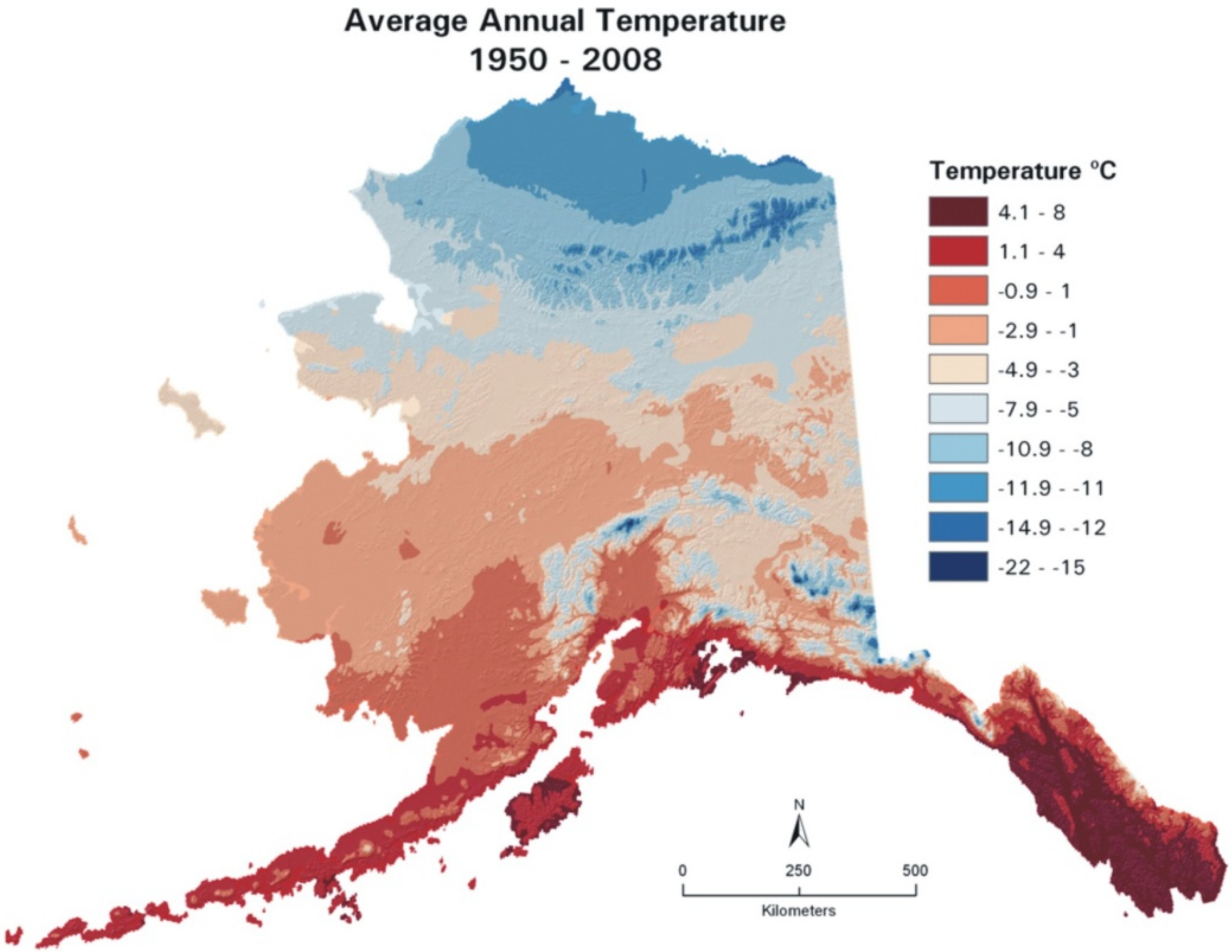
Alaska Garden Helper

A Tool for Visualizing Climate Change Effects on Agriculture

AK CASC
UAF UNIVERSITY OF ALASKA FAIRBANKS
SNAP
USDA

Climate Change in Alaska

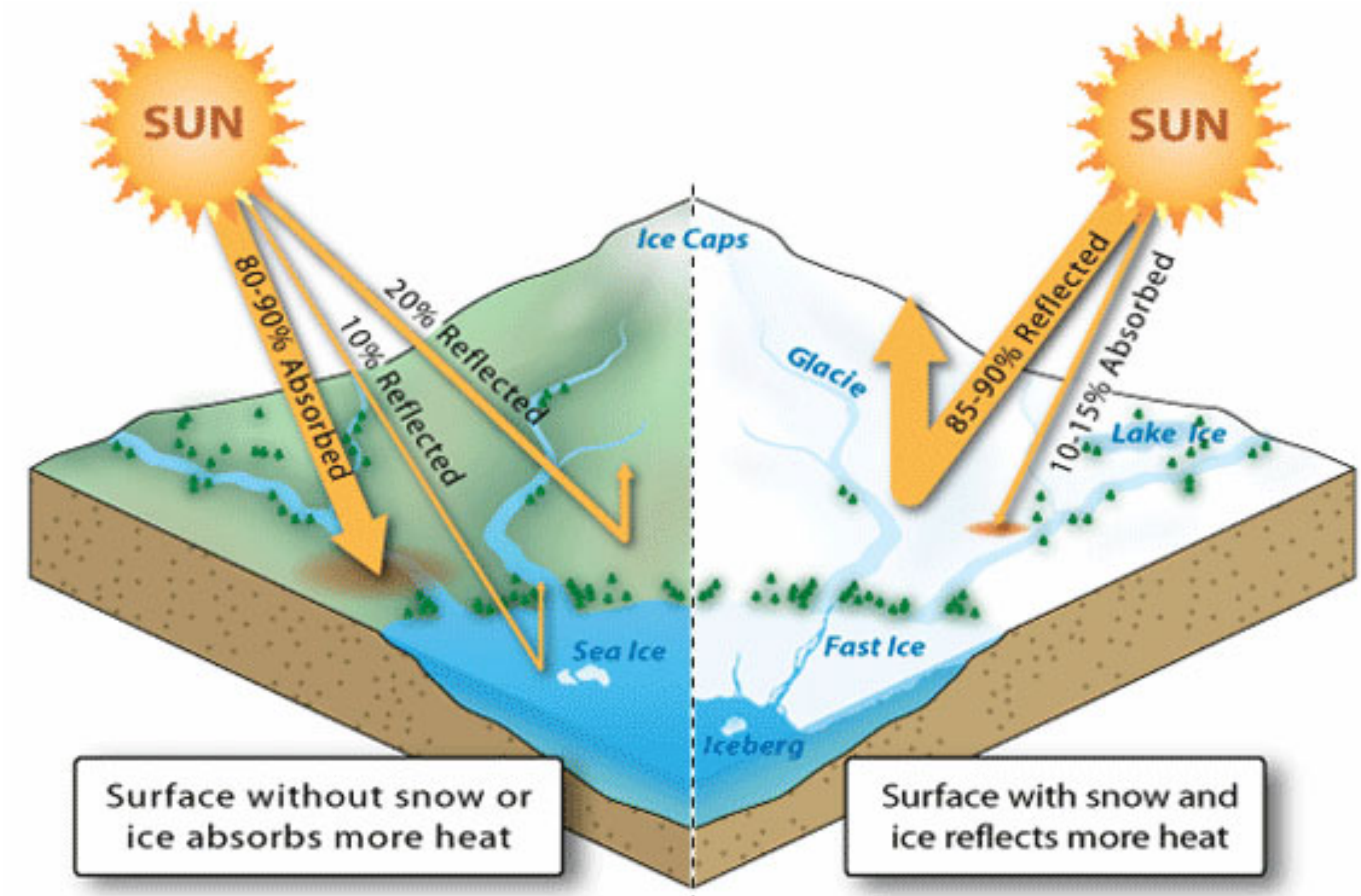
What is "Normal" in Alaska?



Average annual temperature 1950-2008

Weather in Alaska is highly variable from place to place, season to season, and year to year, so we have to look at long-term averages and trends to detect change.

Climate Change in Alaska: Why is it more extreme here?



The far north is warming faster than other parts of the globe because as snow and ice melt, the darker exposed ocean and earth absorb even more heat. This is called the "**albedo effect**".

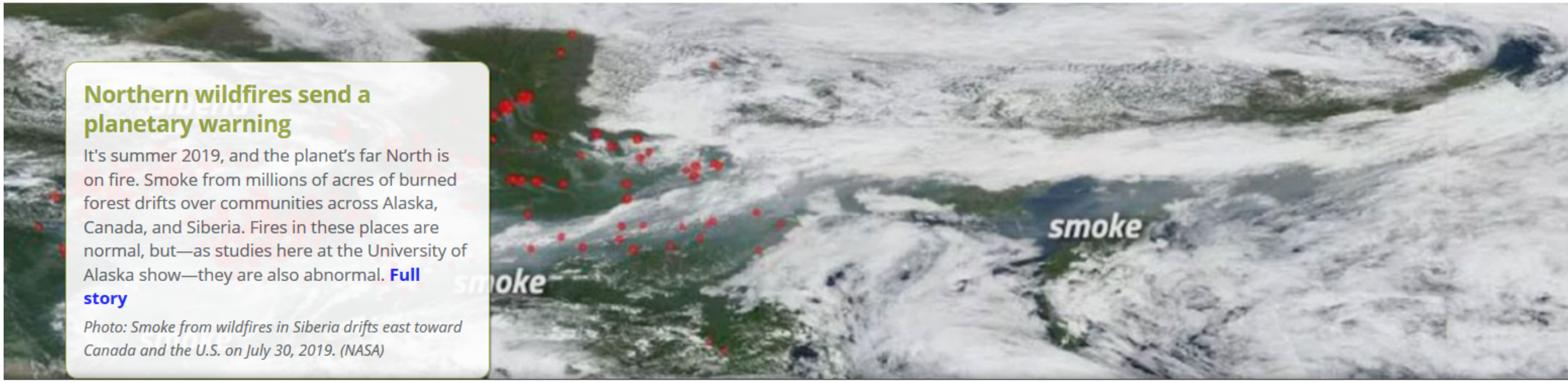
Climate Change in Alaska: Tipping Points and Thresholds

(Chief Eddie Hoffman Highway, Bethel, Alaska Dispatch News, Lisa Demer, July 8 2017)

Even a small temperature change can have profound effects if, for example, frozen ground warms from one degree below freezing to one degree above…

SNAP

SCENARIOS NETWORK FOR ALASKA + ARCTIC PLANNING



Northern wildfires send a planetary warning

It's summer 2019, and the planet's far North is on fire. Smoke from millions of acres of burned forest drifts over communities across Alaska, Canada, and Siberia. Fires in these places are normal, but—as studies here at the University of Alaska show—they are also abnormal. **Full story**

Photo: Smoke from wildfires in Siberia drifts east toward Canada and the U.S. on July 30, 2019. (NASA)

