Alaska Berries and Climate Change

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UNIVERSITY OF ALASKA FAIRBANKS

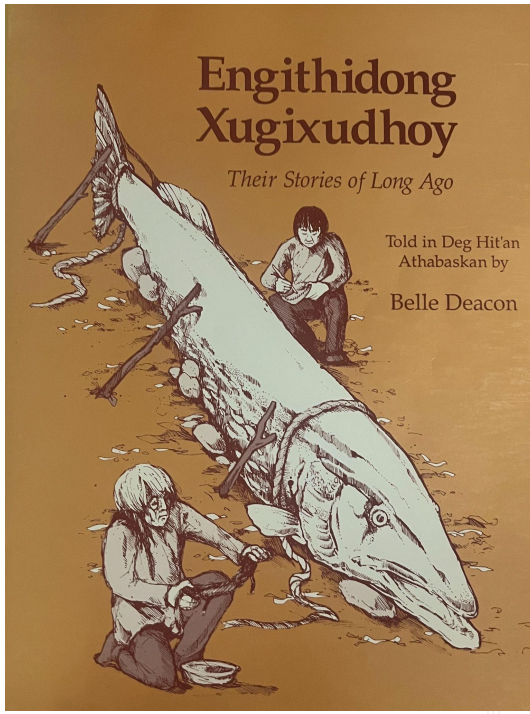
Photo Credit: Katie Spellman

Land Acknowledgement

- UAF is located on the traditional territory of the Lower Tanana Dene People; *Benhti Kenaga'* (Koyukon Athabascan)
- *Troth Yeddha'* – Indian Potato Ridge; Recognized as the official name in 2013

Stories and knowledge

Across Indigenous People of AK, berries are woven into our stories, celebrations, outings, traditional foods and more



We love our berries.

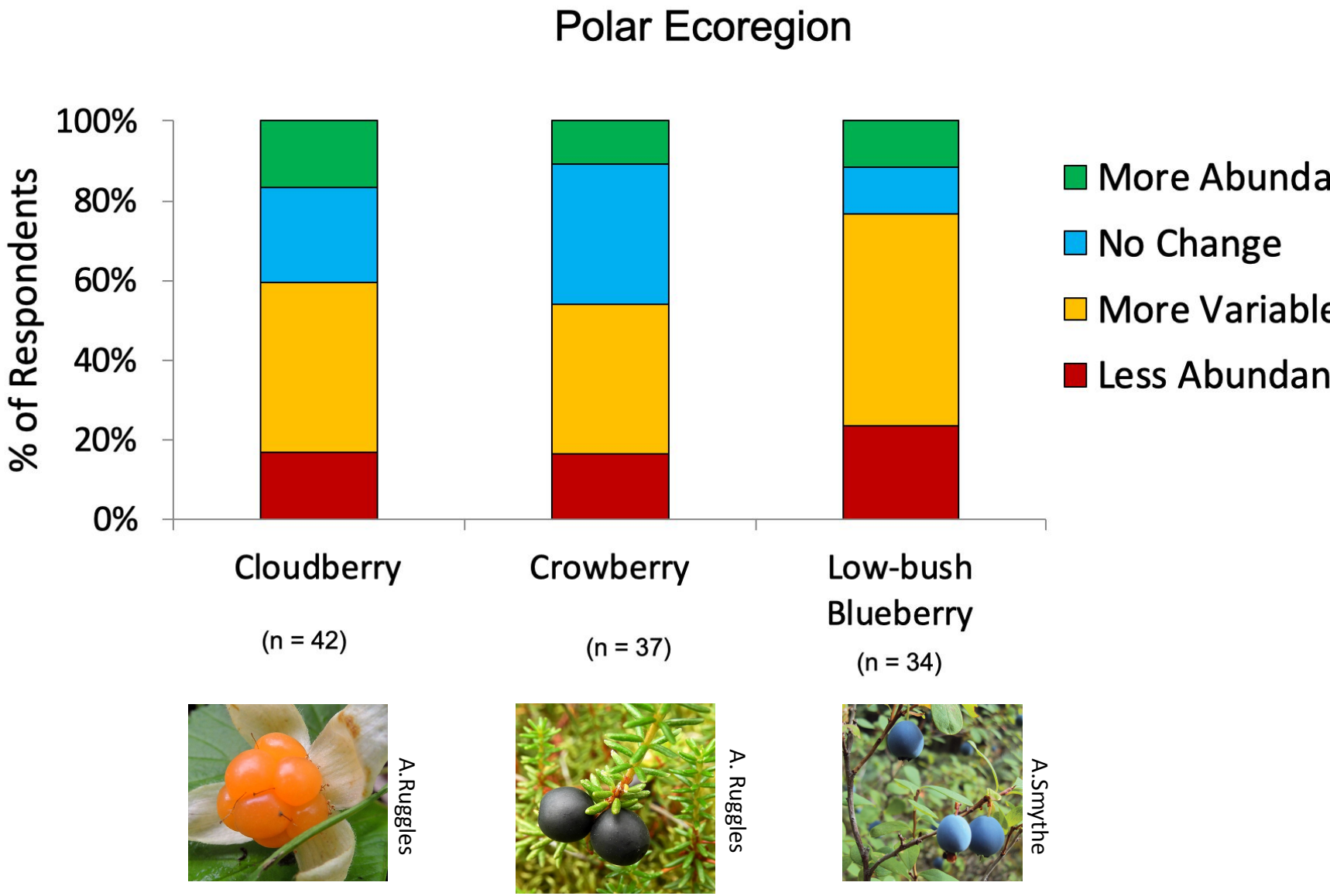

Photo by Blaine Spellman, USDA NRCS

Photo by Kira Wilkinson

- Most families picked at least 19 liters (5 gallons) of berries.
- Some families pick >75 liters (20 gallons)

Hupp et al. 2015

We have noticed increased variability in berry abundances.



Hupp et al. 2015

The birth of a berry is a miracle.

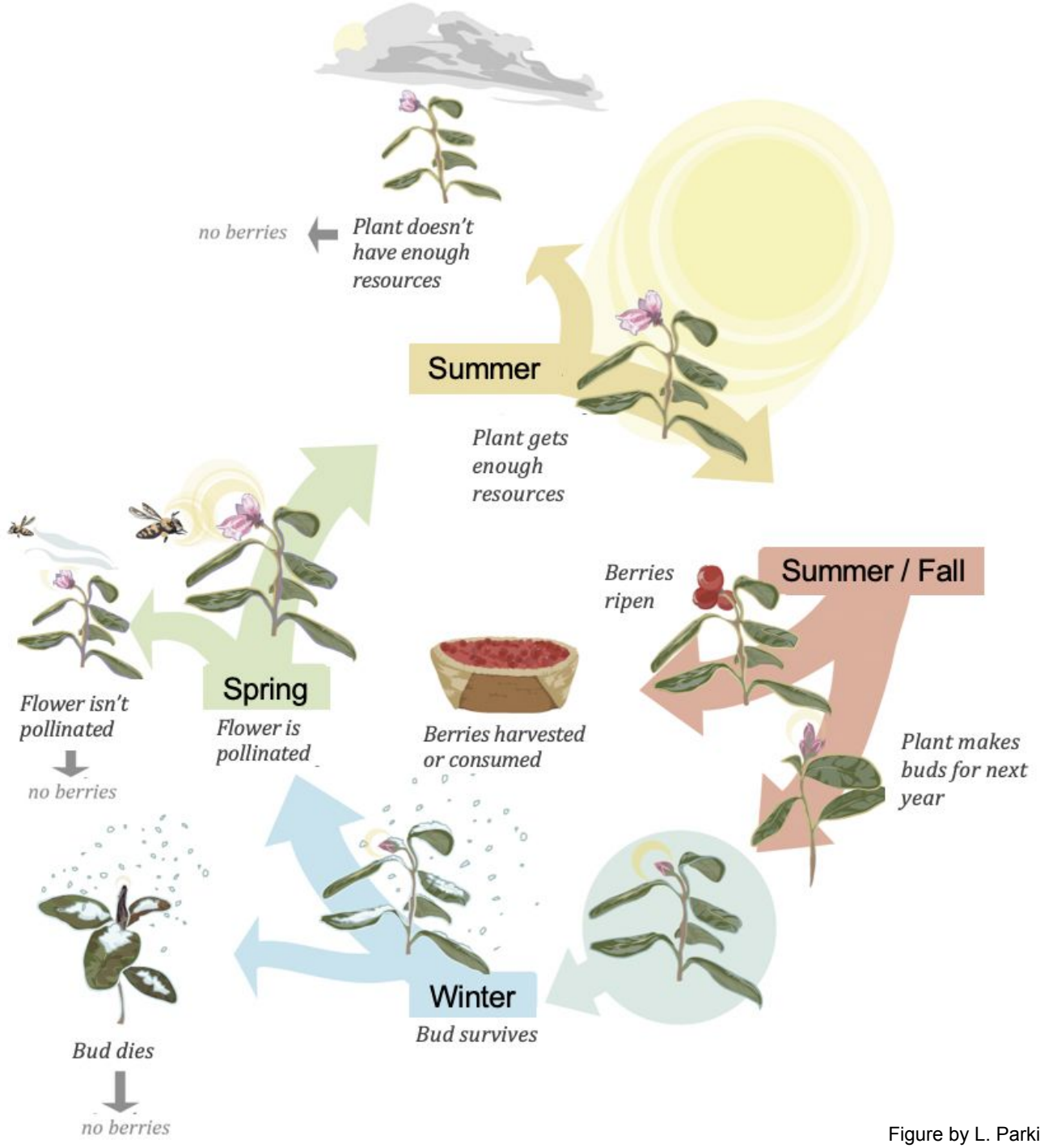


Figure by L. Parkinson and M. Perra

Climate change can influence every phase in a berry plant's life.

