Alaskan Berry Science & Stories

With over 1,500 volunteers making observations, collecting and analyzing data, and sharing stories in 45 different Alaskan communities, our network of scientists, youth, educators and community observers investigates how shifting timing of the seasons in Alaska is affecting our wild berries.

This newsletter shares your stories and your data from the Winterberry and Late Bloomers Citizen Science efforts. These projects are aimed at sharing the knowledge we all have of berries across Alaska through storytelling and generating new knowledge through the power of data and observation.

Winterberry aims to 1) investigate how shifts in the seasons affect the abundance and condition of berries and timing of berry loss from plants in fall and winter across Alaska; 2) improve the participation in and effectiveness of citizen science by comparing different citizen science learning models.

Late Bloomers is a collaborative effort between the University of Alaska Fairbanks and the University of Connecticut to determine if an extended growing season influences flower bud development in berry-producing species and to engage the public in the research process.

Participating in berry science has led to creative ways to preserve and share the goodness of berries, from healing rosehip salves made by 1st graders in Tok to jam given to Elders in Venetie and many, many stories written and told about berries.

Polaris K12 youth scientists.
B. Smith
Phenology: the timing of life events in organisms.

When does the plant growing season begin in Interior Alaska? Dr. Christa Mulder looked at historical records to find the average date with 5 continuous days above freezing. Nearly a century ago, the average was around May 13. Today, the average date for 5 continuous days above freezing is around May 5, more than a week earlier.

The Life of a Berry
It’s all about timing!

Each spring after the snow melts and the ground thaws, our forest and tundra berry plants expand the buds that they prepared during a prior summer. The miraculous, and time sensitive, journey to producing a berry begins. If spring is early, the flowers risk getting damaged by frosts or opening before key pollinators emerge. Fewer pollinated flowers means fewer berries. If fruit ripens earlier in the summer, fewer berries could be available for migrating animals like geese, and a greater proportion of the berries could rot. If late fall weather is warm, some plants like wild rose or cranberry species may flower for a second time, wasting those buds saved for the next year. A long wet fall could mean that more berries rot before they can get eaten.
Winterberry

Since 2017, volunteers have been tagging and naming their 20 adopted berry plants at sites across Alaska. The adoptees are one of four berry species with broad distribution across Alaska that retain a high proportion of their fruit into winter: lowbush cranberry, crowberry, prickly rose, and highbush cranberry. Youth and adults make weekly observations of berry number and condition in the fall and spring and measure snow depth in the winter.

Data is still coming in from spring berry counts, but we are excited to offer you a sneak peak. We have begun to put all the data together from across the state. Below are some exciting preliminary results!

A very sharp drop in the number of berries in a site almost always corresponded with an observation of an animal coming through the site for a feast. We would never have known that without the chance to talk about the data with each group!

Variability from Year to Year

In first two weeks of October 2018, 64% of all berries at the Winterberry sites across species were in good condition; 36% were rotten, dry or damaged. In 2019, a year with record breaking spring temperatures across Alaska and an early start of summer, only 50% were in good condition by the same October dates.

A Natural History of Berry Loss across Alaska

Our first step has been to look at the rate of berry loss for our four species in different regions in Alaska. Take a look at the graphs on the right! Each dot represents an average of the plants at a site on a given day. Can you find a dot that is yours? Berries from our four focal species are lost most rapidly in the boreal forest of Interior Alaska. In the temperate rainforest sites, the plants lose their berries much more slowly.

For lowbush cranberry, 64% of the berries are lost in the fall, 18% are lost during the winter, and 18% in the spring. What types of animals do you think are eating them in each season?
Late Bloomers

“Superman made a flower!” recorded an Arctic Light STEM Club member as students counted their berries for the Winterberry Project on October 16, 2017. They snapped a photo and submitted it to the Late Bloomers project. Superman, one of their adopted prickly rose (Rosa acicularis) plants for Winterberry, had enjoyed an unusually warm fall. The bud it had prepared for next year’s spring season opened, and was spent. There is no chance it will make a fruit before the snow falls.

Does a longer growing season and time for bud development help explain variation in the timing of flowering of Alaska’s berry plants? Late Bloomers paired a warming experiment in the Bonanza Creek LTER with public participation in scientific research to find out. Late Bloomers invited public participation in this research in two ways: 1) collecting dormant buds of Vaccinium vitis-idaea and sending them to us to be analyzed for developmental stage, and 2) recording observations of late blooming plants in the fall through the Local Environmental Observers (LEO) Network observation app of the Alaska Native Tribal Health Consortium.

The data submitted by volunteers contributed in key ways:

- Buds collected from different regions throughout the state all reached approximately the same developmental stage before going dormant.
- Buds do not continue to develop under the snow. Volunteers were able to collect buds throughout the winter when the researchers were unable to.
- Plants blooming for a second time in the fall were observed across Alaska and seem to be associated with warm fall temperatures.