EXPLORING OUR FUTURE IN A CHANGING ARCTIC

DOWNLOAD DATA
Downscaled and historical data for Alaska and parts of Canada
MORE

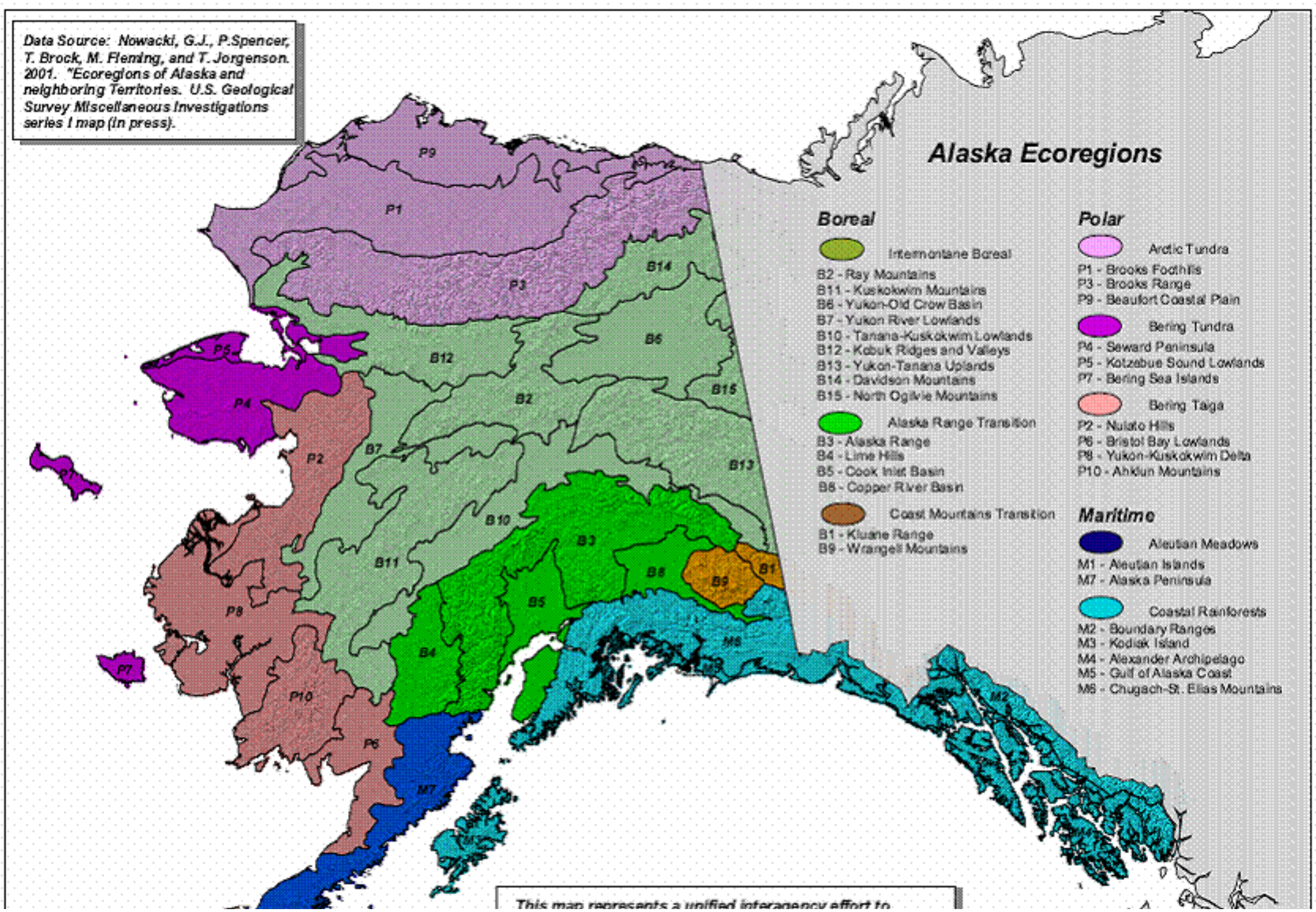
COLLABORATE
How individuals, agencies, non-profits, and communities work with SNAP
MORE

OUR EXPERTISE
Data analysis, planning, and science communication
MORE

SEE THE DATA
Look for patterns in SNAP climate data visualizations
MORE

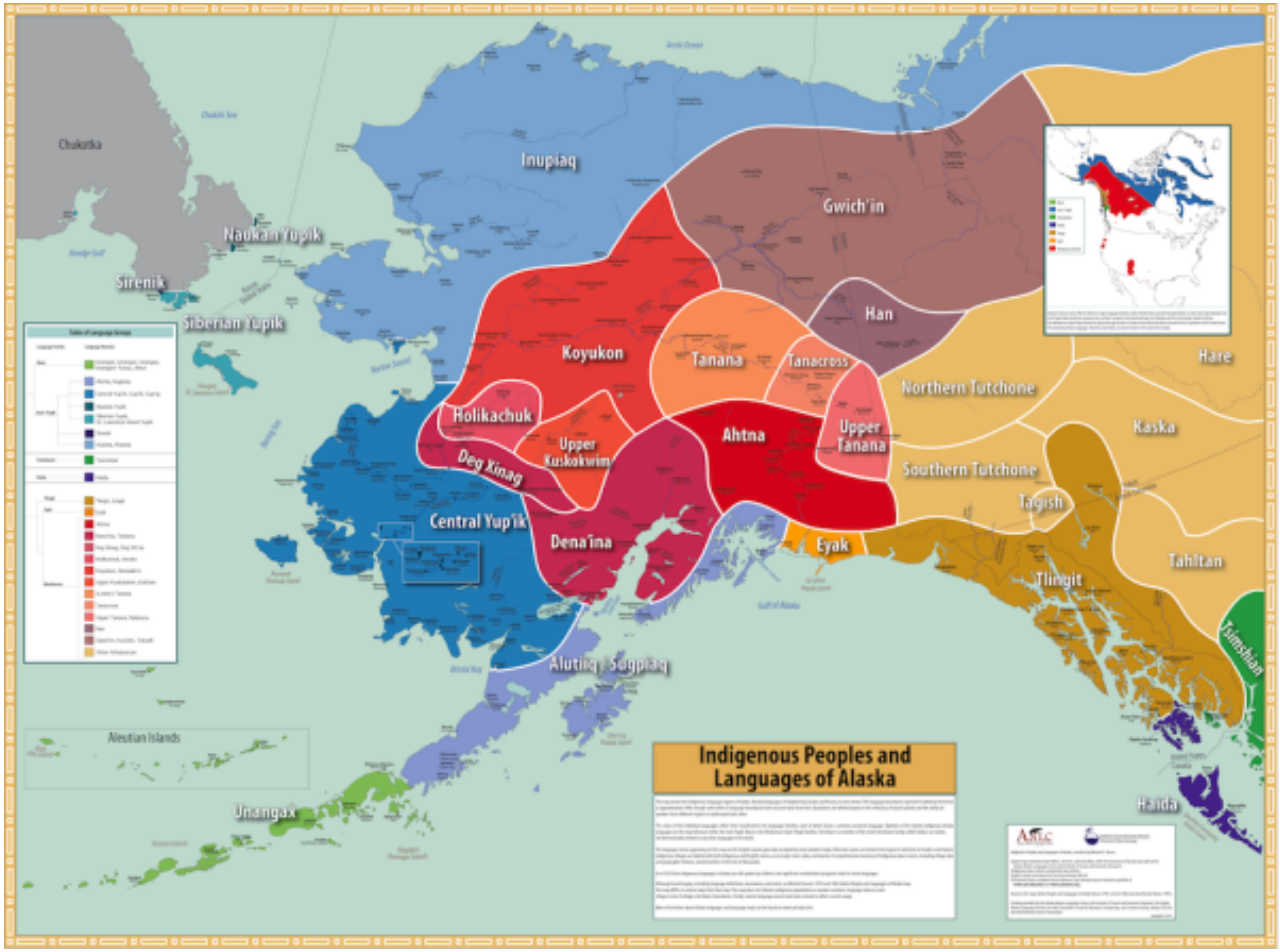
Explore climate trends with our interactive tools

Climate Change in Alaska: One State, Many Ecosystems



Climate change has many different impacts around the state in part because our state is so biologically and geographically diverse.

Climate Change in Alaska: One State, Many People



Climate change is experienced in many different ways because our state is culturally, socially, and economically diverse.

Project Goals

Collaborative Effort

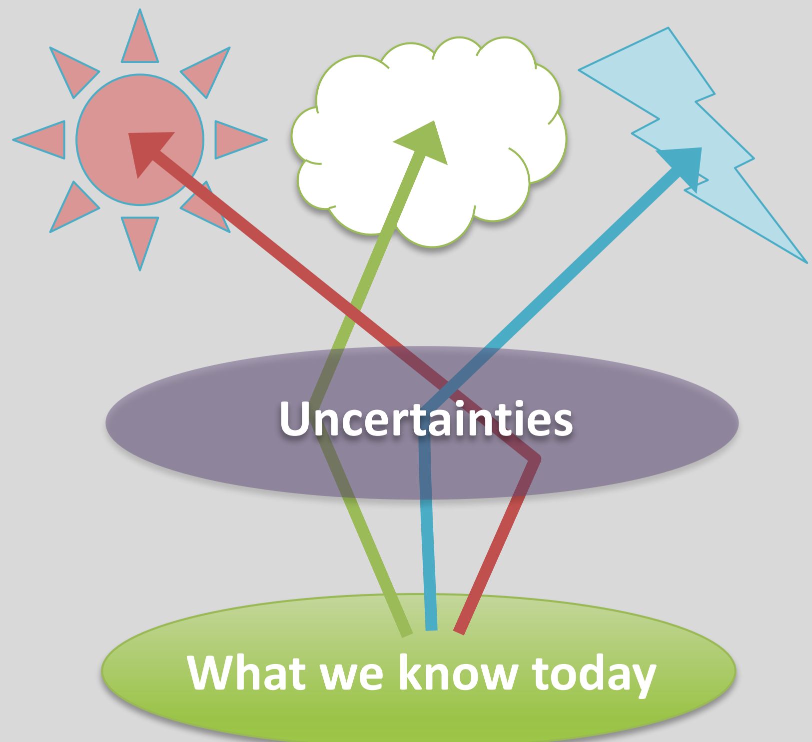
Stated Objectives

- The primary objective of this project is to create user-friendly maps, tools, and datasets that define aspects of current and projected future climate conditions of high pertinence to gardeners and farmers in Alaska.
- These tools and products will be made publically available online, in printed form, and via talks and seminars.
- The project will focus on stakeholder-defined variables of greatest importance.
- The peony growing industry will be used as a case study.
- The research will be a collaborative effort between project partners and stakeholders.

Scenarios Planning

- Forecast Planning
- One Future

- Scenario Planning
- Multiple Futures



Feedback from Stakeholders

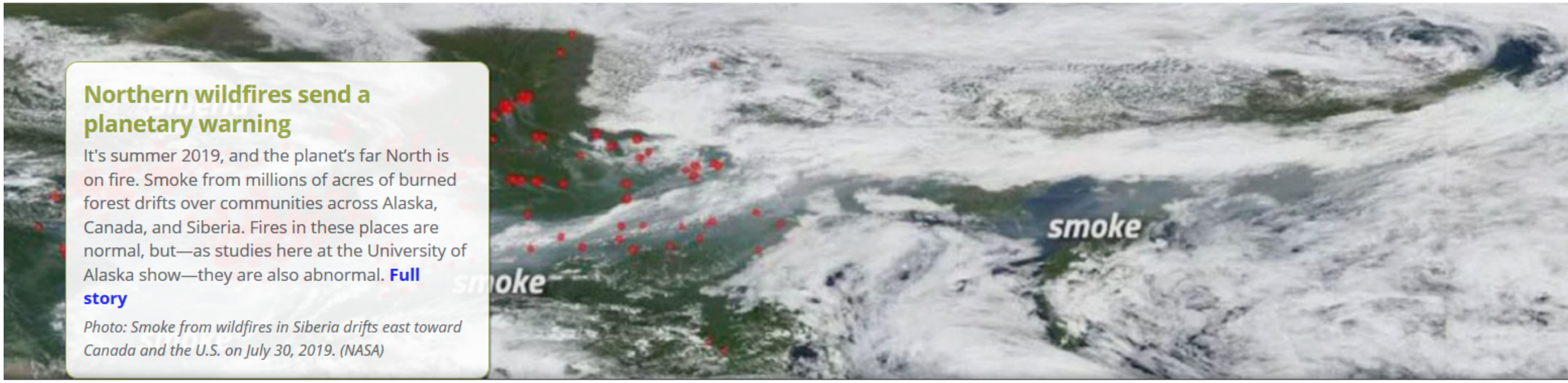
What variables matter most?

