

Northwest Climate Hub



USDA Climate Hubs

Vision: Robust and healthy agricultural production and natural resources under increasing climate variability and climate change.

Mission: Develop and deliver science-based, region-specific information and technologies to agricultural and natural resource managers, and communities, that enable climate-informed decision making, and to help implement those decisions.

Responding to Changes in Climate



Climate Hubs
U.S. DEPARTMENT OF AGRICULTURE

Pacific Northwest Research Station | General Technical Report PNW-GTR-1002 | July 2022

Adaptation Resources for Agriculture: Responding to Changes in Climate in Alaska



Managing Your Farm



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Adaptation Resources for Agriculture: Responding to Changes in Climate in Alaska

Adaptation Resources for Agriculture

- Background information
- Resources and programs
- Workbook (step-by-step)
 - Worksheets
- Examples: two case studies
 - Ridgeway Farm
 - Bushes Bunches Produce Stand
- Soils Climate Handbook



Farmers Constantly Adapting to Changes

Resources to consider climate change in planning and operation to reduced risks

Climate change adaptation resources—

Alaska Garden Helper

Adaptation Actions for a Changing Arctic

Peony Farming in a Changing Climate: A Case Study

Sustainable Livestock Production in Alaska: Workshop White Paper

Government of Canada Climate Scenarios for Agriculture

Climate Atlas of Canada: Agriculture and Climate Change

Farming resources—

USDA Small and Mid-sized Farmer Resources

University of Alaska Fairbanks, Agricultural and Forestry Experimental Station

University of Alaska Fairbanks Cooperative Extension Service

Growing All Seasons: NRCS Assistance with High Tunnels

Agroforestry: Enhancing Resiliency in U.S. Agricultural Landscapes Under Changing Conditions

USDA National Agroforestry Center

Alaska FarmLink

...and more!

On-line Resources

Box 1.2

New and Beginning Farmer Resources

[U.S. Department of Agriculture's New Farmer web-site](#) (USDA NF, n.d.) has resources for each step of farming. Find information about how to start a farm and find resources about planning; women, youth, and veterans in agriculture; and how to get startup business support.

[Beginning Farmers](#) (Carbon Media Group Agriculture 2017) has a collection of information and resources for new farmers in the United States, including online education, videos, and employment and farming resources.

[USDA Service Centers](#) (USDA Farmers.gov, n.d. a) are locations where you can connect with Farm Service Agency and Natural Resources Conservation Service employees to learn and apply for programs. Find your county office by selecting Alaska and your county from the dropdown menus.

[Natural Resources Conservation Service's Five Steps to Assistance](#) (USDA NRCS, n.d. a) is a detailed process on how to apply for financial and technical assistance to make improvements to land that you own or lease. Historically underserved customers, including Alaska Natives, may receive greater financial assistance.

[University of Alaska Fairbanks Cooperation Extension Service](#) (UAF CES, n.d.) has many publications on a variety of agricultural topics, including farm

structures, greenhouses, field crops, soil management, horticulture, agricultural business management, and pest control.

[USDA Farm Service Agency Alaska](#) (USDA FSA, n.d.) provides information on land acquisition and operating loans, as well as assistance and relief programs available to new and established farmers.

[National Sustainable Agriculture Coalition](#) (USDA FSA 2020) has resources for beginning farmers, including assistance and information.

[USDA Beginning Farmer and Rancher Coordinators](#) (USDA Farmers.gov, n.d. b) can help you get started or grow your farming operation through a variety of programs and services. Get connected with the Alaska Coordinator.

[Tool Box for Farmland Seekers from Alaska Farmland Trust](#) (Alaska Farmland Trust, n.d.) includes information on lease agreements, how to develop a farm business plan, how to acquire financial assistance, and labor resources.

[Alaska Grown: A New Look at Mat-Su Agriculture](#) (Byrd 2020) is a short documentary on how food security challenges in Alaska present new opportunities for farmers. It includes interviews with farmers about how they got started and where they received local training.