Before the Berry

Over a year before we pick them, the journey toward becoming a berry begins. Inside tiny buds, cells are dividing and differentiating throughout the late summer and fall to become recognizable parts of a flower prepared for spring, pollination and, if everything goes well, a berry. University of Connecticut scientists Eileen Schaub and Pamela Diggle, worked to identify stages of berry flower development in these buds using a Scanning Electron Microscope. Just as families treasure the ultrasound images of their babies, every berry lover will appreciate these precious images of what will become a lowbush cranberry (Vaccinium vitis-idaea)!

A clump of cells that will become the flower starts to form and bumps which will form the flower sepals (S) are visible. Scale bar=100 um

Petals start to form and the male (stamen, St) and female (carpel, C) reproductive parts can be seen. Scale bar=200 um

Filaments and anthers are differentiated on the stamens (outside arrows) and stigma is formed to catch pollen on the carpel (inner arrow). Scale bar=200 um

After laying dormant through winter, buds expand and develop in spring, then flowers open. Stamen (yellow) surround the carpel fully developed and ready for pollination.
Thank You Volunteer Community Scientists!

** Indicates participation in BOTH Winterberry and Late Bloomers

**ANAKTUVUK PASS**
Mellinda Berg, Dakota Helmes & Nunamiut School students

**ANCHORAGE**
Bryan Smith, Heidi Postishek & Polaris K12 students
Arnold Harder & the East High Environmental Club
Amy & Mike Reidell and Denise Rader
Molly Larmie, Jen Christopherson, Hannah Brewster & Campbell Creek Science Center Volunteers

**ANVIK**
Sandra Ninninger & Blackwell School students

**BETHEL**
**Jennifer Coggins & Bethel Regional High students

**DELTA JUNCTION**
Tammie Kovalenko & Delta FFA Club

**EAGLE**
**Marlys House & Eagle Community School and 4-H Club

**FAIRBANKS**
Jenn Wallace & Anne Wien Elementary students
Carol Scott & Randy Smith Middle School students
Danette Peterson, Frida Schroyer & Tanana Middle School students
Nancy Fresco, Christa Mulder, Katie Spellman & UAF students
Chastity Perez, Rebecca Hansen, Marlene McDermott & Watershed Charter School students
Maxine Dibert, Lynn DiFilippo & Denali Elementary students
Billy Smith, Angelica Yocom & Hunter Elementary Afterschool Club
Karine Chinglak, Jody Demienti & Willer Elementary students
Deb Bennett & Boreal Sun Charter Students

**FT. WAINRIGHT**
**Gretchen Nelson & Arctic Light Elementary STEM club

**HOLY CROSS**
Annie Martin, Adrienne Wright & Holy Cross School students

**HOMER**
Henry Reiske & Center for Alaskan Coastal Studies Eco-Kids club

**JOINT BASE ELMENDORF-RICHARDSON**
Regina Rovira

**METLAKATLA**
**Sesilynn Schleusner and the Boys and Girls Club of Metlakatla

**NANWALEK**
Teri Gentry, Priscilla Evans, Eugenia Moonin & Nanwalek School students

**NENANA**
Eric Filardi & Nenana High students

**NOME**
Keane Richards & Anvil City Science Academy students

**NORTH POLE**
Andrea Chin & North Pole Middle students
Nicole James & James Family kids

**PALMER**
Christina James & Girl Scout Troop 849

**PILOT POINT**
Robert Kirchner, Greg Kinsley, Bill Harris, Pilot Point Tribal Council & Pilot Point School students

**SCAMMON BAY**
**Kristian Nattinger and Scammon Bay High School students

**SHAGELUK**
**Sonta Roach, Joy Hamilton & Innoko River School students

**SHISHMAREF**
Lisa Villano, Chioke Brent, Natalie Donaldson & Shishmaref Climate Heroes Club

**SITKA**
Jasmine Shaw, Kitty LaBounty, Claire Sanchez, Emily Bristol, Darcy Peter and the Sitka Spruce Tips 4-H

**ST. PAUL**
Veronica Padula, Jaylene, St. Paul School & UAF Berry Course students

**TAKOTNA**
**Susan Smith & Takotna School students

**TOK**
Bonnie Dompierre & Tok School students

**TWO RIVERS**
Allison Wylde & Two Rivers Elementary students

**TYONEK**
Mike Allen & Tebughna High School students

**UNALASKA**
Lucy Ortiz, Mary Heimes, Riley Spetz, Darlene Jeppesen, Jane Ruckman & Eagle’s View Elementary
Laura Jarvis, Amy Purevsuren & Unalaska City Jr./Sr. High students

**VENETIE**
**Terri Mynatt, Mary Rose Gamboa, Bob Pymn, Manuel Gamboa & John Fredson School students

**WASILLA**
Faith Lussow & Mat-Su Career and Technical High students

Bud Collectors & LEO Observers (not also participating in Winterberry)
Angela Johnson, Anna R John, Bernice Nicoli, Carol Oliver, Daisy Huang, Erica Lujan, Girl Scout Troop 78, Jeff Mason, John Disney, karis porcincula, Kim Wickman, Lorene Lynn, Michael Opheim, Mike Brook, Mike Brubaker, Spellman Family, Susan Iverson, Timm Nawrocki, USDA NRCS Staff, and Wilson Justin