- Season length -- frost to frost and for other temperature thresholds
- Soil temperature, particularly in spring
- Soil saturation and drainage
- Summer heat and cumulative growing degree days
- Coldest winter temperatures
- Cold winter weather prior to snowfall, or when soils are saturated
- Extreme events – storms, heatwaves, droughts, etc.

The Tools

SNAP

SCENARIOS NETWORK FOR ALASKA + ARCTIC PLANNING



Northern wildfires send a planetary warning

It's summer 2019, and the planet's far North is on fire. Smoke from millions of acres of burned forest drifts over communities across Alaska, Canada, and Siberia. Fires in these places are normal, but—as studies here at the University of Alaska show—they are also abnormal. **Full story**

Photo: Smoke from wildfires in Siberia drifts east toward Canada and the U.S. on July 30, 2019. (NASA)

EXPLORING OUR FUTURE IN A CHANGING ARCTIC

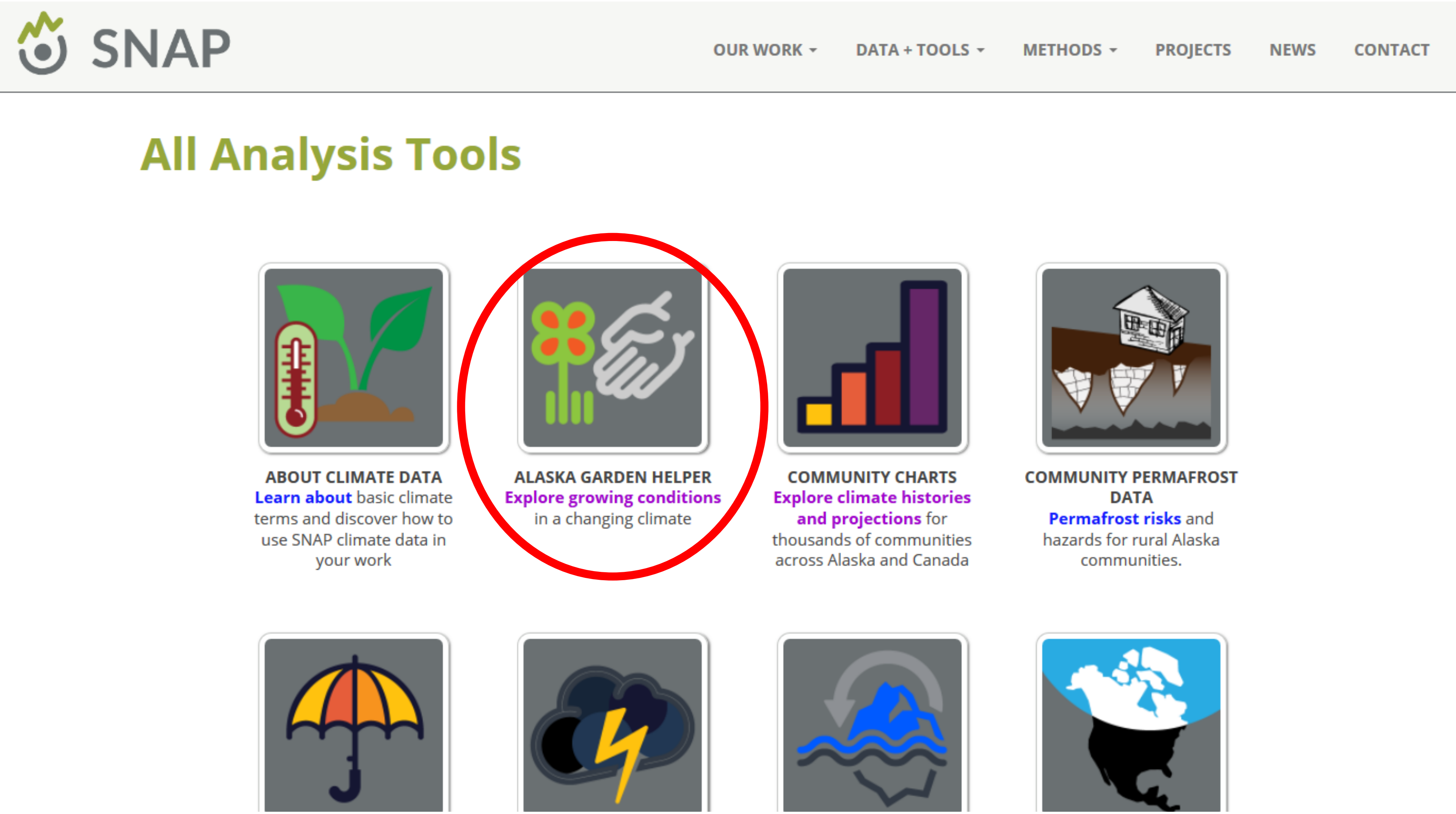
DOWNLOAD DATA
Downscaled and historical data for Alaska and parts of Canada
MORE

COLLABORATE
How individuals, agencies, non-profits, and communities work with SNAP
MORE

OUR EXPERTISE
Data analysis, planning, and science communication
MORE

SEE THE DATA
Look for patterns in SNAP climate data visualizations
MORE

Explore climate trends with our interactive tools


SNAP
OUR WORK
DATA + TOOLS
METHODS
PROJECTS
NEWS
CONTACT
All Analysis Tools
ABOUT CLIMATE DATA
Learn about basic climate terms and discover how to use SNAP climate data in your work
ALASKA GARDEN HELPER
Explore growing conditions in a changing climate
COMMUNITY CHARTS
Explore climate histories and projections for thousands of communities across Alaska and Canada
COMMUNITY PERMAFROST DATA
Permafrost risks and hazards for rural Alaska communities.

SNAP

OUR WORK ▾ DATA + TOOLS ▾ METHODS ▾ PROJECTS NEWS CONTACT

Projects

Alaska Garden Helper
Use this web tool to explore local growing conditions under a changing climate, including growing season length, minimum temperatures, growing degree days, and hardiness zones.

Alaska-Canada climate-biome shift
Projections of shifts in 18 climate types linked to ecological biomes across Alaska, the Yukon, and the Northwest Territories. An expansion of the Connecting Alaska Landscapes project.

ALFRESCO and habitat research
Simulates responses of subarctic and boreal vegetation to climatic changes. Key terms: Fire, caribou habitat, bird habitat

Arctic climate change impacts on ecosystem services and society
Relationships between climate change and availability of subsistence resources. Creating scenarios of how and where resources may be available in the future.

Arctic sea ice: satellite observations, climate model performance, future scenarios
Using technology to investigate the downward trend of Arctic sea ice.

Arctic shipping data synthesis
Understanding risks presented by marine shipping traffic on ecosystem services.

Assessment and mapping of riverine hydrokinetic resources in the continental US
Assessment of the riverine hydrokinetic energy resource in the contiguous 48 states and Alaska, excluding tidal waters.

Chugach climate change scenario planning
An assessment of future scenarios in the Chugach National Forest given ongoing climate change, social change, and economic change.

Alaska Garden Helper

This tool was created with input and expertise from Alaska farmers and gardeners, including experts from the UAF Georgeson Botanical Gardens, Spinach Creek Farm, Calypso Farm, and the Alaska Peony Growers Association. Funding was provided by the U.S. Department of Agriculture via the Alaska Climate Adaptation Science Center.

Peonies at Fox Hollow Farm, Nenana, AK.

Length of Growing Season

Time between the last cold day in spring (based on the temperature threshold you select: 32°F, 40°F, or 50°F) and the first cold day in fall. Here, you can see projections of start/end dates and the number of days in between. This can help you decide if a crop is worth planting in your area. "Days to maturity" information is often provided on seed packets. But keep in mind that cool temperatures can slow growth, so also check our "Growing Degree Days" tool.

AREAS OF EXPERTISE:

Data visualization and analysis
Science communication

DOWNLOADS:

Peonies in a changing climate: a case study	1.87 MB
Garden Helper Tool Outreach Flyer	5.83 MB

RELATED WEBSITES:

Alaska Garden Helper
Alaska Peony Growers Association
UAF Georgeson Botanical Garden

COLLABORATORS:

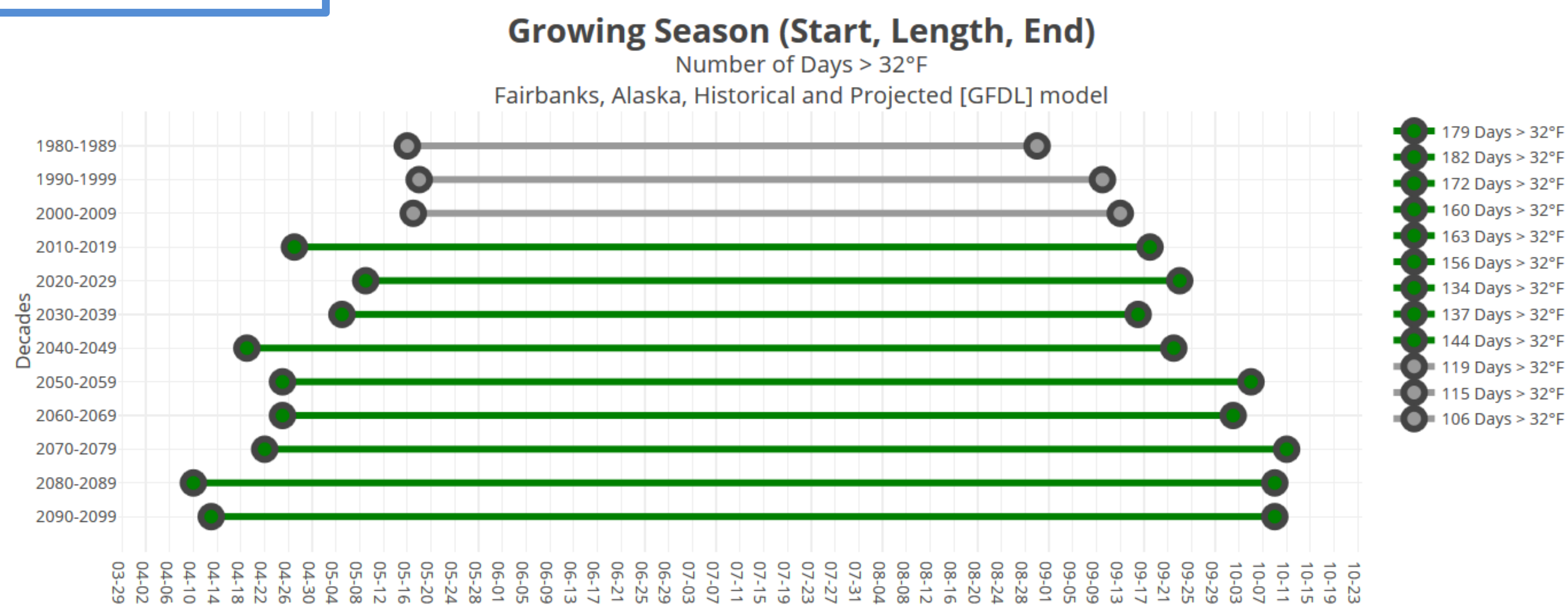
Alaska Climate Adaptation Science Center
United States Department of Agriculture

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones

First, choose a tool



Choose Community

Fairbanks

Choose Minimum Temperature Threshold

32°F (Light Frost)