Adaptation Strategies

Strategy 1: Sustain Fundamental Functions of Soil and Water

Strategy 2: Reduce Existing Stressors of Crops and Livestock

Strategy 3: Reduce Risks from Warmer Conditions

Strategy 4: Prepare for and Mitigate Consequences from Extreme Weather

Strategy 5: Manage Farms and Fields as Part of a Larger Landscape

Strategy 6: Alter Management to Accommodate Expected Future Conditions

Strategy 7: Alter Agricultural Systems or Lands to New Climate Conditions

Strategy 8: Alter Infrastructure to Match New and Expected Conditions



Adaptation Strategies

Strategy 1: Sustain Fundamental Functions of Soil and Water

Approach 1: maintain and improve soil health

Approach 2: protect water quality

Approach 3: match practices to water supply and demand



Adaptation Strategies and Tactics

Strategy 1: Sustain Fundamental Functions of Soil and Water

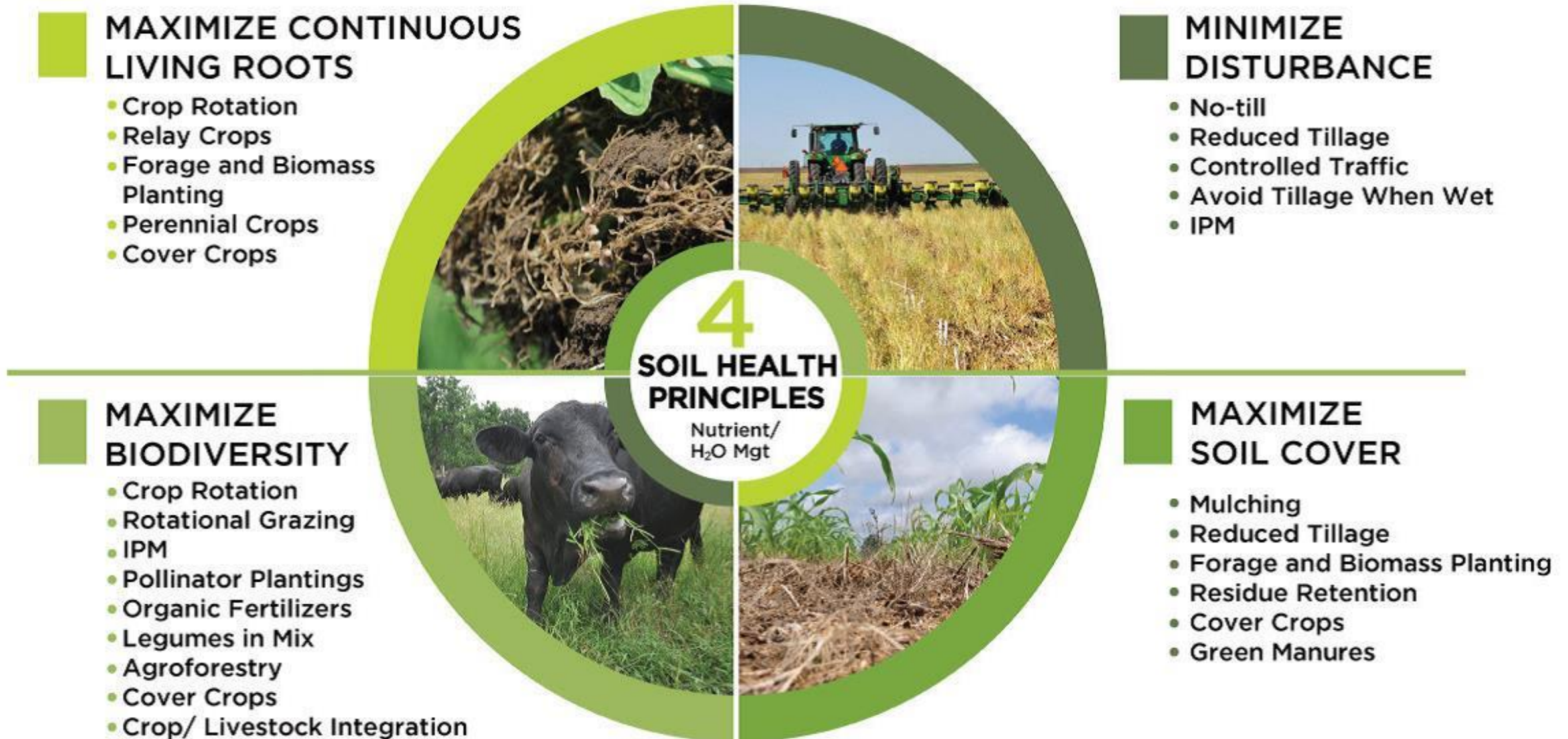
Approach 1.1: maintain and improve soil health—

Example adaptation tactics 3.1.1

- Minimize soil disturbance by avoiding or reducing tillage for planting, weed control, or other purposes.
- Provide nearly year-round ground cover of residue or plants to reduce soil exposure to erosive forces of water and wind.
- Increase soil organic matter to improve soil water-holding capacity, soil structure, and water infiltration, and to reduce erosion (use cover crops and mixes, crop or livestock residues, compost, mulch, biochar, or other organic amendments).