Special Thanks to In-Kind Partners
LEO Network of ANTHC
UAF Network of ANTHC
BLM Campbell Creek Science Center
ARCUS Arctic in the Classroom
Recipe for No-bake Berry Balls

From Jasmine’s 4-H Kitchen

Ingredients:
- 1 cup rolled oats
- 1 tbsp peanut butter (or nut butter of choice)
- 1/4 cup maple syrup or honey
- 1 cup frozen or dry berries
- 1/2 tsp of vanilla, pinch of salt (optional)

from Jasmine Shaw, who made them with Winterberry youth groups in St. Paul and Sitka.

Enjoy!

A laska Berry Science Youth Symposium

October 27, 2019
Twenty-two youth, educators, scientists and community members from the Winterberry and Late Bloomers projects gathered at the Campbell Creek Science Center to share their berry research. Participants gathered from the communities of Venetie, Takotna, Shageluk, Anchorage, Fairbanks, and Storrs (Connecticut). Students presented scientific posters, interpreted statewide project data through hands-on activities, and conducted a field investigation on winter cranberry buds using GLOBE protocols.

GLOBE NW Regional Student Research Symposium for students in grades 5-12 will be in Fairbanks next spring. Teams of Winterberry youth are invited to apply and present their berry research.

Sharing Science World Wide

Global Learning and Observations to Benefit the Environment (GLOBE) is a world-wide citizen science program for K-16 students. Winterberry volunteers used GLOBE to measure snow depth throughout the winter.

Student in Scammon Bay measuring snow depth at -21.7°C (-7°F).

Dr. Elena Sparrow poses with a student from Holy Cross in front of the data graphs during a berry data jam.

>1,350 GLOBE snow observations at 47 separate Alaska sites.

All Winterberry snow observations follow GLOBE protocols. View them at https://vis.globe.gov/

From Jasmine’s 4-H Kitchen

Best if you can mix ingredients in a food processor but you can also mix by hand with a large wooden spoon. Make sure you wash your hands before you roll them into balls!

Spoon them out and place on a cookie sheet. Refrigerate for at least 1 hour for best results. Optional roll in coconut or cocoa powder for more tasty flavors.
Learning through Stories

Community Storytelling

The Winterberry Citizen Science Project teamed up with the Alaska Community of Writing (COW) program, led by Sarah Stanley, UAF English Department, to host berry story community nights.

Participants enjoyed berry-themed snacks while writing and sharing stories of their experiences with berries in Alaska or elsewhere. Families of the Winterberry youth and the broader community created felt symbols of their stories. They placed these symbols on a felt landscape, which became an interactive storyboard. Stories showcase how everyone is connected and what berries mean to us all. Alaskans love our berries! Check out interactive images and audio files on the Winterberry website.

Scenario Stories

How do we turn citizen science data into stewardship action? Start with imagining scenarios: do nothing vs. best berry future.

In this lesson designed by Doug Cost, Katie Spellman and Chris Villano, students use Winterberry data from different climate regions of Alaska to imagine the different scenarios for their own berry future. This “futures thinking” helps students realize that they are not powerless to act. Students illustrate or write their two versions of the future, share with classmates, and brainstorm possible solutions. They then vote on which action seems most important and possible. Here are some students’ ideas: create protected berry picking areas, cultivate berries, experiment with new cultivars of berries, reduce greenhouse gas emissions, and many more. Though Alaska is changing, students are full of hope. Let’s get started!

Best Berry Future

Students from Nenana High School used storytelling throughout their berry science learning. They hosted a berry stories community night, wrote stories about their science process, and used Winterberry data from around the state to imagine scenario stories. They voted to prioritize actions they could take to sustain berries into the future (Top) and presented them at the 2019 Alaska Forum on the Environment with UAF’s Dr. Katie Spellman and Dr. Doug Cost (Bottom). Way to go Nenana Lynx!

Want to use storytelling to in your science lessons?

Find lesson plans at https://sites.google.com/alaska.edu/winterberry/berry-learning

Students from Shageluk proudly show their scenario stories. K. Spellman
It’s Berry Time!

Hunting for crowberries in Sitka with Jasmine Shaw and her 4H Club.

Fresh muffins in Shishmaref made by Climate Heroes Afterschool Club.

A student in Venetie counting rosehips.

MOST OBSERVATIONS
Sitka Spruce Tips 4-H Club (4082 observations of two species over 3 years)

POLLINATOR PRIZE
Center for Alaskan Coastal Studies, Homer
Thanks for spreading the word and helping other communities participate!

MOST SNOW
Takotna Community School
121 cm Jan 23, 2020

CREATIVE NAMES AWARD
Earl’s World, at MatSu Career and Tech High, Wasilla. All adopted plant names rhymed with Earl!

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