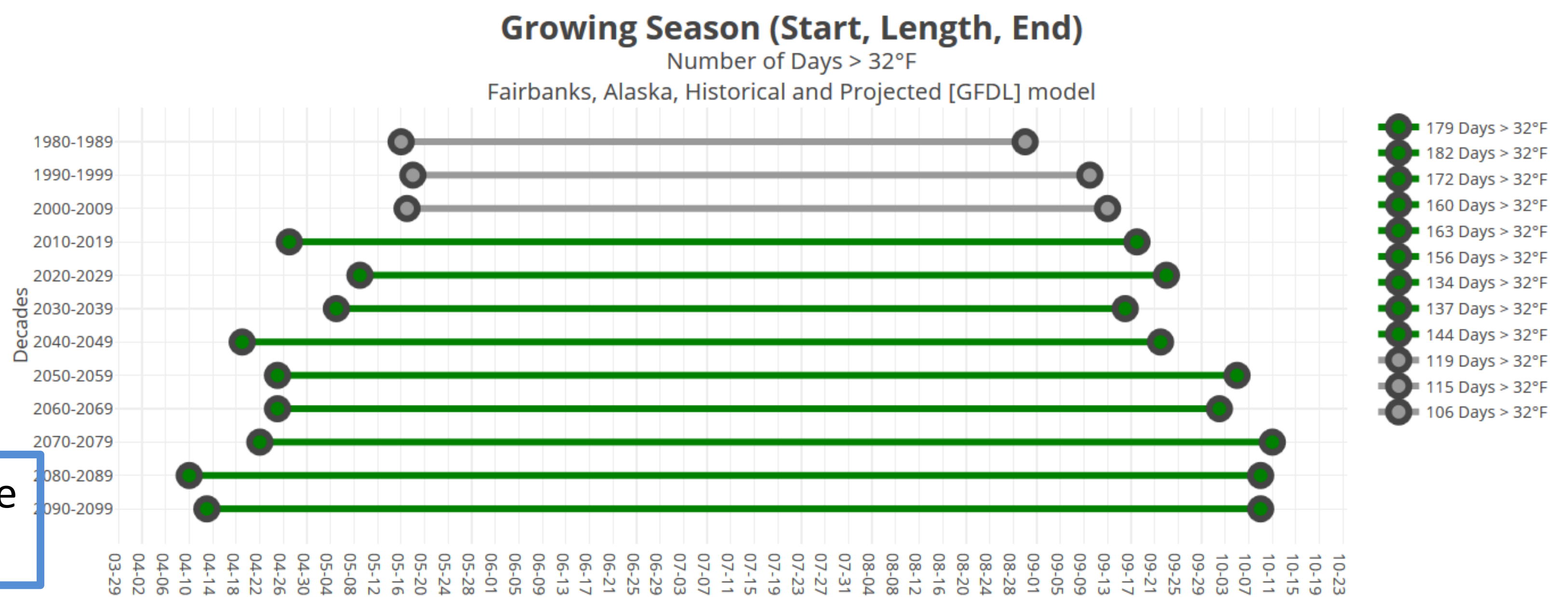
Choose Dataset

Model Projection (GFDL) Model Projection (NCAR)

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones



Next, choose a location

Choose Community

Fairbanks

Choose Minimum Temperature Threshold

32°F (Light Frost)

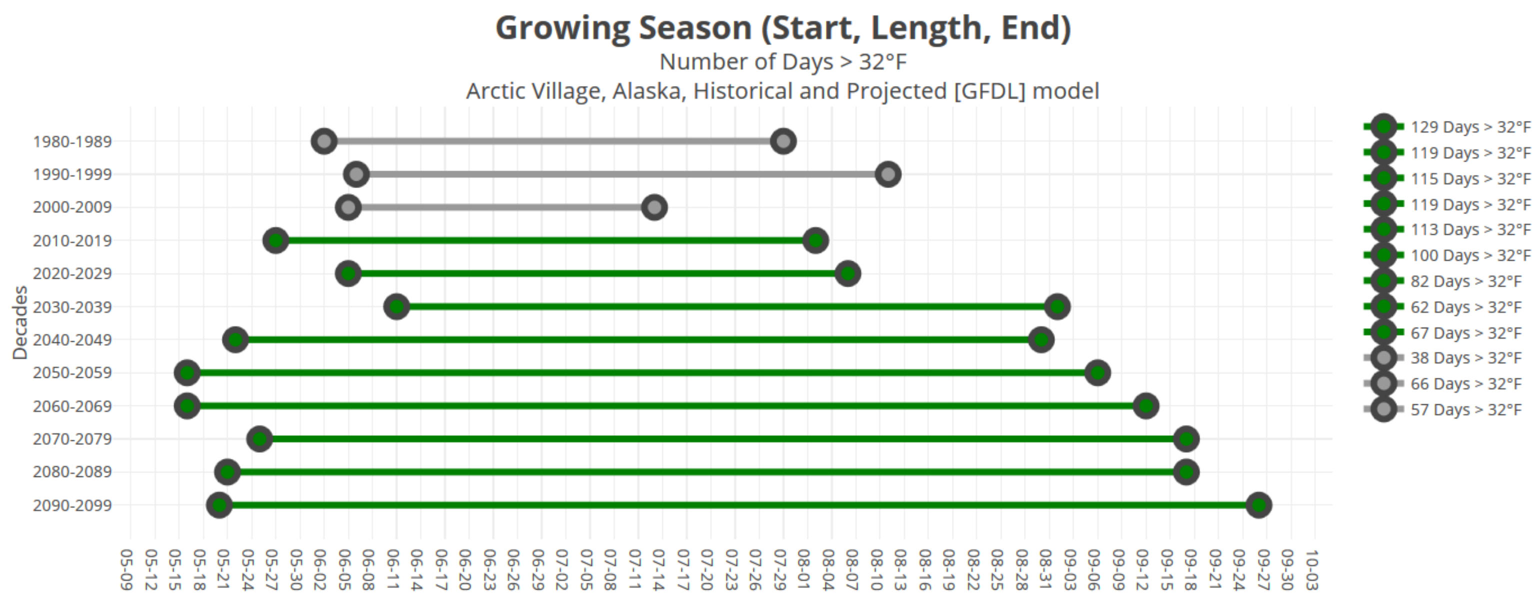
Choose Dataset

Model Projection (GFDL) Model Projection (NCAR)

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones



Choose Community

Arctic Village

Choose Minimum Temperature Threshold

32°F (Light Frost)

Choose Dataset

Model Projection (GFDL) Model Projection (NCAR)

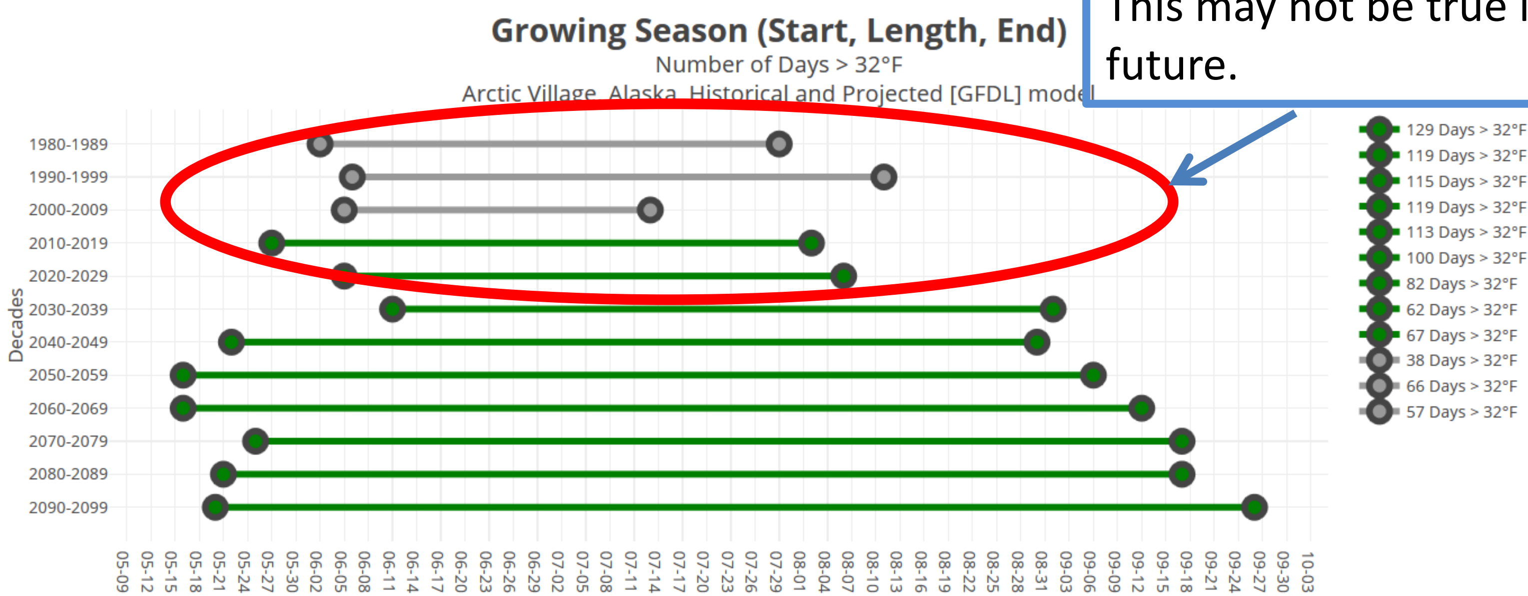
Alaska Garden Helper

SNAP

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones

In Arctic Village, frost can occur at any time, currently. This may not be true in the future.



Choose Community

Arctic Village

Choose Minimum Temperature Threshold

32°F (Light Frost)

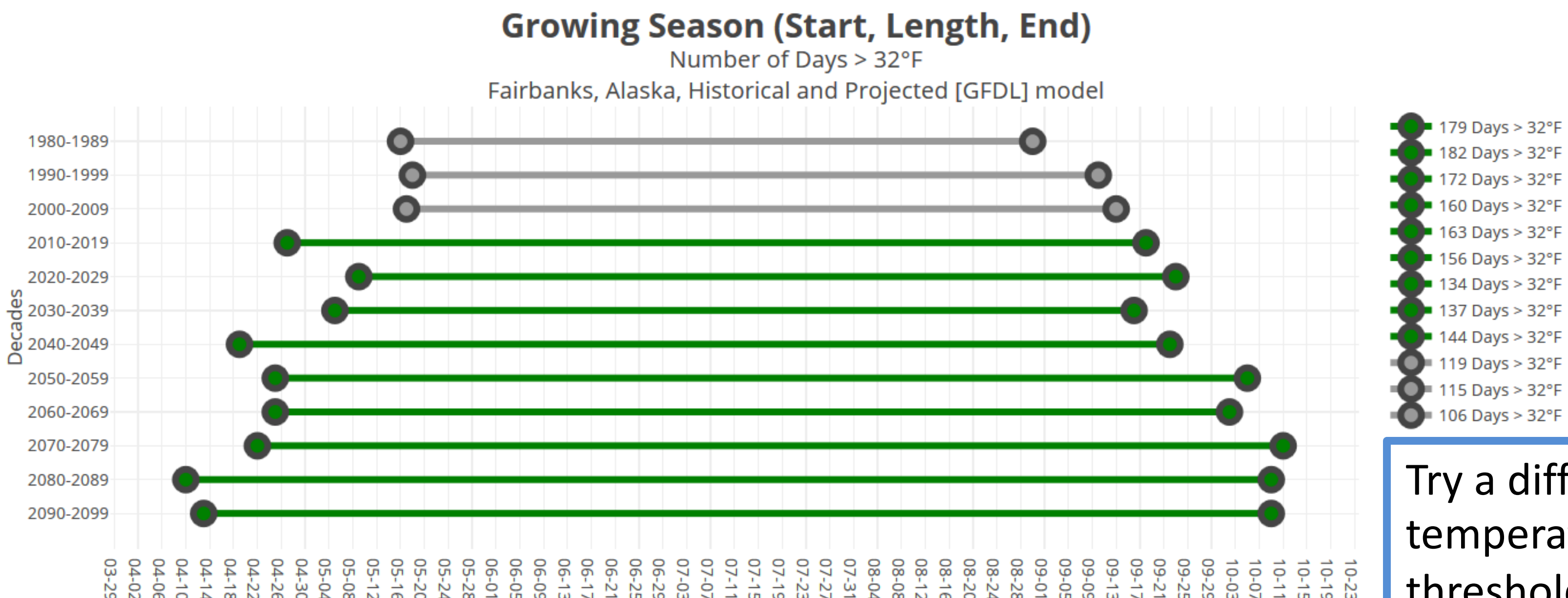
Choose Dataset

- Model Projection (GFDL)
- Model Projection (NCAR)