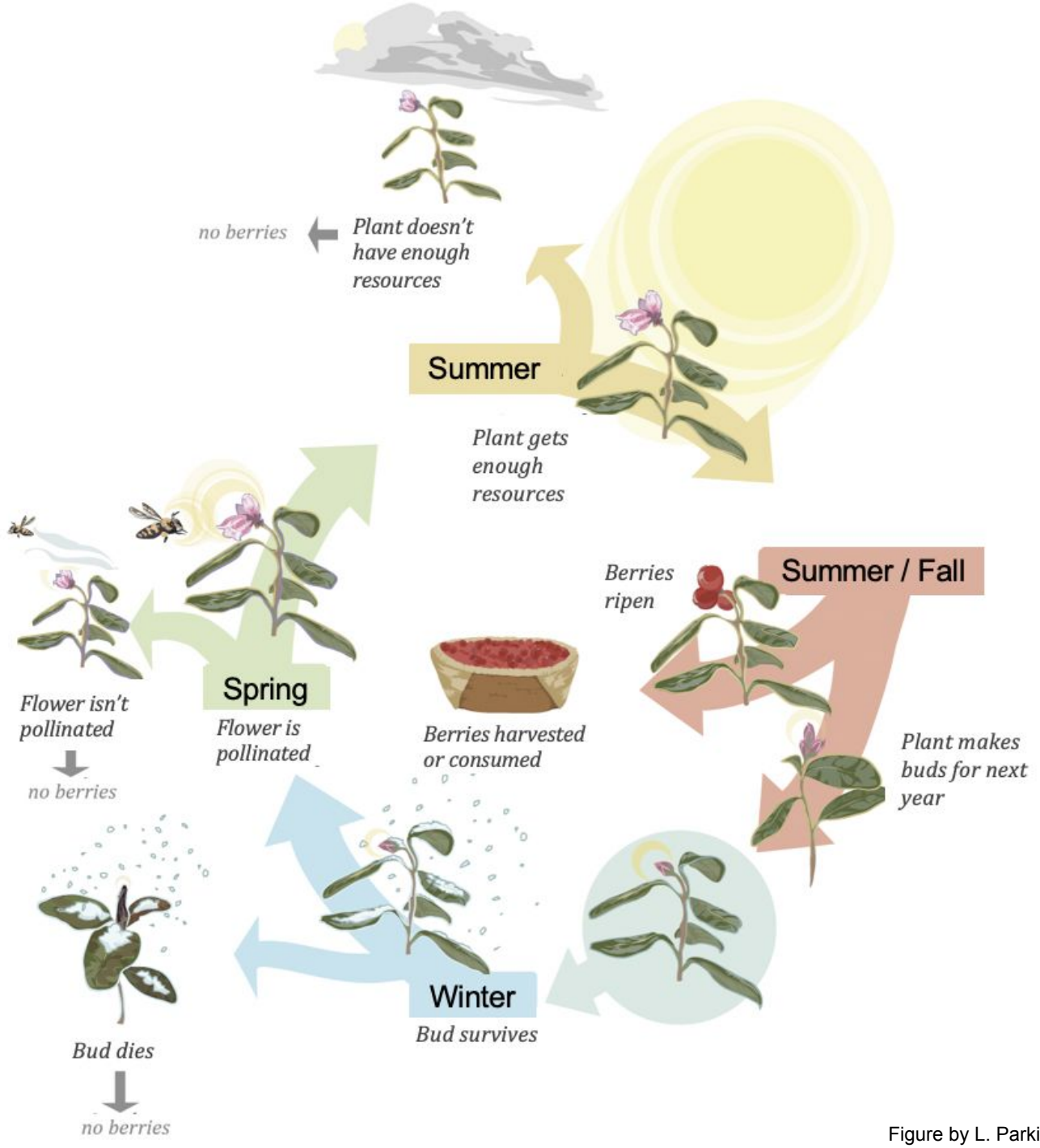
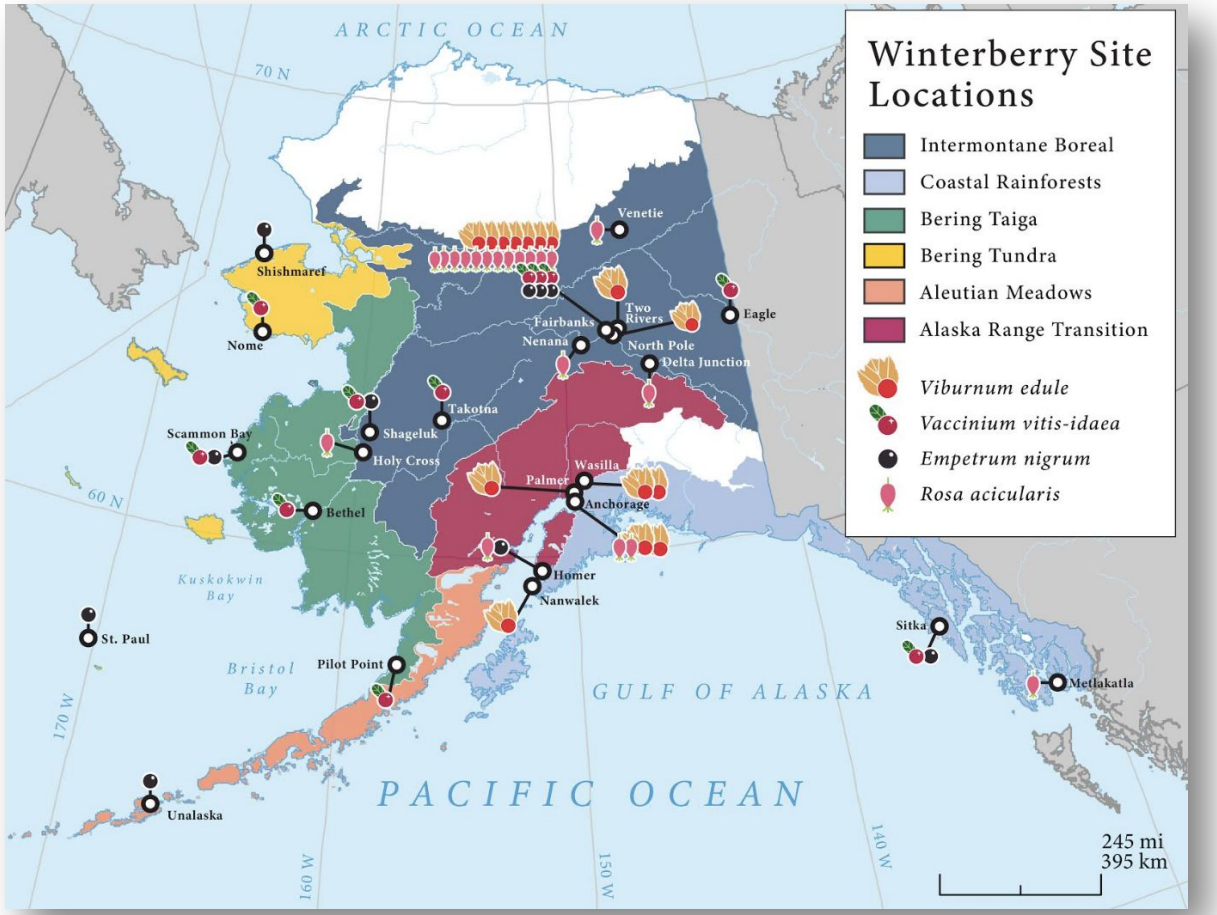