Maintain and Improve Soil Health



Adaptation Strategies

Strategy 2: Reduce Existing Stressors of Crops and Livestock

Approach 1: reduce the effects of pests and pathogen on crops

Approach 2: reduce competition from weedy and invasive species

Approach 3: maintain livestock health and performance

Strategy 3: Reduce Risks from Warmer Conditions

Approach 1: adjust the timing or location of on-farm activities

Approach 2: manage crops to cope with warmer conditions

Approach 3: manage livestock to cope with warmer conditions



Adaptation Strategies and Tactics

Strategy 3: Reduce Risks and Maximize Opportunity from Warmer Conditions

Approach 3.2: manage crops to cope with warmer conditions—

Example adaptation tactics 3.3.2

- Adjust timing of planting to avoid heat stress during critical periods of plant development.
- Study soil types and permafrost areas to assess potential for damage and opportunity for future cultivation, particularly for new operations.
- Select longer growing-season, heat-resistant, or drought-resistant varieties of crops.



Adaptation Strategies

Strategy 4: Prepare for and Mitigate Consequences from Extreme Weather

Approach 1: reduce peakflow, runoff velocity, and soil erosion

Approach 2: reduce severity or extent of water-saturated soil and flood damage

Approach 3: reduce severity or extent of wind damage to soils and crops

Strategy 5: Manage Farms and Fields as Part of a Larger Landscape

Approach 1: maintain or restore natural ecosystems

Approach 2: promote biological diversity across the landscape

Approach 3: enhance landscape and waterway connectivity



Adaptation Strategies

Strategy 6: Alter Management to Accommodate Expected Future Conditions

Approach 1: diversify crop or livestock varieties, breeds, or products

Approach 2: diversify existing systems with new crop combinations

Approach 3: switch to commodities expected to be better suited to future conditions



Adaptation Strategies

Strategy 7: Alter Agricultural Systems or Lands to New Climate Conditions

Approach 1: minimize potential negative consequences following disturbance

Approach 2: realign severely altered systems toward future conditions

Approach 3: alter lands in agricultural production

Strategy 8: Alter Infrastructure to Match New and Expected Conditions

Approach 1: expand or improve water systems to match water demand and supply

Approach 2: use structures to increase environmental control for plant crops

Approach 3: improve or develop structures to reduce animal heat stress

Approach 4: match infrastructure and equipment to new and expected conditions

Adaptation Strategies and Tactics

Strategy 7: Alter Agricultural Systems or Lands to New Climate Conditions

Approach 7.3: alter lands in agricultural production—

Example adaptation tactics 3.7.3

- Convert agricultural lands to new commodities based on altered climatic conditions, such as converting row crops to perennial forage where water availability decreases
- Remove lands from agricultural production
- Add lands to agricultural production, recognizing the potential for negative impacts on natural ecosystems or environmental benefits



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Thank you

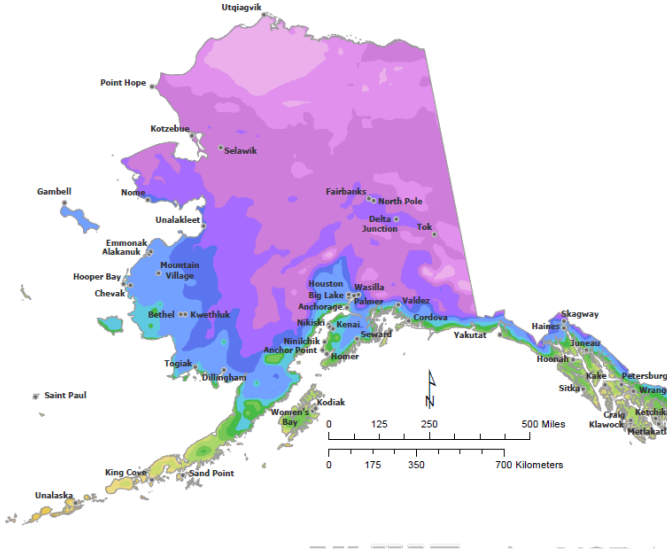
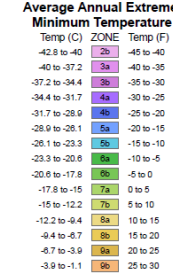
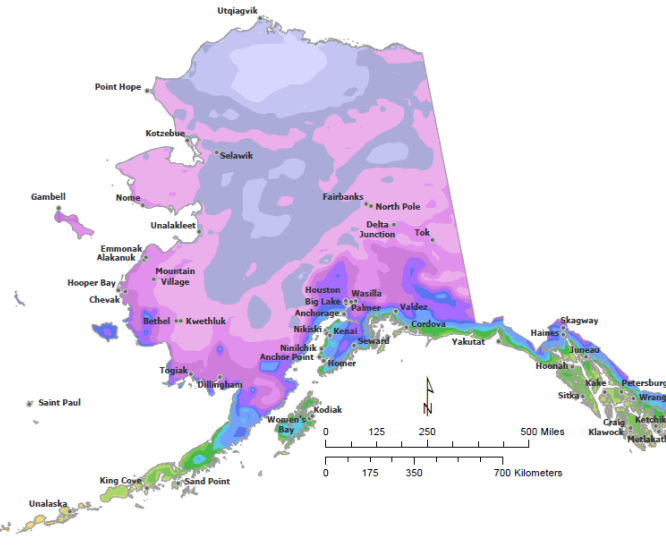
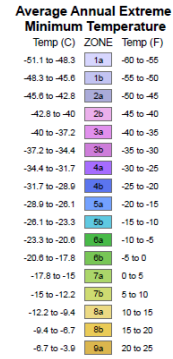
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Projected