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season	Annual Minimums	Growing Degree Days	Hardiness Zones



Try a different temperature threshold

Choose Community

Fairbanks

Choose Minimum Temperature Threshold

32°F (Light Frost)

Choose Dataset

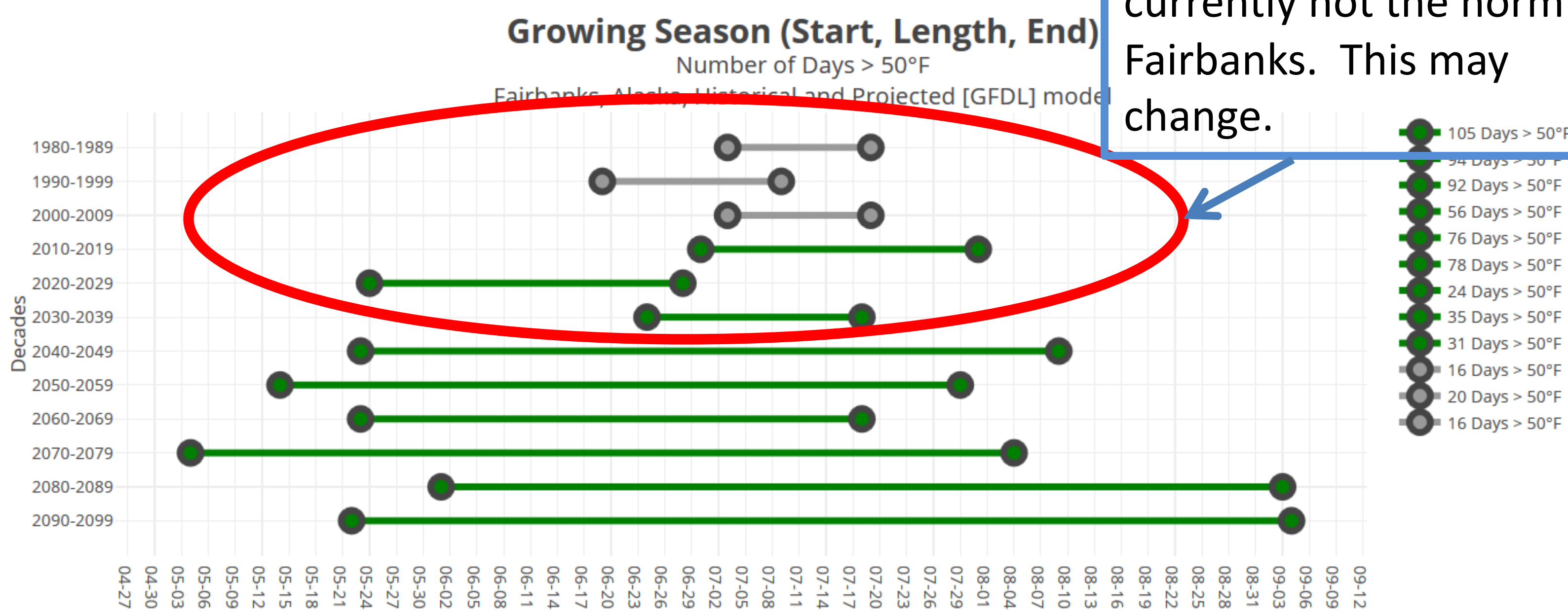
Model Projection (GFDL) Model Projection (NCAR)

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones

Temperatures that never drop below 50°F are currently not the norm in Fairbanks. This may change.



Choose Community

Fairbanks

Choose Minimum Temperature Threshold

50°F (Warm Crops)

Choose Dataset

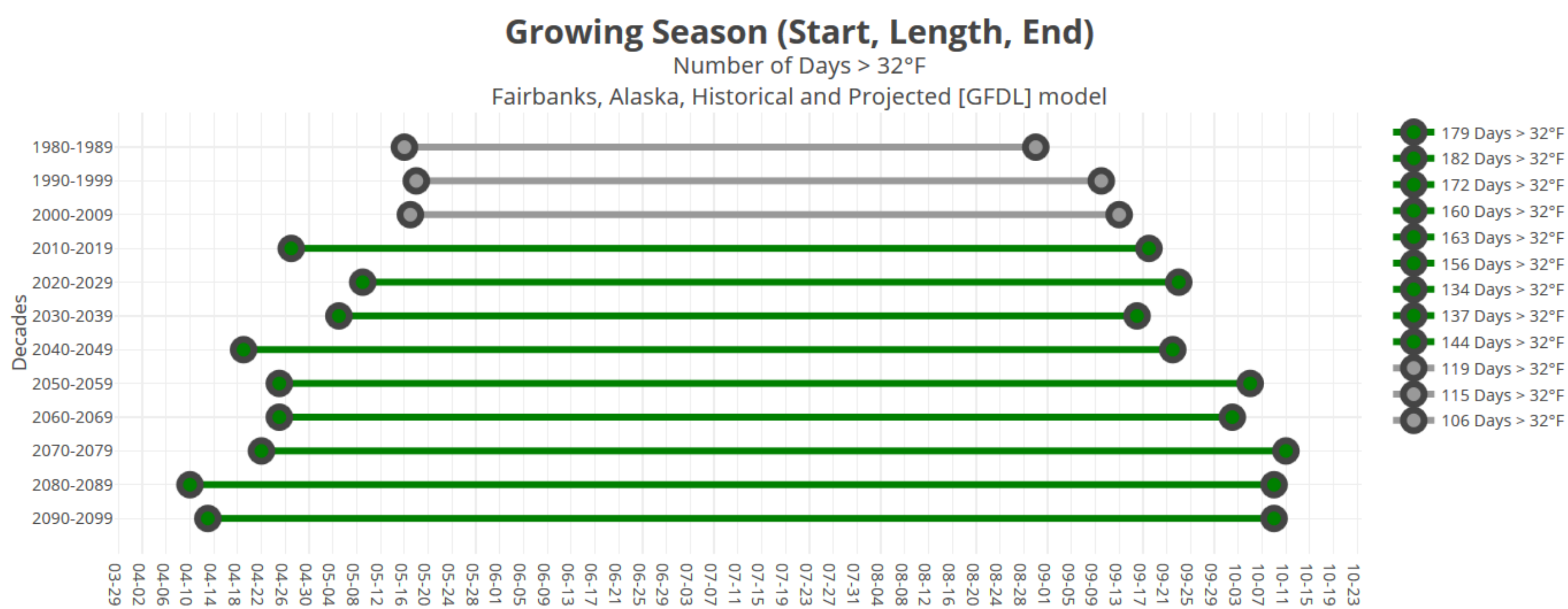
Model Projection (GFDL) Model Projection (NCAR)

SNAP

Alaska Garden Helper

Explore local growing conditions under a changing climate.

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones



Choose Community

Fairbanks

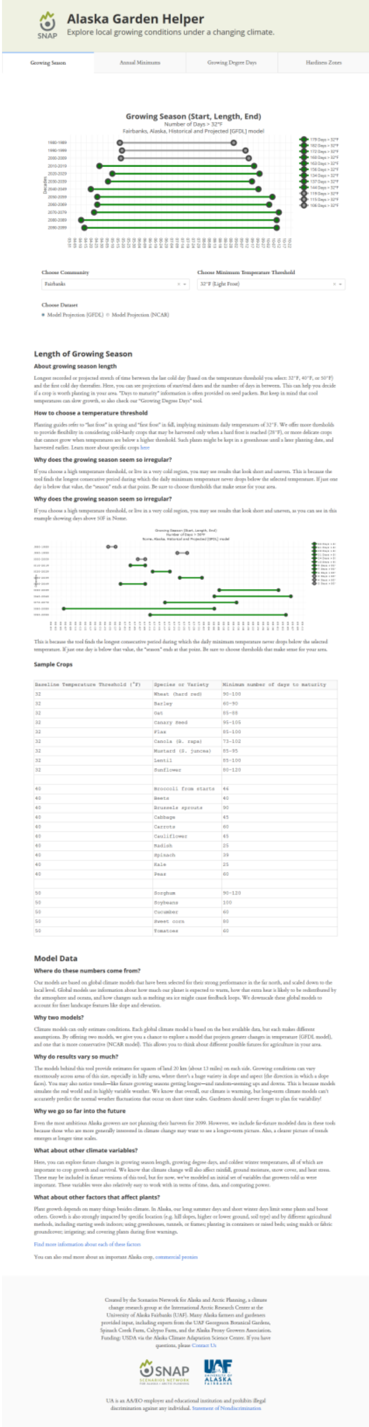
Choose Minimum Temperature Threshold

32°F (Light Frost)

Choose Dataset

Model Projection (GFDL) Model Projection (NCAR)

We offer outputs from more than one model.



More information is available if you scroll down the page, including…

Length of Growing Season

About growing season length

Longest recorded or projected stretch of time between the last cold day (based on the temperature threshold you select: 32°F, 40°F, or 50°F) and the first cold day thereafter. Here, you can see projections of start/end dates and the number of days in between. This can help you decide if a crop is worth planting in your area. "Days to maturity" information is often provided on seed packets. But keep in mind that cool temperatures can slow growth, so also check our "Growing Degree Days" tool.

How to choose a temperature threshold

Planting guides refer to "last frost" in spring and "first frost" in fall, implying minimum daily temperatures of 32°F. We offer more thresholds to provide flexibility in considering cold-hardy crops that may be harvested only when a hard frost is reached (28°F), or more delicate crops that cannot grow when temperatures are below a higher threshold. Such plants might be kept in a greenhouse until a later planting date, and harvested earlier. Learn more about specific crops here

Why does the growing season seem so irregular?

If you choose a high temperature threshold, or live in a very cold region, you may see results that look short and uneven. This is because the tool finds the longest consecutive period during which the daily minimum temperature never drops below the selected temperature. If just one day is below that value, the "season" ends at that point. Be sure to choose thresholds that make sense for your area.

Why does the growing season seem so irregular?

If you choose a high temperature threshold, or live in a very cold region, you may see results that look short and uneven, as you can see in this example showing days above 50F in Nome.

Sample Crops

Baseline Temperature Threshold (°F)	Species or Variety	Minimum number of days to maturity
32	Wheat (hard red)	90-100
32	Barley	60-90
32	Oat	85-88
32	Canary Seed	95-105
32	Flax	85-100
32	Canola (B. rapa)	73-102
32	Mustard (S. juncea)	85-95
32	Lentil	85-100
32	Sunflower	80-120
40	Broccoli from starts	46
40	Beets	40
40	Brussels sprouts	90
40	Cabbage	45
40	Carrots	60
40	Cauliflower	45
40	Radish	25
40	Spinach	39
40	Kale	25
40	Peas	60
50	Sorghum	90-120
50	Soybeans	100
50	Cucumber	60
50	Sweet corn	80
50	Tomatoes	60

Model Data

Where do these numbers come from?