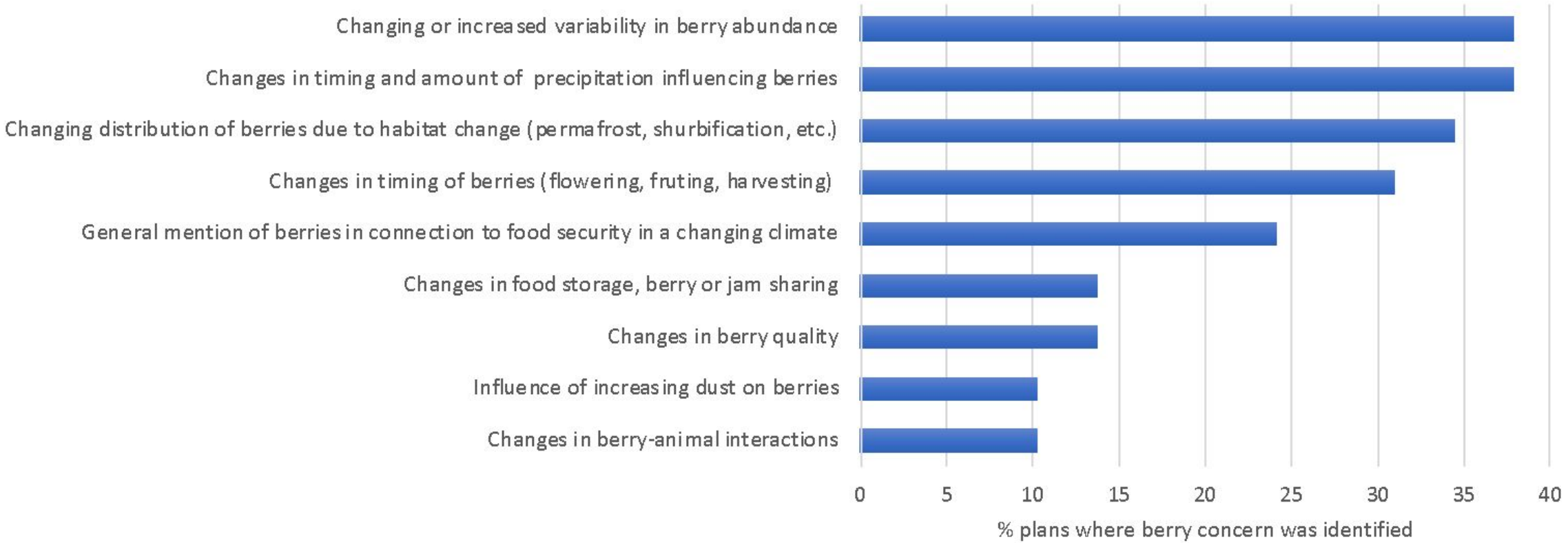
Figure by L. Parkinson and M. Perra

Winterberry Citizen Science

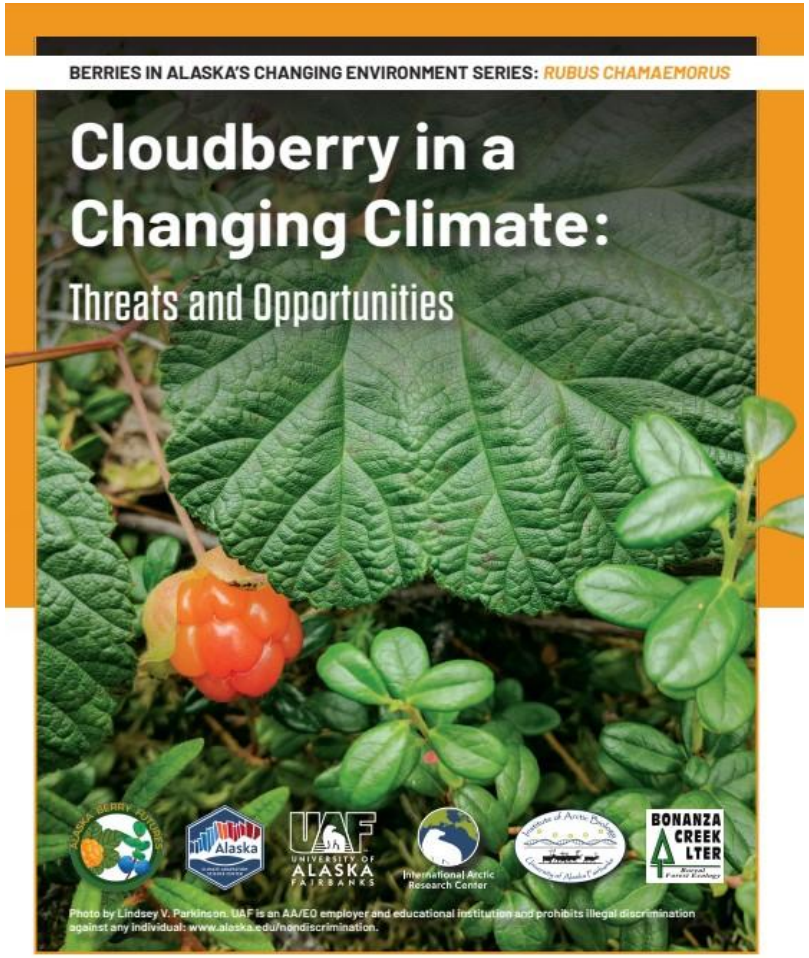
> 1500 volunteers in 30 communities tracking berry abundance & condition

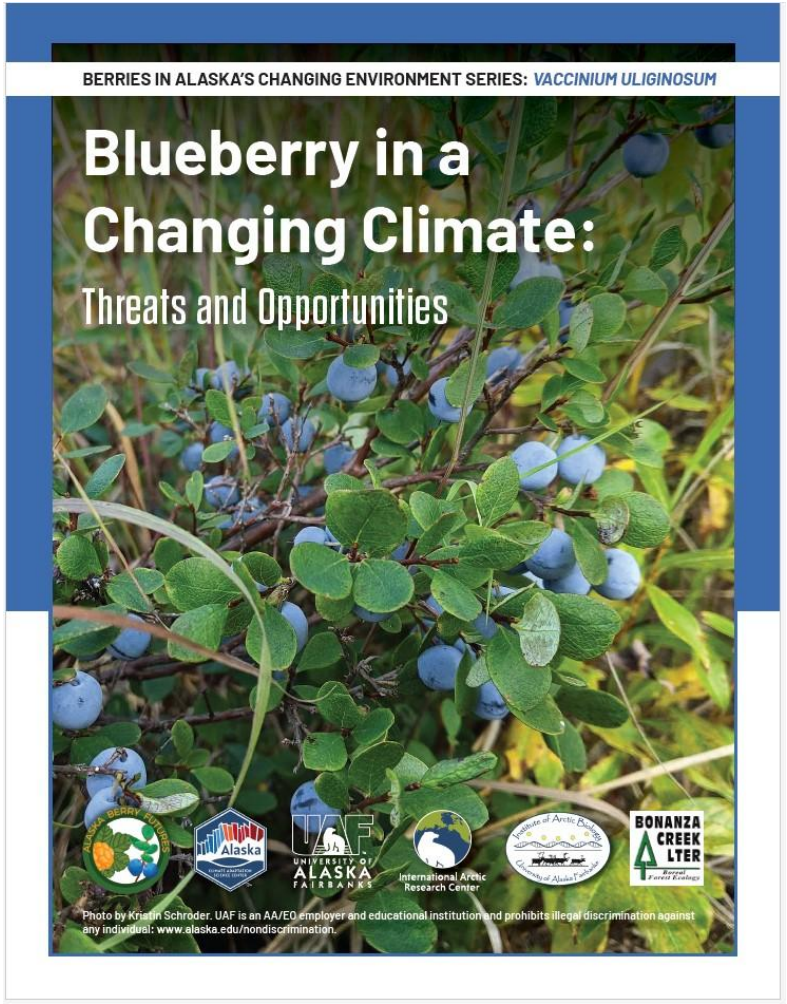


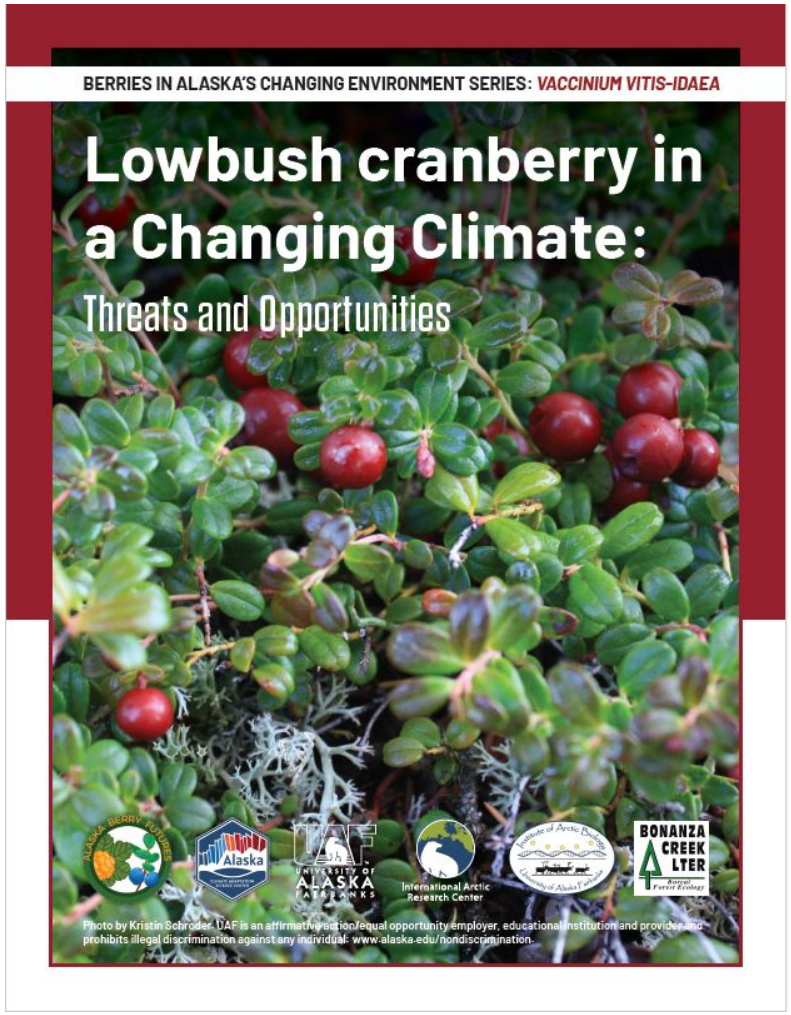
Communities and Tribes are naming berry concerns in adaptation plans



Spellman analysis of 29 AK adaptation plans and risk assessment, unpublished







Download at:
casc.alaska.edu/changingberries

Berry plants make flower buds a year before they flower.

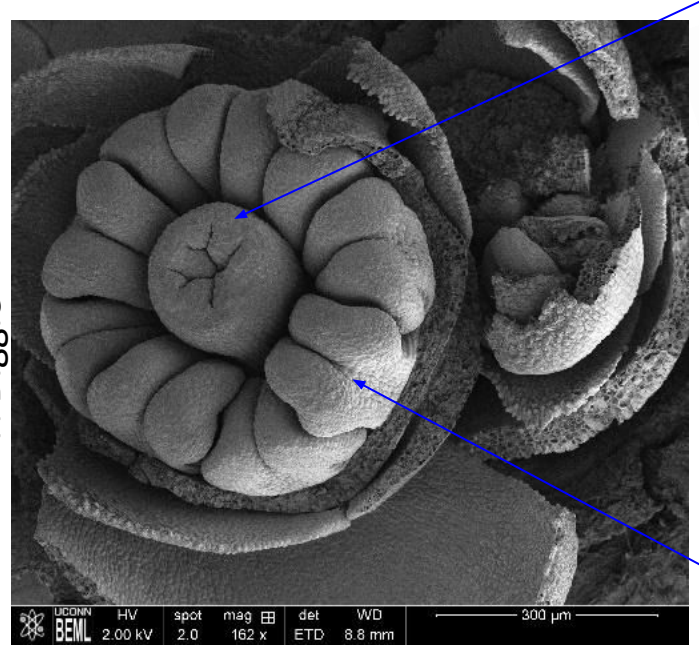
Lowbush cranberry buds in fall.