Alaska Hardiness Zone Map: Historical 1980 - 2009

Alaska Hardiness Zone Map: 2010 - 2039



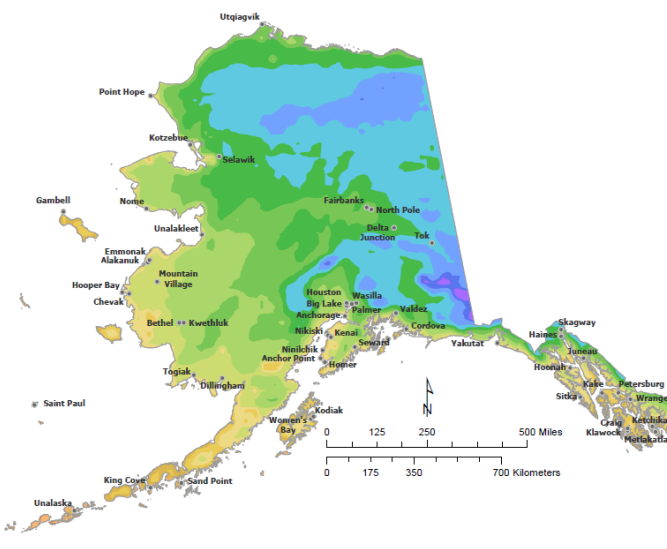
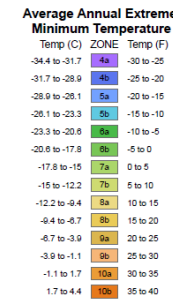
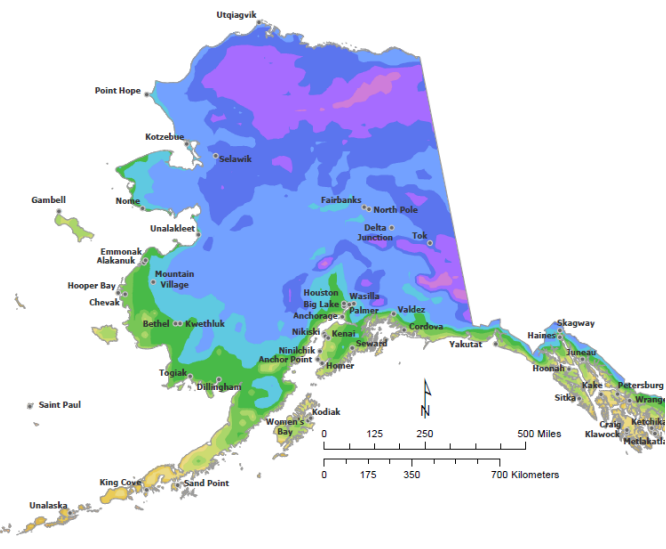
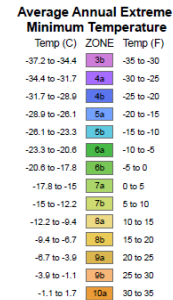
1980-2009

2010-2039

2040-2069

2070-2099

Alaska Hardiness Zone Map: 2040 - 2069



Plant Hardiness Zones & Crops

Average Annual Extreme Minimum Temperature

Temp (C)	ZONE	Temp (F)
-51.1 to -48.3	1a	-60 to -55
-48.3 to -45.6	1b	-55 to -50
-45.6 to -42.8	2a	-50 to -45
-42.8 to -40	2b	-45 to -40
-40 to -37.2	3a	-40 to -35
-37.2 to -34.4	3b	-35 to -30
-34.4 to -31.7	4a	-30 to -25
-31.7 to -28.9	4b	-25 to -20
-28.9 to -26.1	5a	-20 to -15
-26.1 to -23.3	5b	-15 to -10
-23.3 to -20.6	6a	-10 to -5
-20.6 to -17.8	6b	-5 to 0
-17.8 to -15	7a	0 to 5
-15 to -12.2	7b	5 to 10
-12.2 to -9.4	8a	10 to 15
-9.4 to -6.7	8b	15 to 20
-6.7 to -3.9	9a	20 to 25
-3.9 to -1.1	9b	25 to 30
-1.1 to 1.7	10a	30 to 35
1.7 to 4.4	10b	35 to 40

1980-2009

2010-2039

2040-2069

2070-2099