Our models are based on global climate models that have been selected for their strong performance in the far north, and scaled down to the local level. Global models use information about how much our planet is expected to warm, how that extra heat is likely to be redistributed by the atmosphere and oceans, and how changes such as melting sea ice might cause feedback loops. We downscale these global models to account for finer landscape features like slope and elevation.

Why two models?

Climate models can only estimate conditions. Each global climate model is based on the best available data, but each makes different assumptions. By offering two models, we give you a chance to explore a model that projects greater changes in temperature (GFDL model), and one that is more conservative (NCAR model). This allows you to think about different possible futures for agriculture in your area.

Why do results vary so much?

The models behind this tool provide estimates for squares of land 20 km (about 13 miles) on each side. Growing conditions can vary enormously across areas of this size, especially in hilly areas, where there's a huge variety in slope and aspect (the direction in which a slope faces). You may also notice trends—like future growing seasons getting longer—and random-seeming ups and downs. This is because models simulate the real world and its highly variable weather. We know that overall, our climate is warming, but long-term climate models can't accurately predict the normal weather fluctuations that occur on short time scales. Gardeners should never forget to plan for variability!

Why we go so far into the future

Even the most ambitious Alaska growers are not planning their harvests for 2099. However, we include far-future modeled data in these tools because those who are more generally interested in climate change may want to see a longer-term picture. Also, a clearer picture of trends emerges at longer time scales.

What about other climate variables?

Here, you can explore future changes in growing season length, growing degree days, and coldest winter temperatures, all of which are important to crop growth and survival. We know that climate change will also affect rainfall, ground moisture, snow cover, and heat stress. These may be included in future versions of this tool, but for now, we've modeled an initial set of variables that growers told us were important. These variables were also relatively easy to work with in terms of time, data, and computing power.

What about other factors that affect plants?

Plant growth depends on many things besides climate. In Alaska, our long summer days and short winter days limit some plants and boost others. Growth is also strongly impacted by specific location (e.g. hill slopes, higher or lower ground, soil type) and by different agricultural methods, including starting seeds indoors; using greenhouses, tunnels, or frames; planting in containers or raised beds; using mulch or fabric groundcover; irrigating; and covering plants during frost warnings.

Find more information about each of these factors

You can also read more about an important Alaska crop, commercial peonies

Follow links for information from other sources, plus case study on peonies.

Created by the Scenarios Network for Alaska and Arctic Planning, a climate change research group at the International Arctic Research Center at the University of Alaska Fairbanks (UAF). Many Alaska farmers and gardeners provided input, including experts from the UAF Georgeson Botanical Gardens, Spinach Creek Farm, Calypso Farm, and the Alaska Peony Growers Association. Funding: USDA via the Alaska Climate Adaptation Science Center. If you have questions, please Contact Us

Agriculture in the Far North

Agriculture and horticulture in Alaska is distinct. Growers, farmers and gardeners must contend with unpredictably short growing seasons, yearly infestations of various insects, long daylight hours and even the occasional mid-season frost. While consumers may have a difficult time finding informed advice from the "outside," local Extension agriculture and horticulture agents and specialists are highly-trained professionals who experience the same challenges as residents.

Visit our publications page for information on a variety of agricultural topics including farm structures, greenhouses, field crops, soil management, horticulture, agricultural business management, pest control and more.

Programs:

- AgrAbility
- Integrated Pest Management (IPM)
- Livestock
- Sustainable Agriculture Research and Education (SARE)
- Pesticide Safety Education Program
- Soils

Peonies in a changing climate

A case study

Peony farming serves as an excellent case study for research on climate change and agriculture in Alaska. Why? Peonies represent a burgeoning niche market, and are a crop that is uniquely lucrative in Alaska for reasons linked directly to our climate. Peonies bloom in Alaska in July, August, and September—later in the year than in other locations—and are available commercially nowhere else in the world during this time.

Not just for peonies! The University of Alaska Fairbanks and partners have developed an online Garden Helper tool to make it easier for you to explore future changes in growth and survival for Alaska crops in your part of the state.

The tool has four components:

- **Length of Growing Season**— helps you estimate the number of days between the last cold spring day and the first cold fall day in your community
- **Growing Degree Days (GDD)**— estimates how much heat is available to crops. Plants reach particular growth stages when cumulative GDD reaches the necessary values.
- **Daily Minimum Temperatures**
- **Alaska Hardiness Zones**— similar those created by USDA, but based on average annual minimum winter temperatures in Alaska

Commercial peony farming has seen considerable growth in recent years, with gross sales of well over a million dollars. Peony stems are shipped to U.S. destinations in California, Colorado, Florida, Hawai'i, Iowa, New York, Oregon, Pennsylvania, and Rhode Island; as well as to Canada, Japan, Taiwan, and other locations.

Peony growers are concerned about seeing shifts toward earlier blooming times, which put Alaska's peonies in more direct competition with other markets.

What can we predict about the future of the crop in this state, and how might growers adapt?

Climate data, climate model projections, and agricultural research on peonies—particularly research conducted in Alaska at the University of Alaska Fairbanks' Georgeson Botanical Garden—change is in store for Alaska peonies.

What the research shows

Peonies are unaffected by day and night lengths, meaning that Alaska's long summer days are not a factor. However, heat does have an effect in winter, spring, and summer.

Winter— Relatively cool winter temperatures are necessary for the plant roots to achieve dormancy. Therefore, as long as temperatures are consistently below 43°F for 70 days, dormancy will be achieved.[1] This is unlikely to become a problem in most parts of the state.

Spring and summer— The timing of spring is the next factor to consider. Plants emerge from dormancy and start growing as soon as temperatures rise above freezing.[3,4,5] This means that if spring arrives earlier, growth will start earlier. Using the **Length of Growing Season** tool to look at the 32°F threshold can help you estimate when this may occur in the future for your Alaska community.

Once growth begins, flowering can occur in a span of only about 50 days in greenhouse conditions.[1] However, slower growth in cooler temperatures would actually be better for increasing the chances that buds will open.

Research has shown that moderate temperatures with highs of 72°F and lows of 50°F are best for enhancing stem length and flowering.[6] Hotter temperatures are not as good for blooming: temperatures over 77°F have resulted in reduced blooms. When daily highs were 82°F and lows were 72°F, flowering was drastically reduced.[2]

more

EXPLORE THE GARDEN HELPER TOOL ONLINE snap.uaf.edu/tools/gardenhelper

The Growing Degree Days (GDD) web tool can help you with planning

Using the **Growing Degree Days** tool to plan for peony growth once buds have emerged is likely more effective than using the Growing Season tool.

Researchers tracked how many days it took for peonies to bloom in different years and different locations. They compared these dates with cumulative GDD above a 32°F threshold. Generally, flowers bloomed when cumulative GDD reached between 1,734 and 2,313—a fairly small window. In contrast, the number of days from bud emergence to first cutting ranged from 32 days in Fairbanks to 79 days in much cooler Kenai.[3,4,5]

In summary

Alaska winters are likely to remain cool enough for peony dormancy, while growers in other parts of the world may find challenges in this regard. This may provide some local advantage. However, late springs and cool summer weather are better for Alaska's peony growers. These conditions:

- promote healthier flowering
- promote later flowering, which allows Alaska growers to capture the late-season niche market

As late springs and cool summers become more rare, growers may need to adapt. This may be hardest for those who already farm in regions of the state that are warmest in the summer, such as Fairbanks.

For new growers, picking cooler parts of the state or cooler sites within a community—such as north-facing slopes—might help. New storage methods for cut blooms can also extend the season for sales.

Alaska's peony growers will see a mixed bag of climate change effects on their growing efforts as the state's climate continues to change. Use the Garden Helper tools to help you with planning your growing strategies, no matter which crop you're planting.

EXPLORE THE GARDEN HELPER TOOL ONLINE snap.uaf.edu/tools/gardenhelper

Citations

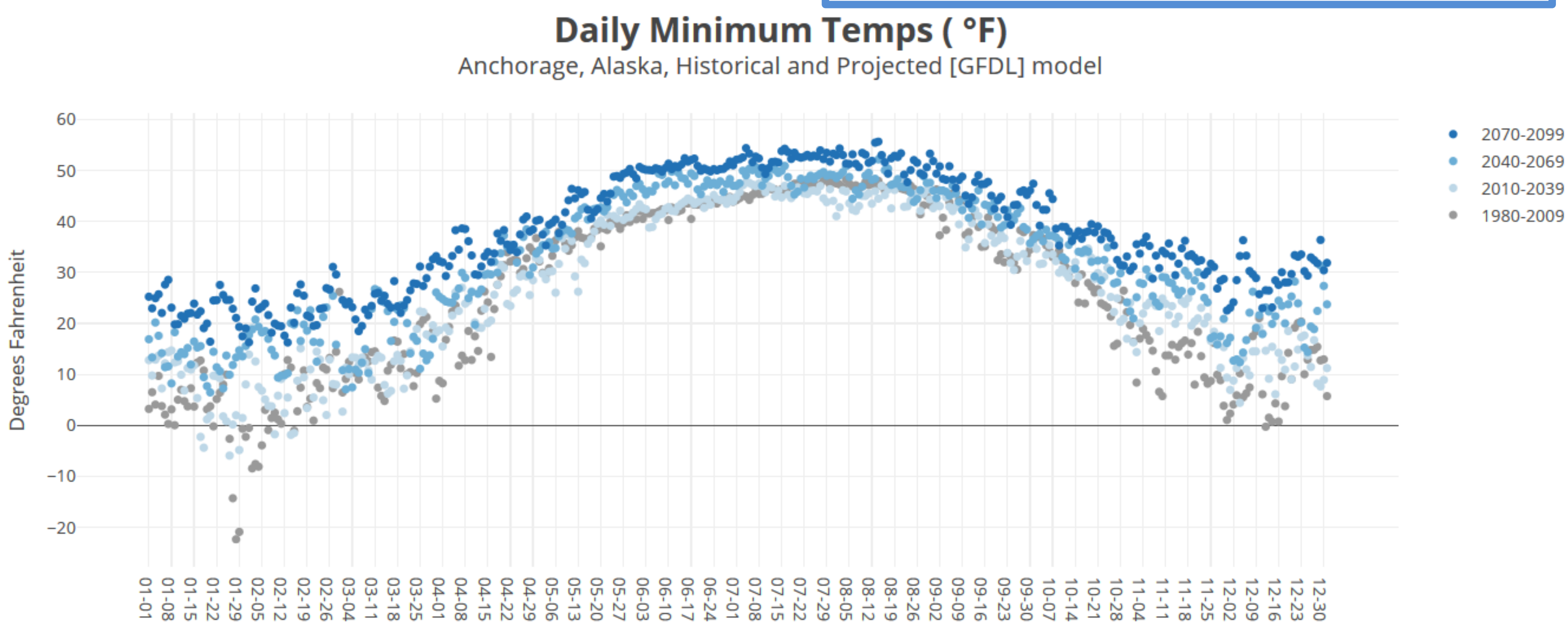
1. Byrne, T. and A. Halevy, 1986. Forcing herbaceous peonies. J. Amer. Soc. Hort. Sci. 111:379-383.
2. Hall, A., J. Catley, E. Walton, 2007. The effect of forcing temperature on peony shoot and flower development. Horticultural Research.
3. Holloway, P., G. Matheke, and K. DiCristina, 2013. Peony Phenology in Alaska. School of Natural Resources and Agricultural Sciences Agricultural and Forestry Experiment Station, University of Alaska Fairbanks.
4. Holloway, P., J. Hanscom, and G. Matheke, 2003. Peonies for field cut flower production. First-year growth. University of Alaska Fairbanks. Agricultural and Forestry Experiment Station Research Prog. Report 41. 4 pp.
5. Holloway, P., .J. Hanscom, and G. Matheke, 2004. Peonies for field cut flower production. Second-year growth. University of Alaska Fairbanks. Agricultural and Forestry Experiment Station Research Prog. Report 43. 8 pp.
6. Kamenetsky, R., A. Barzilay, A. Erez, and A. Halevy, 2003. Temperature requirements for floral development of herbaceous peony cv. 'Sarah Bernhardt.' Scientia Horticulturae.