Highbush cranberry buds in fall.

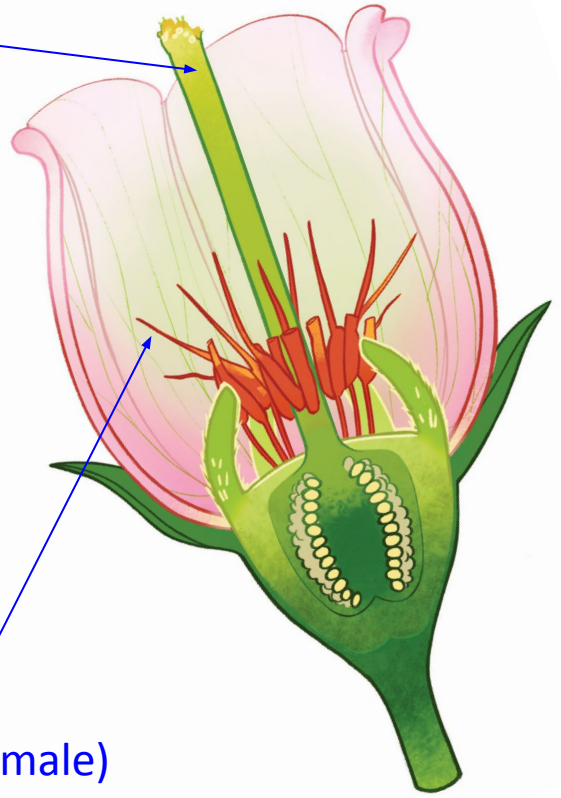
Credit: C. Mulder

Blueberries have both sexes in one flower

pistil (female)



P. Diggle



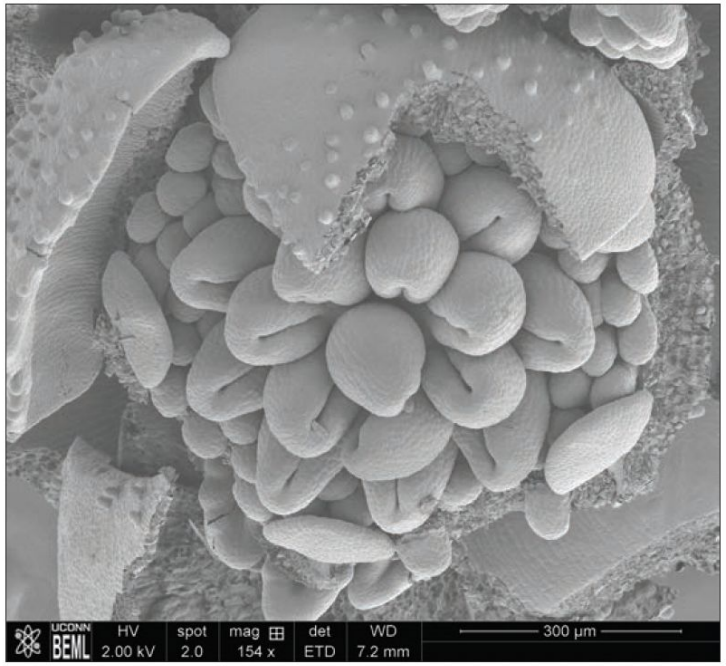
stamens (male)

L. Bird

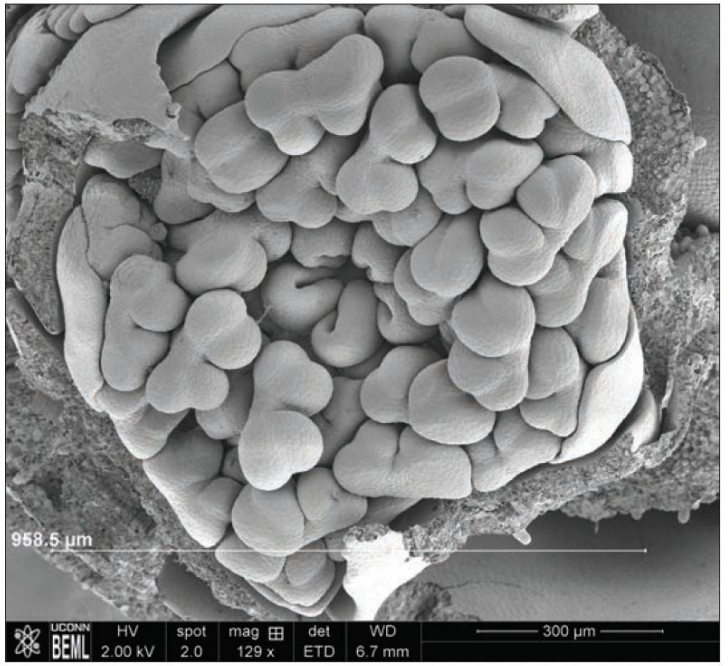
Mulder et al. 2023 *Bog Blueberry in a Changing Climate*

Cloudberry buds make two sexes of flowers.

