may be subject to “founder effect” and inbreeding, which can lead to genetic drift. In a metapopulation sense, however, the goats of MSH may have become numerous enough to serve as a source for dispersal. As the MSH population of goats became prominent in the mid-2000s, a single mountain goat was often seen on Silver Star Mountain in Skamania County, 30 miles south of St. Helens, where the Yacolt Burn forest fire of 1902 created pseudo-alpine habitat that still challenges natural reforestation today.

The success of this first survey, and the apparent recovery of goat numbers in the Mount St. Helens area, is good news in light of the decline in goat abundance reported in the rest of the state. In future years, this ground count survey will be repeated, and changes in index number are expected to represent general trends in population size. MSHI volunteers and staff were fundamental to the success of this survey -- maybe YOU could participate in future surveys, and catch a closer glimpse of a unique North American species emblematic of high, rugged wildness?



Mountain goat resting on a rock face in the lower part of the photo

Later that Sunday survey morning, Gary and I arrived at our third station, on a rocky bench overlooking Loowit Falls. We set our backpacks next to a half-dead willow. A twist of white wool wrapped around dry, grey branches, and a loose end fluttered delicately in the breeze. I collected the wool, like Cowlitz boys of generations past, and later gifted it to a Tribal elder.



Prior to the 1980 eruption, there were about 15 mountain goats living in the backcountry. They were killed in the eruption, like all exposed living things. However, the population has bounced back, and mountain goats can be located.

She broke into tears when I explained what it was and where it came from. As the ecology of the mountain slowly recovers from the violent forces of the 1980 eruption, the ebb and flow of cultural heritage recovers as well, making our limited understanding of *Lawetlat'la's* secrets richer and more vibrant for all of us.

Nathan Reynolds is an ecologist for the Cowlitz Indian Tribe, where he studies prehistoric and historic interactions between humans and the habitats and species of what is now southwest Washington State. For further information about mountain goats, read "A Beast the Color of Winter" by DH Chadwick, Bison Books 2002.

- 1 - Durbin, Hill and Kolberstein, "Out of the Ashes" The Oregonian, Sunday 13-May-1990, pg 8
- 2 - Holm, "Volcano wildlife loss figured in millions" The Oregonian, Thursday 5-Jun-1980, pg E6
- 3 - <http://www.fs.fed.us/pnw/mtsthelens/faq/q7.shtml>
- 4 - Topinka L 1980: USGS geologist, Mount St. Helens General Slide Set, Caption on #45, Accessed online at: <http://www.nt.ntnu.no/users/ystenes/div/bilder/sidesp/helene/slideset.html>
- 5 - http://wdfw.wa.gov/about/regions/region5/wildlife_reports/2007/jul07.html
- 6 - Examples: <http://www.portlandhikersfieldguide.org/ph/forum/viewtopic.php?f=8&t=17497> ; <https://www.flickr.com/photos/ujelang/3073630974/in/set-72157607067587767>
- 7 - See www.salishweaving.com, also <http://www.york.ac.uk/news-and-events/news/2011/research/blankets/>
- 8 - Rice, CG 2012: Status of Mountain Goats in Washington, Biennial Symposium of the Northern Wild Sheep and Goat Council, 18:64-70, 2012. Accessed online at: <http://wdfw.wa.gov/publications/01611/>
- 9 - Ibid. 8, pg 68
- 10 - Rice, CG, KJ Jenkins, and W Chang 2009: A sightability model for mountain goats. Journal of Wildlife Management 73(3):468-478.

Riddle answers from page 2

- 1 - Hummocks
- 2 - Coldwater Lake