The Alaska Garden Helper web tool was developed by the Scenarios Network for Alaska and Arctic Planning, a climate change research group at the University of Alaska Fairbanks (UAF) International Arctic Research Center. We are grateful for the contributions of many Alaska farmers and gardeners, including experts from the UAF Georgeson Botanical Gardens, Spruce Creek Farm, Calypso Farm, and the Alaska Peony Growers Association.

Above: Peonies in bloom at Fox Hollow Peonies, Nenana, AK. (Photo courtesy Fox Hollow Peonies)

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones

This tool focuses on the record-breaking coldest days recorded or projected throughout the year.



Choose Community

Anchorage

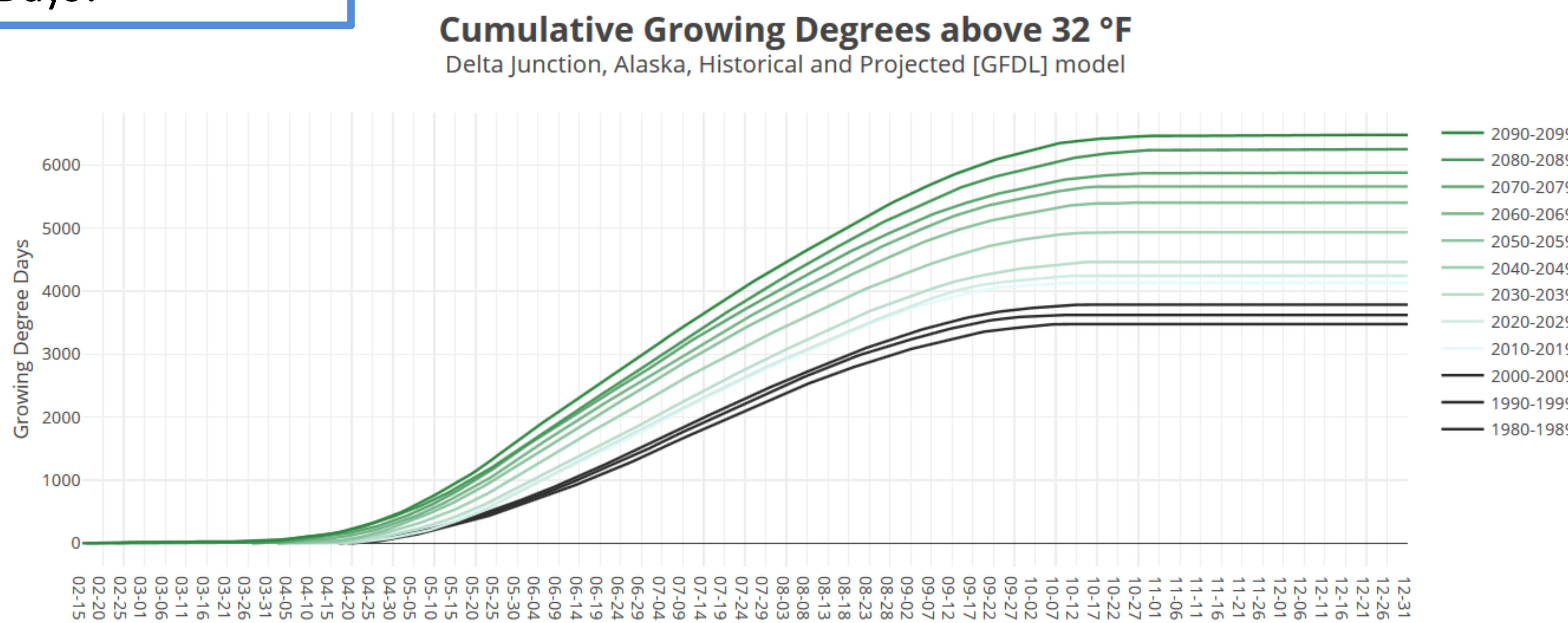
Choose Dataset

GFDL NCAR

You can choose your community and toggle between two climate models. I selected Anchorage.

Growing Season | Annual Minimum | Growing Degree Days | Hardiness Zones

What are Growing Degree Days?



Choose Community

Delta Junction

Choose Minimum Temperature Threshold

32 °F (Light Frost)

Choose Dataset

Model Projection (GFDL) Model Projection (NCAR)

Growing Degree Days (GDD)

Used to estimate how much heat is available to crops. Heat units are added up daily, throughout the growing season, to create a cumulative total. Plants tend to reach particular growth stages when cumulative GDD reaches the necessary values.

About temperature thresholds

Plants can grow when the temperature is above some minimum value, which varies by species. Many Alaska plants are cold-hardy and can grow on all above-freezing days. For these, GDD can be calculated with a baseline of 32°F. Most crops in other regions have higher baseline temperatures, such as 40°F for barley and oats, or 50°F for corn and tomatoes. Choose a threshold based on what crop you plan to grow. For more information, click here

How this tool measures GDD

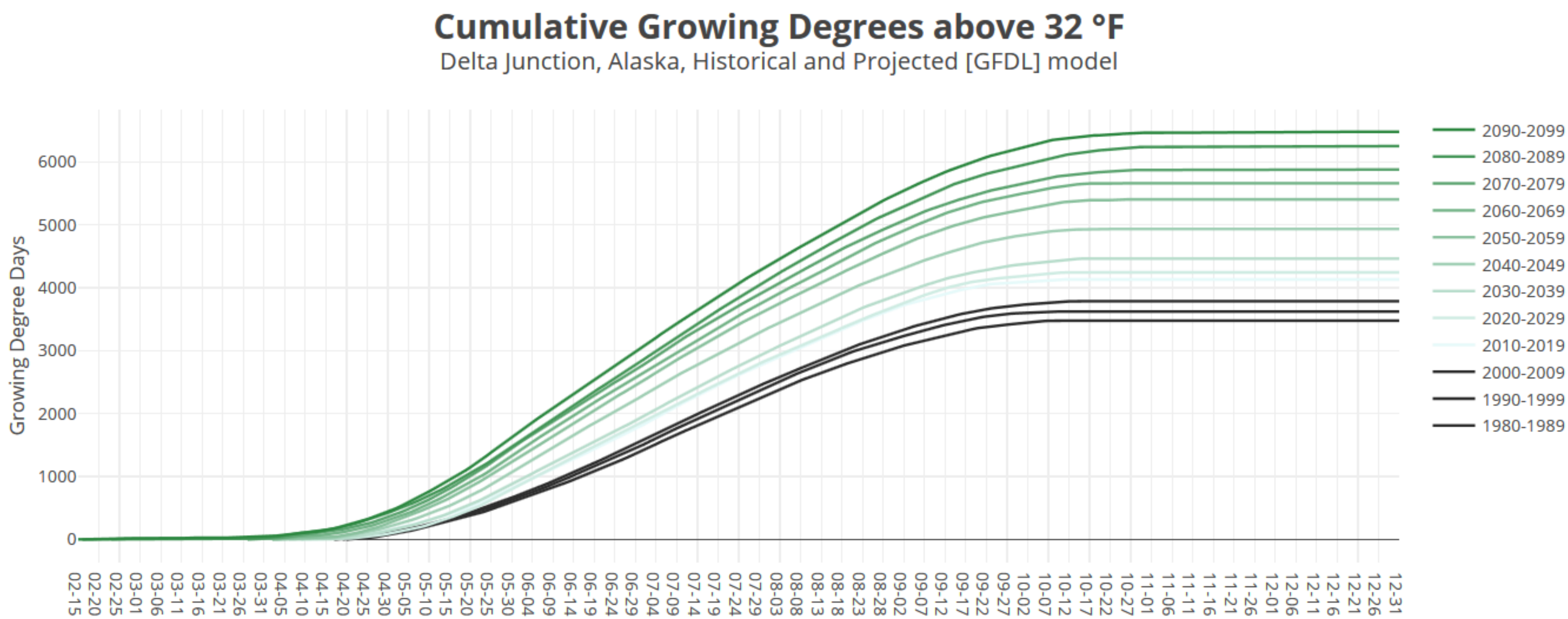
We average daily high and low temperatures (based on our climate models) and subtracts the baseline value (which you choose) from that average. Example: If you choose a baseline of 25°F, and if the daily high for a particular day was 72°F and the low was 45°F, the GDD value for that day would be (72°F + 45°F)/2 – 25°F = 33°F. Because heat stress is rare in Alaska, we did not include upper thresholds in our calculations.

What GDD means for you

GDD can help you plan what to plant—and what not to plant—especially when the length of the frost-free season does not provide enough information. Example: Corn—with a baseline temperature of 50°F and over 2,000 GDD necessary for maturation—is unlikely to succeed in most parts of Alaska outside of a greenhouse, even though many varieties can mature in only 60-80 days, given enough heat.

Georgeson Botanical Garden, UAF

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones



Choose Community

Delta Junction

Choose Minimum Temperature Threshold

32 °F (Light Frost)

Choose Dataset

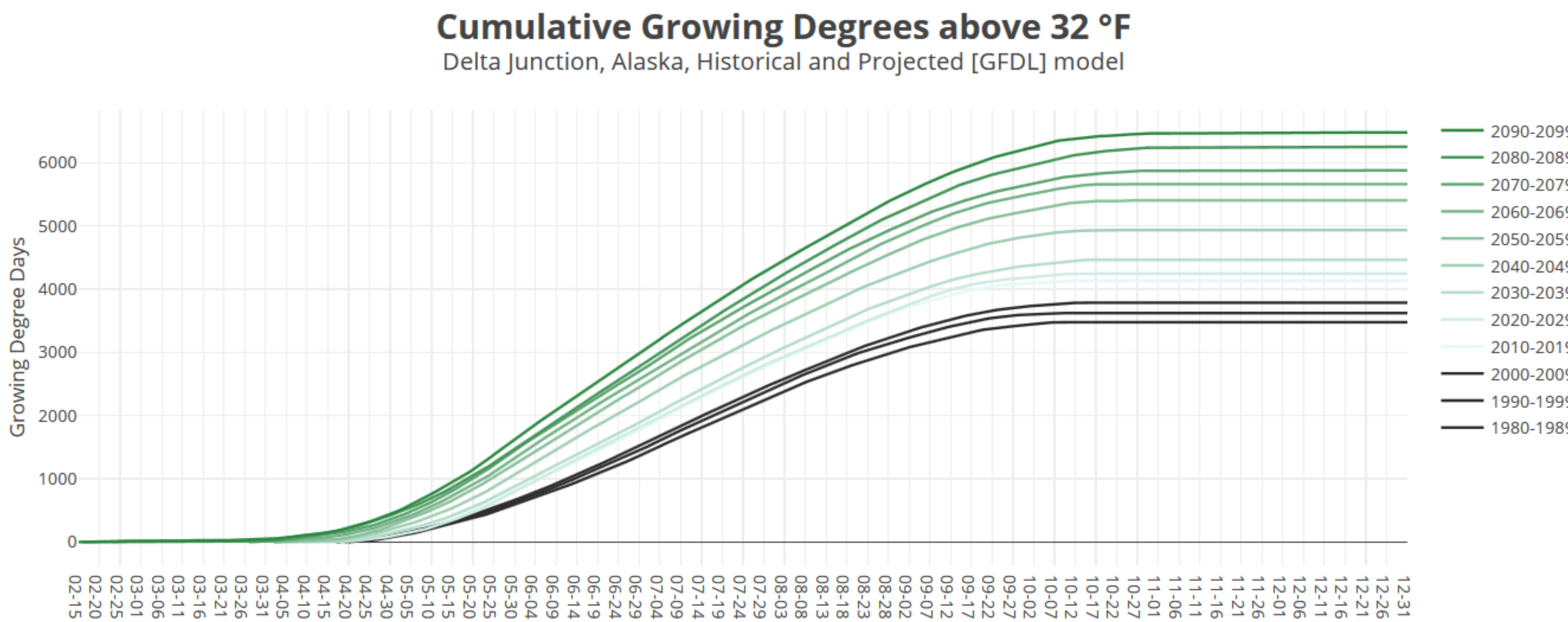
Model Projection (GFDL) Model Projection (NCAR)

This is important!