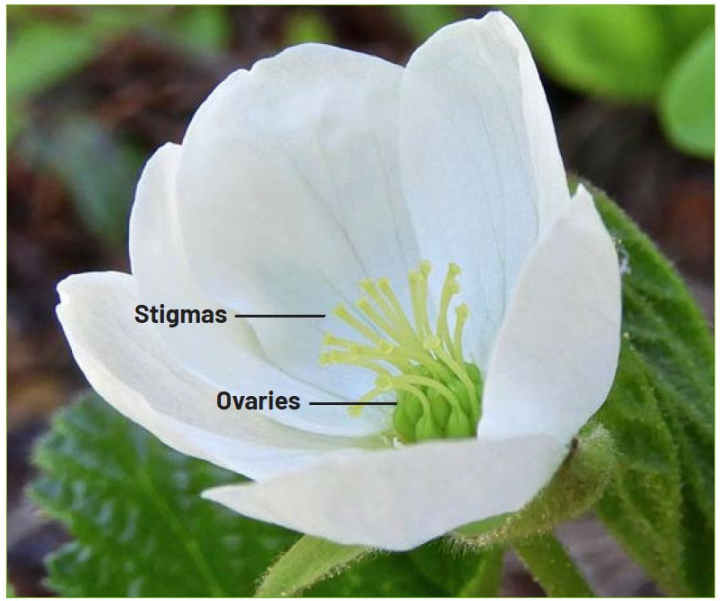
Female Flower



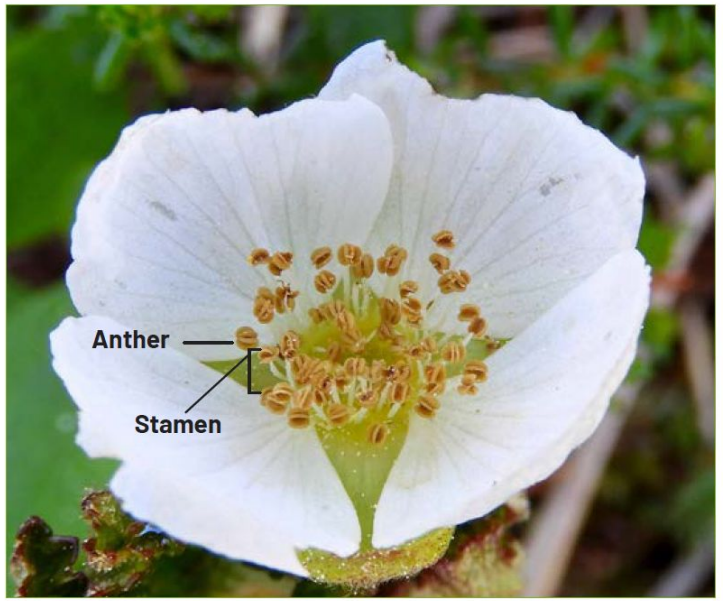
Male Flower



Female Flower

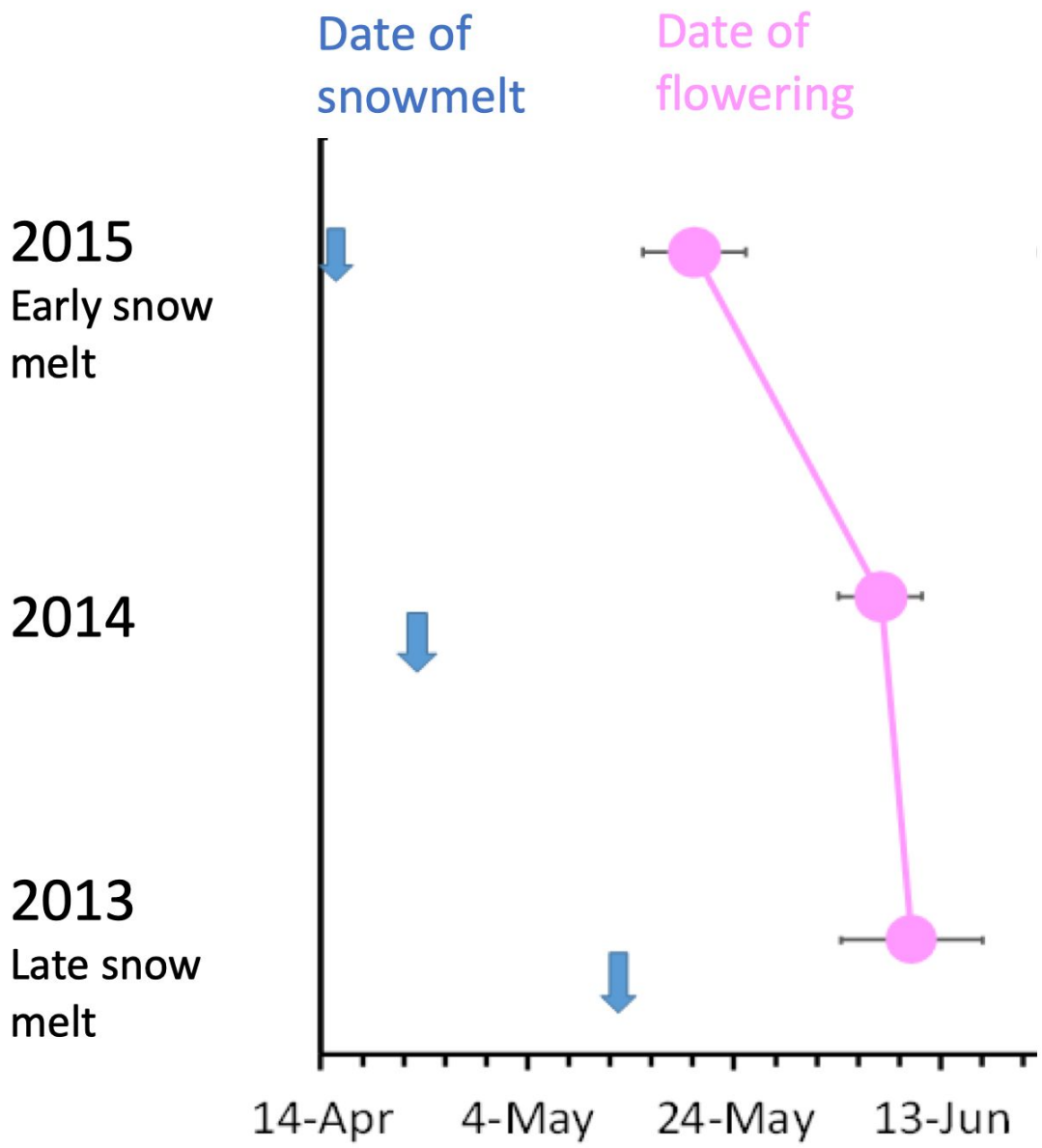


Male Flower



Mulder et al. 2023 *Cloudberry in a Changing Climate*

Timing of snow melt influences when flower buds open and when growth starts.



Mulder and Spellman 2019 *Botany,* data for 8 berry species

Temperature influences plant growth

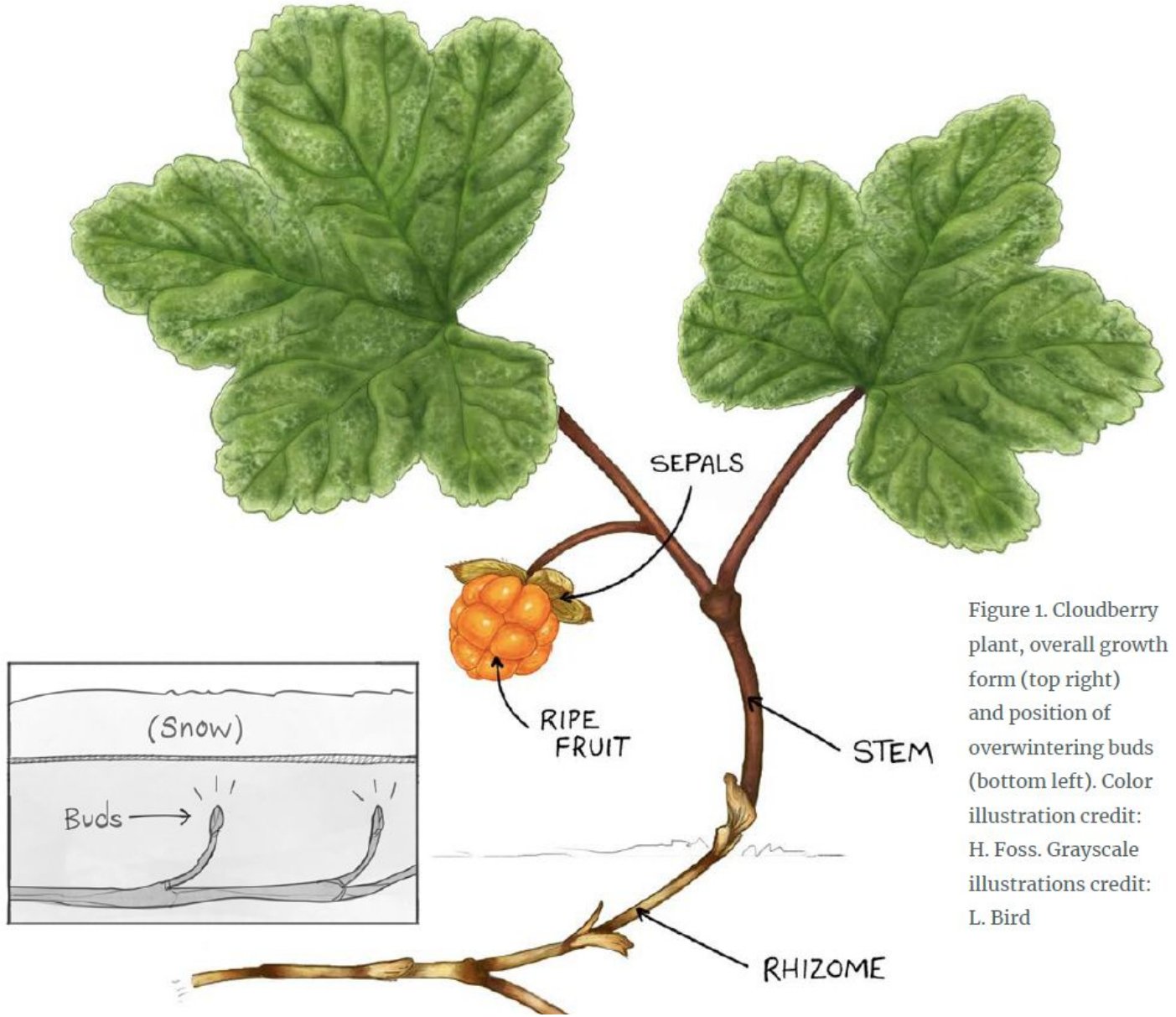


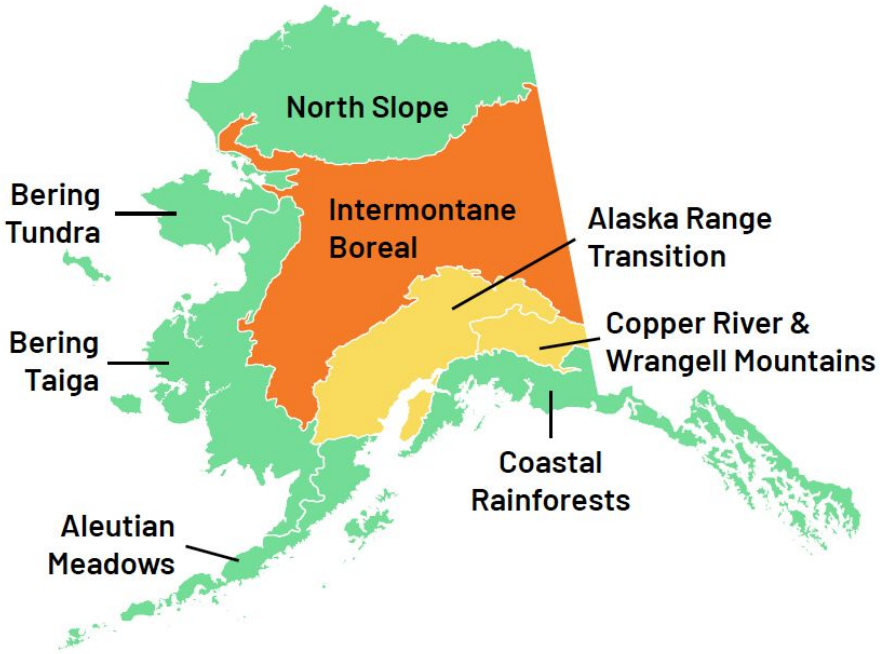
Figure 1. Cloudberry plant, overall growth form (top right) and position of overwintering buds (bottom left). Color illustration credit: H. Foss. Grayscale illustrations credit: L. Bird

Mulder et al. 2023 *Cloudberry in a Changing Climate*

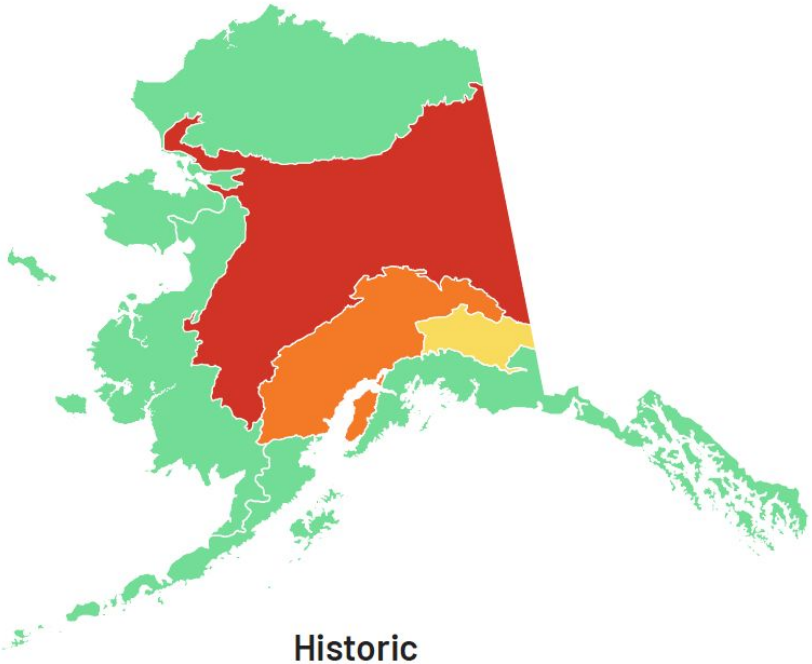
Above 18°C / 64°F cloudberry is under stress

Historic and Projected Percent of Summer Days Stressful for Cloudberry Photosynthesis by Ecoregion

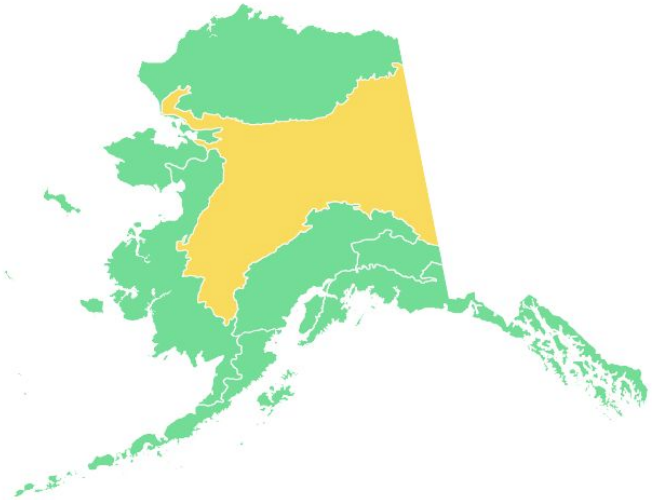
Projected for 2060-2069 under the Slow Progress toward Reduced Emissions Scenario (RCP 6.0)*



Projected for 2060-2069 under Business as Usual Scenario (RCP 8.5)*



Historic

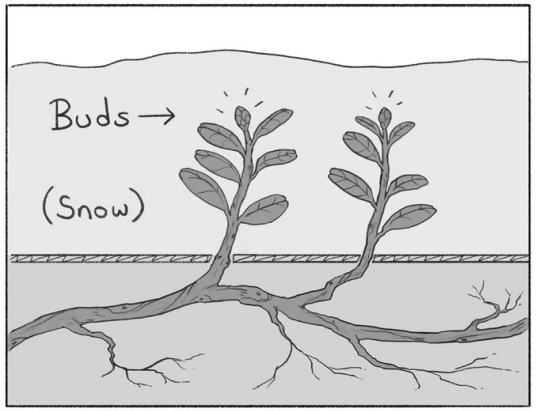


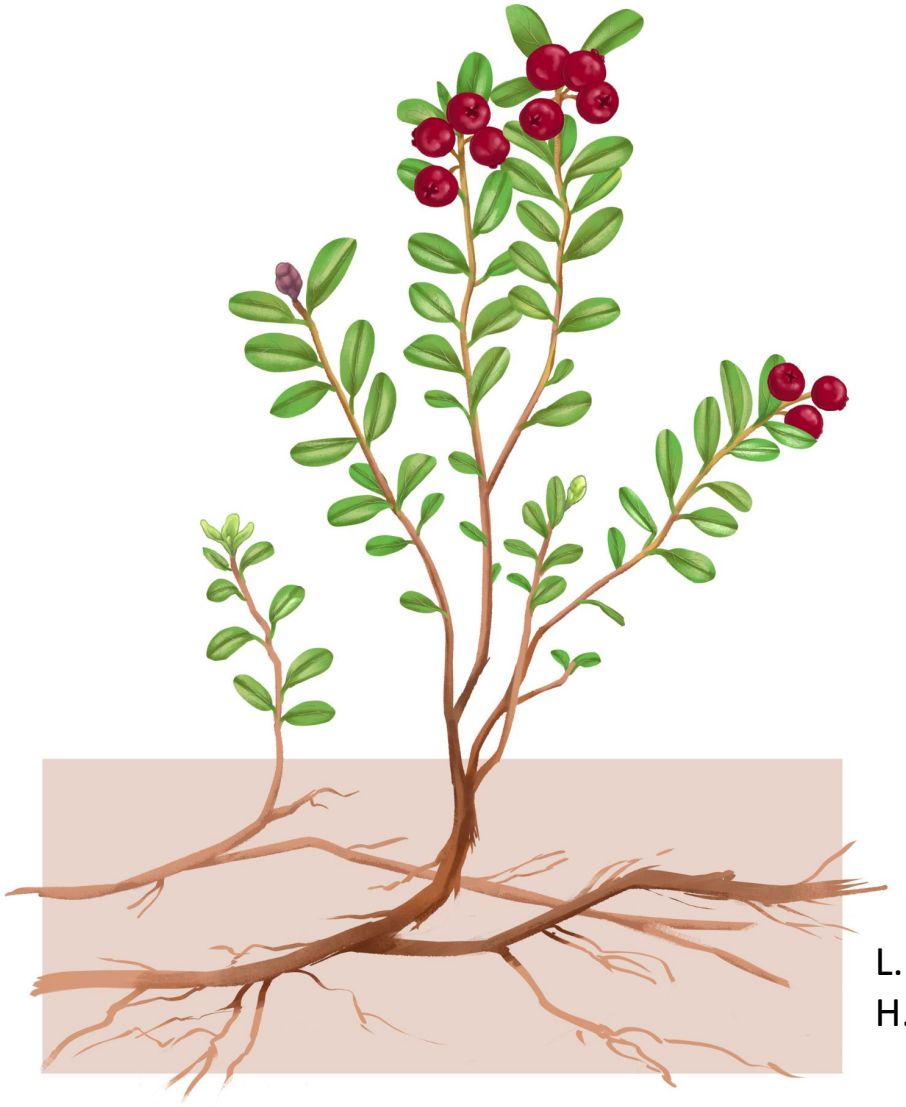
Degree of Risk

- > 40%, high risk
- 20-40% moderate risk
- 10-20% low risk
- < 10% very low risk

*Historic data from Scenarios Network for Alaska.