Sample Crops

Baseline Temperature Threshold (°F)	Species or Variety	Minimum number of days to maturity
32	Wheat (hard red)	2800-3029
32	Barley	2316-2771
32	Oat	2701-3160
32	Canary Seed	2447-2795
32	Flax	2917-3273
32	Canola (B. rapa)	2280-2519
32	Mustard (S. juncea)	2748-2930
32	Chickpea	3054-3277
32	Lentil	3164-3408
32	Sunflower	3236-3581
40	Wheat (Indiana)	2100-2400
40	Broccoli from starts	1623-1702
40	Cabbage	1623-1702
40	Cauliflower	1623-1702
50	Sorghum	1690-1944
50	Soybeans	1679-1992
50	Cucumber	682-952
50	Sweet corn	1134-1522
50	Tomatoes	1700 +

Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones



Choose Community

Delta Junction

Choose Minimum Temperature Threshold

32 °F (Light Frost)

Choose Dataset

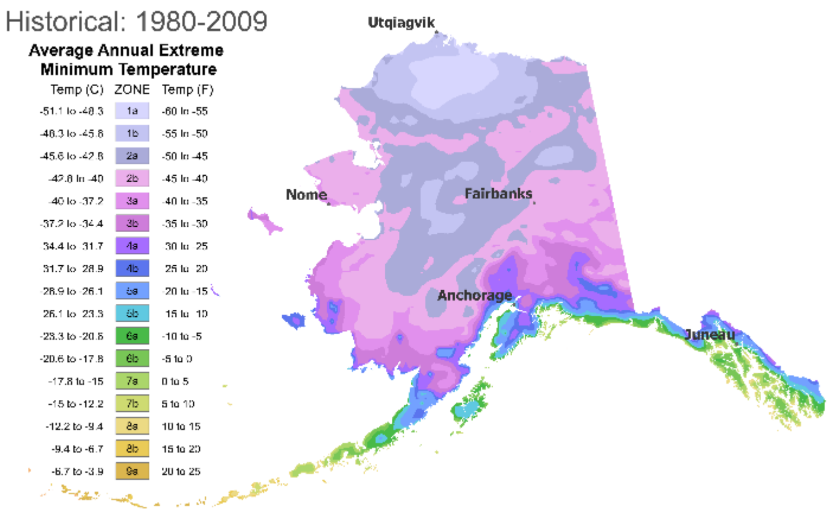
- Model Projection (GFDL)
- Model Projection (NCAR)

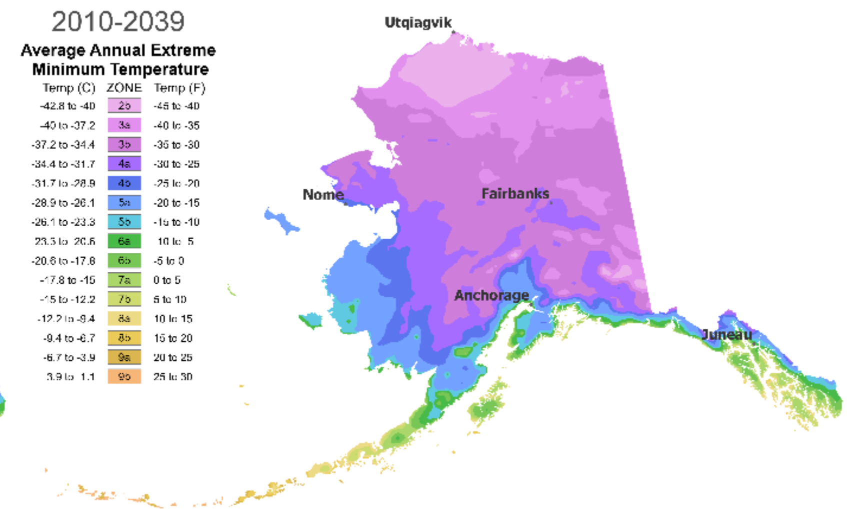
You can choose your community and toggle between two climate models. I selected Delta, a big area for farming.

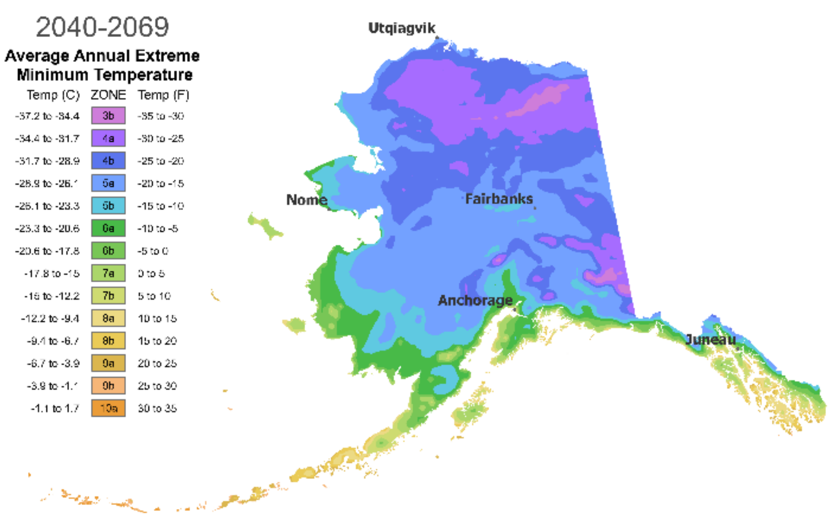
Growing Season | Annual Minimums | Growing Degree Days | Hardiness Zones

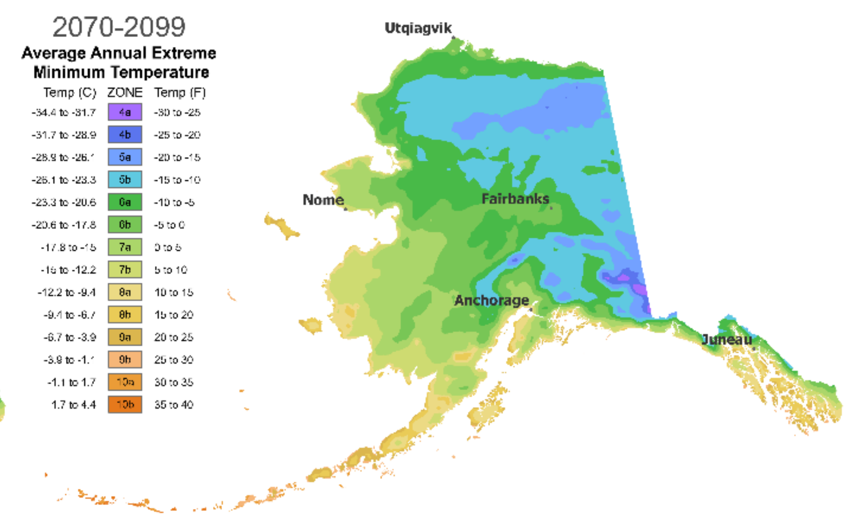
The final tool allows you to view and download hardiness maps

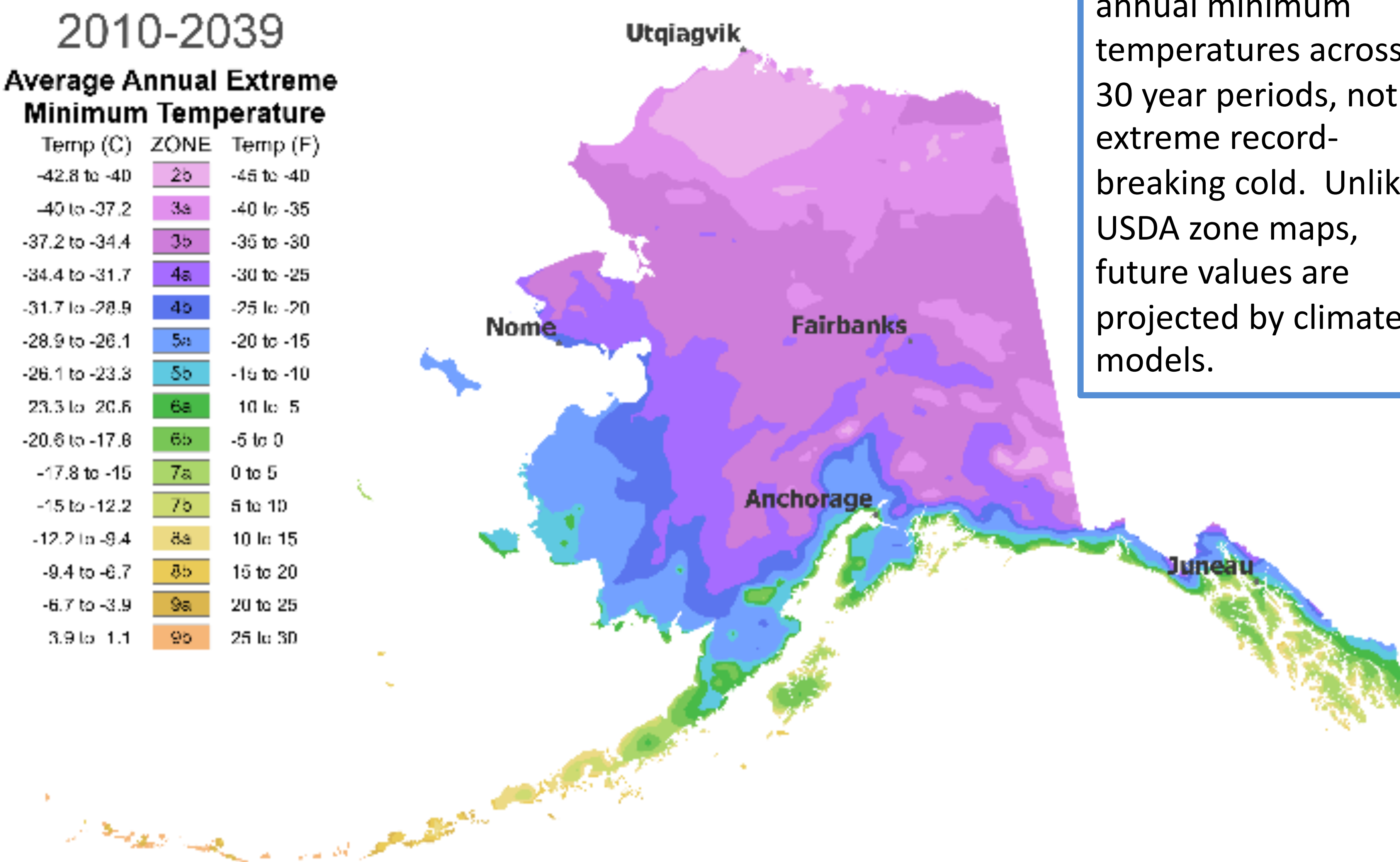
Alaska Hardiness Maps











As in USDA hardiness maps, values represent average annual minimum temperatures across 30 year periods, not extreme record-breaking cold. Unlike USDA zone maps, future values are projected by climate models.

Future Projects?

- New funding sources
- New partners
- Feedback from users
- Additional data and variables
- Model updates
- More case studies and field testing

Calypso Farm and Ecology Center

Questions and Discussion