Temperature influences plant growth

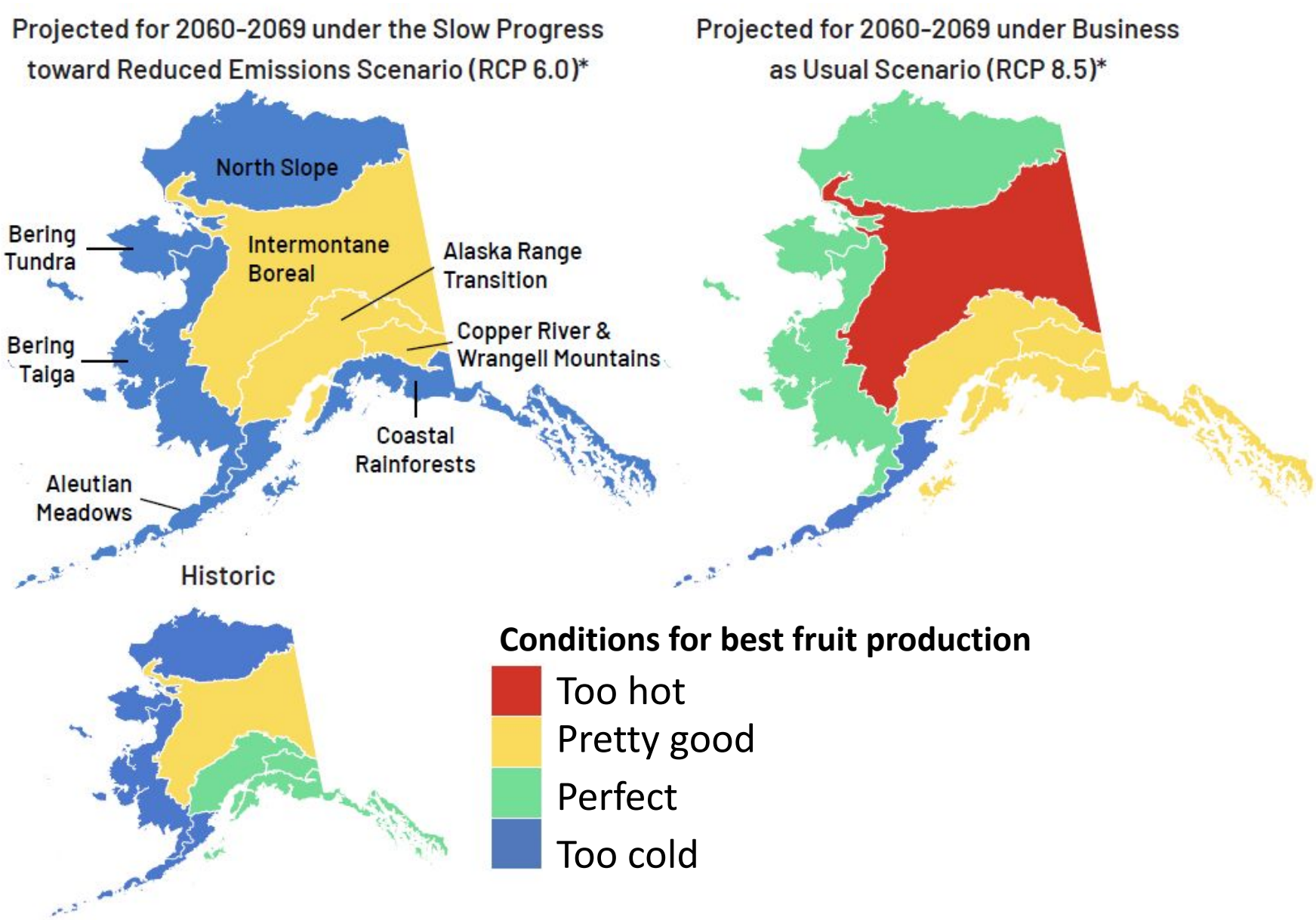




L. Bird and H. Foss

Parkinson et al. 2023 *Lowbush cranberry in a Changing Climate*

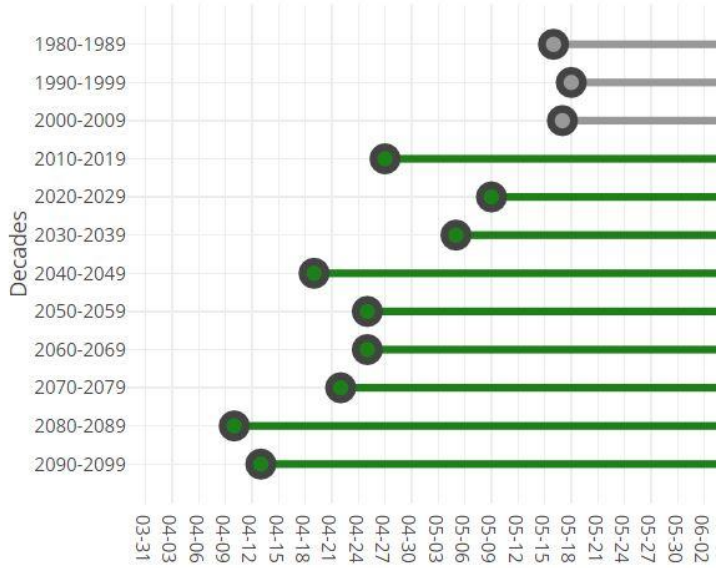
For lowbush cranberry 15-20 °C (59-68 °F) is perfect for fruit production



Parkinson et al. 2023 *Lowbush cranberry in a Changing Climate*

Climate change alters flowering time and may damage plants

Historic and projected growing season start



Credit: K. Schroder

Figures Credit: UAF SNAP

Actions to support temperature and timing stress!

Snow addition or snow fences

Shading

Actions to support temperature and timing stress!

Berry Agrovoltaics

Blueberry agrivoltaic project in Maine.
Photo: University of Maine

Actions to support temperature and timing stress!

Photo: G. Winter, MIC

Fruit-bearing trees and shrubs planted around Metlakatla Indian Community

Community food forests

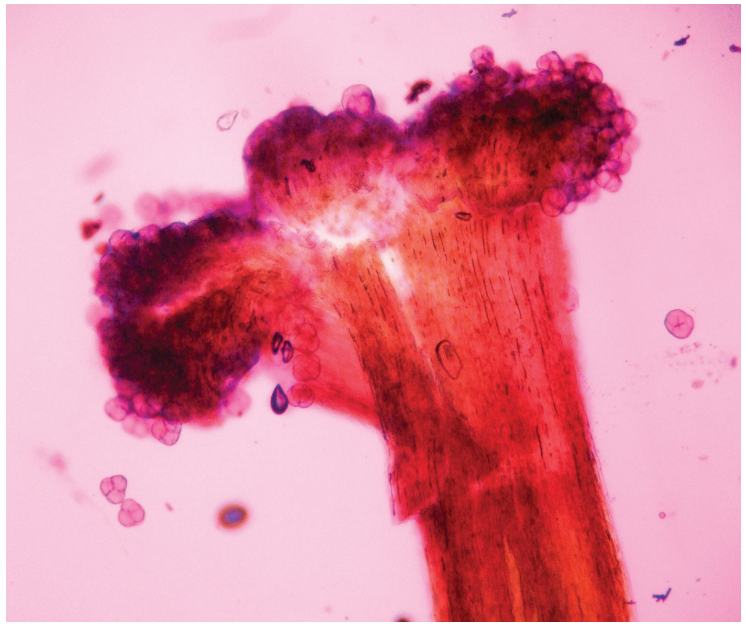
Photo: K. Spellman, UAF

Honeyberry plot at Georgeson Botanical Garden in Fairbanks

Berry cultivation

Most berry plants need pollinators.

V. Mononen, CC by NC-2.00 DEED



K. Spellman

Figure 7b. A lowbush cranberry flower with a stigma wet with fluid to trap the pollen from visiting pollinators. Photo credit: A. Ruggles.

Parkinson et al. 2023 *Lowbush cranberry in a Changing Climate*

Changes in flowering time may lead to a mismatch with pollinators

Credit: A. Ruggles

Credit: A. Ruggles

Credit: A. Ruggles

Mulder et al. 2023 *Cloudberry in a Changing Climate*

DATA NEED!

Actions to support pollination!

iStock.com

Honeybee hives

J. Evans

Pollinator monitoring - Alaska Bee Atlas Project (Alaska Center for Conservation Science and BLM Casey Burns)

Fruits and seeds develop with care.

Credit: M. Chase

Changes in habitat can change resources available for making berries.

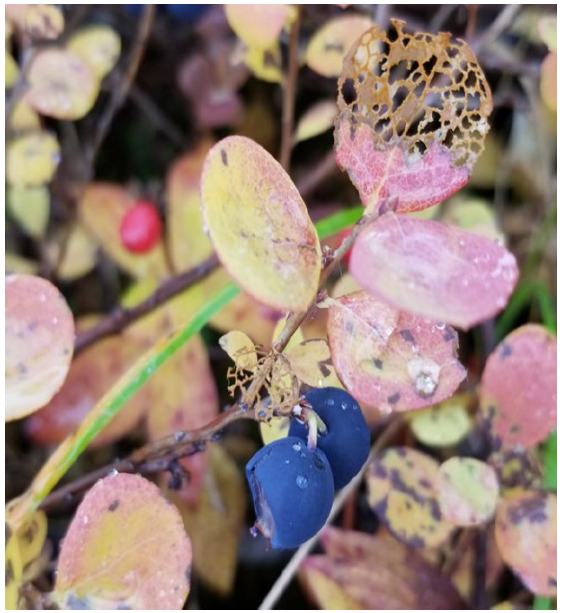
Parkinson and Mulder 2020 *PloS One*

DATA NEED!

Changes in climate can increase vulnerability to herbivores and pathogens

Credit: A. Ruggles

Credit: L. Parkinson



Credit: A. Smyth

DATA NEED!

Actions to support berry availability in a changing landscape!

Photo: Hoonah Native Forest Partnership

Forest stand management

Photo: H. Rader, UAF CES

Pruning
(shrubs above berry plant and berries themselves)

Animals, fungi and bacteria consume fruits.

Credit: D. Baier

Bear scat full of berries in fall.

Credit: R. Rovira

Berry cache made by squirrel.

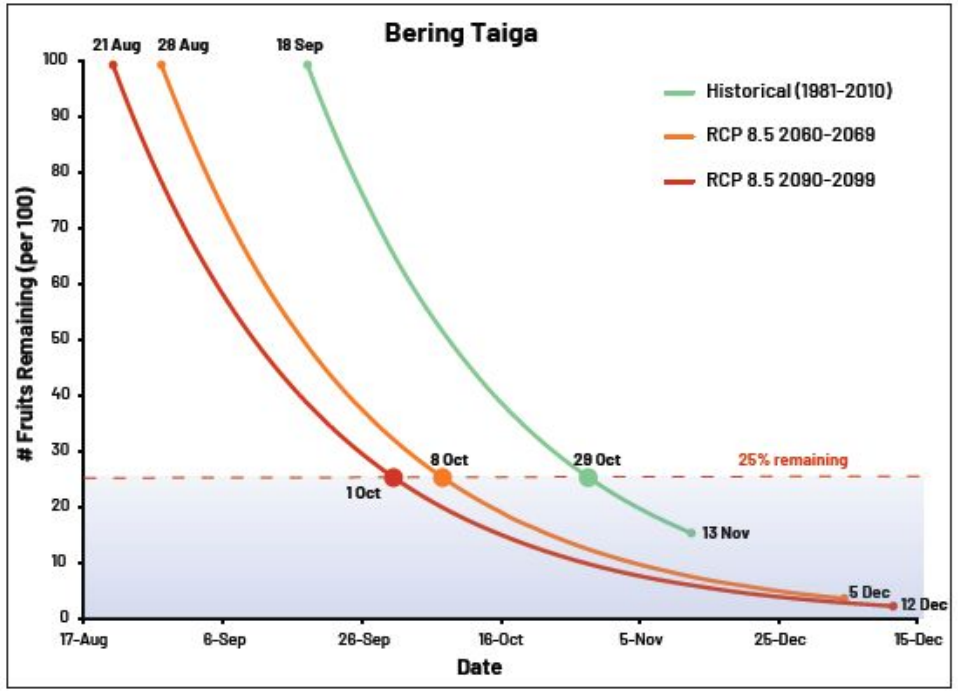
Credit: J. Hupp

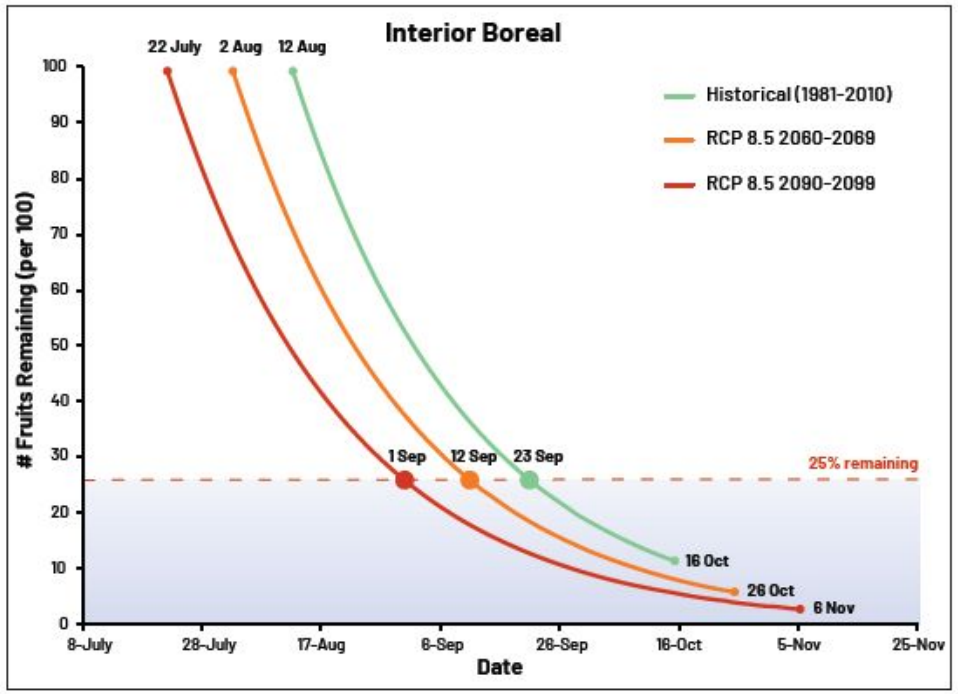
Migratory geese eat berries in fall and spring.

Credit: J. Hupp

Ptarmigan eat berries whenever they can!

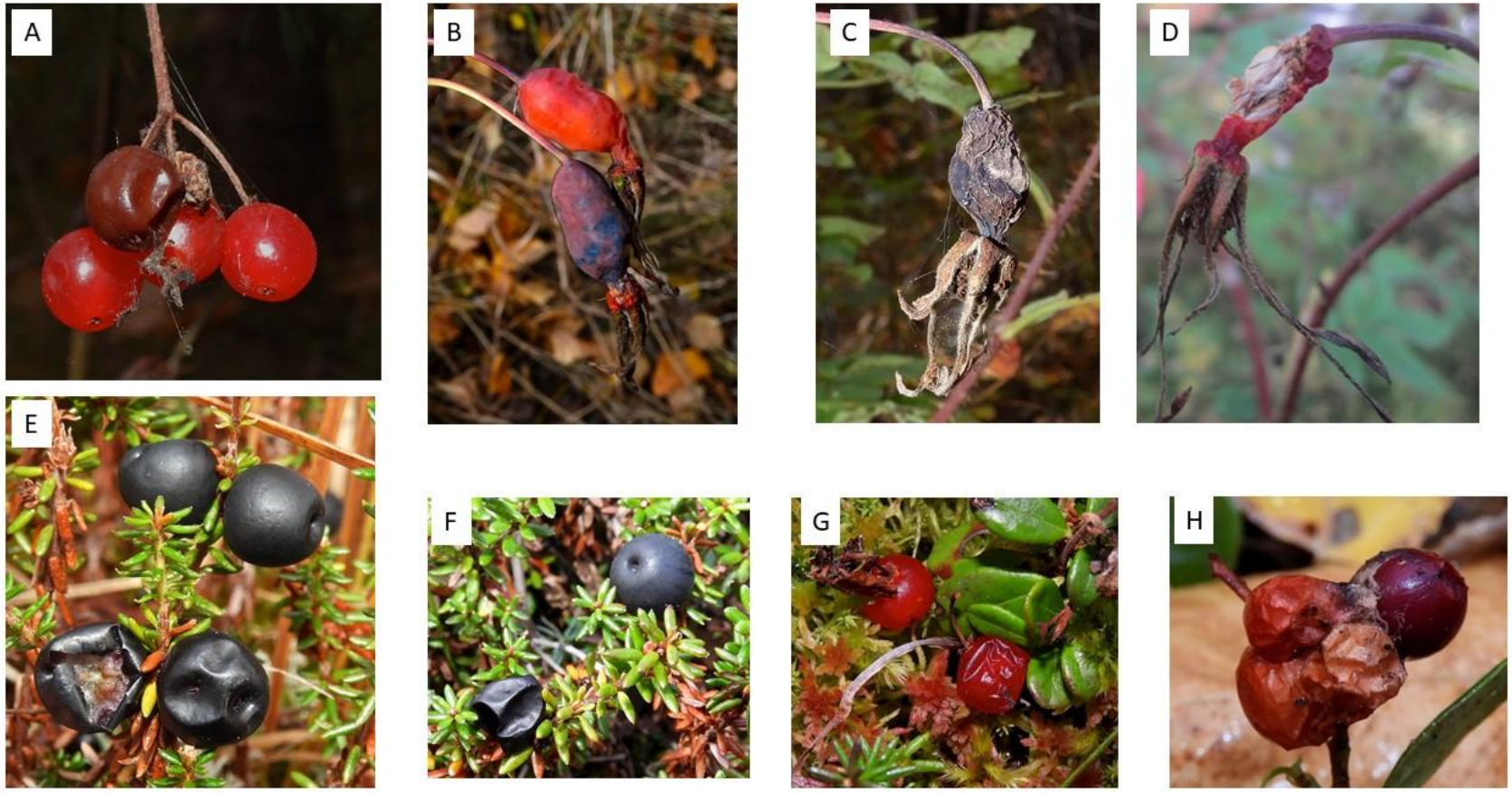
Longer periods with fruits may mean less fruit in winter for winter animals.





Parkinson et al. 2023 *Lowbush cranberry in a Changing Climate*

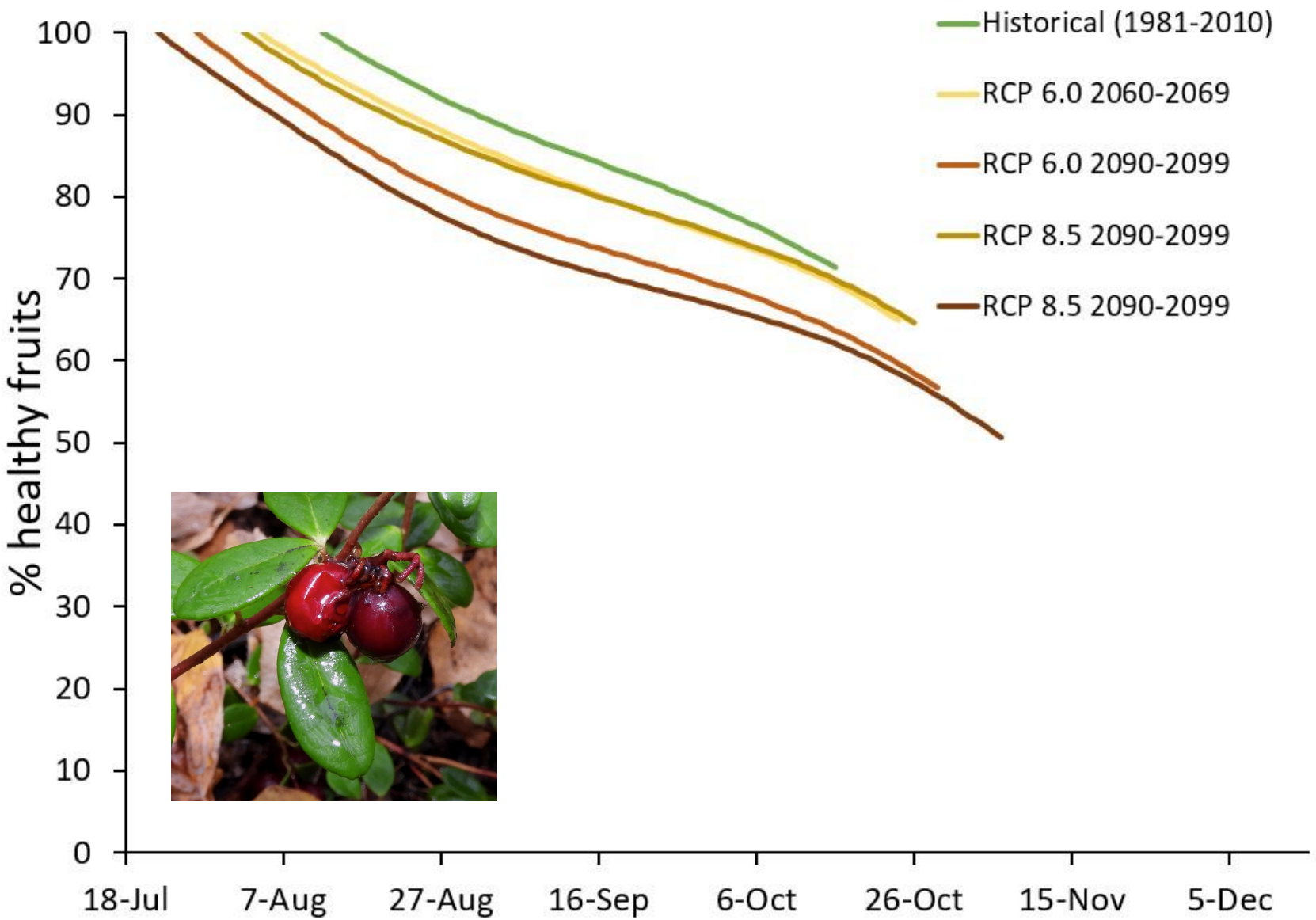
Early flowering leads to early fruits and possibly more rot.



Credits: A. Ruggles, except for D (C. Mulder)

Warmer, wetter conditions may lead to more rot.

Lowbush cranberry in Interior Alaska



C. Mulder, Unpubl. data

Hope and information possibilities

Photo: KC Nattinger, Scammon Bay School

From the inside of a ptarmigan crop.

Northern bird migration brings propogules north

Credit: L. Parkinson

Insect larva feeding on cranberry flower.

Need for information on pathogens and pests

Taking Action

- Post your berry observations on LEO.
- Participate in berry monitoring or start a local program. (UAF can help!)
- Think about what adaptation strategies that might work for your community

Credit: leonetwork.org

Credit: K. Spellman

For monitoring resources for different berry questions see https://mkp28.wixsite.com/cbm-best-practice/winterberry

Contact details

WEBSITE (download all completed booklets):

casc.alaska.edu/changingberries

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