

Site Climate: Frost, Temperature, and Daylight

Prairie Plants · Mountain Prairie Acres, Prairie, Idaho · about 4,750 ft · measured at the Prairie SNOTEL weather station, 1991 to 2020

Companion to the rain and snowmelt harvesting plan, the 2027 planting plan, and the site baselines page (snow, storms, heat and chill, wind, sun, building values, and hail). The numbers live in `data/cClimate.json` and the SQLite tables built from it, so they can be queried and corrected. The lot has no weather station of its own yet, so these are the nearest measured record and two models, not readings on the ground (see [How Well the Sources Agree](#)).

FROST-FREE DAYS

90

between 32 °F nights in a typical year; 1 year in 10 has fewer than 74, 1 in 10 more than 113

LAST SPRING FREEZE

Jun 17

32 °F, typical year; 1 year in 10 has one after Jun 24

FIRST FALL FREEZE

Sep 9

32 °F, typical year; 1 year in 10 has one before Aug 31

COLDEST NIGHT, AVERAGE YEAR

−11 °F

USDA zone 5b; the station's lowest was −32 °F (Dec 22, 1990)

WARMEST MONTH

86 °F

July average high; the average low is 49 °F

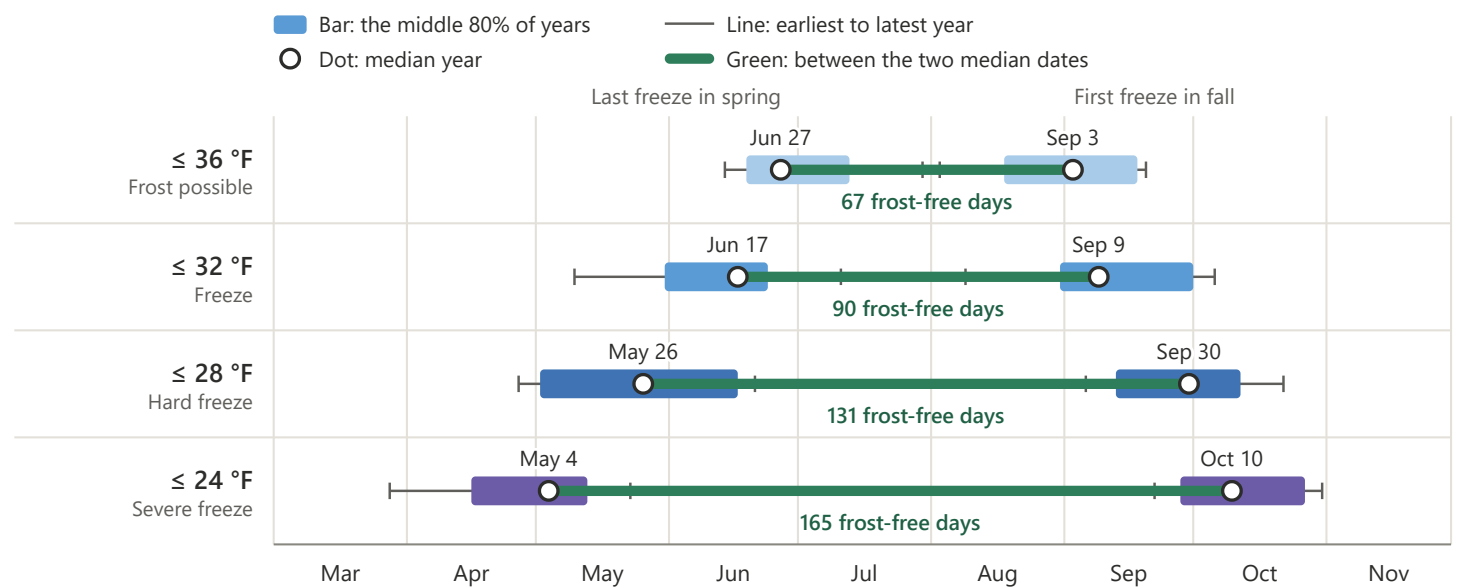
LONGEST DAY

15 h 25 m

June 21; the shortest, 8 h 57 m, is December 21

Frost at Both Ends of the Season

Measured at the Prairie SNOTEL, 2.4 miles from the lot and 50 ft higher, the typical year has its last 32 °F freeze about Jun 17 and its first about Sep 9. Counted year by year, from each year's own last spring freeze to its first fall freeze, the middle year has about 90 frost-free days (the two typical dates alone are 84 days apart), and the worst year of the record had only 50. Both ends are risky: in 1 spring in 10 a 32 °F freeze still comes after Jun 24 (the latest was Jul 11, 2016), and in 1 fall in 10 the first one arrives before Aug 31 (the earliest was Aug 9, 1995). A freeze is not just a winter event: 89% of years have a 32 °F night in June, 15% in August, and 89% in September.



Each bar covers the middle 80% of years (1 year in 10 falls before it and 1 in 10 after it), the dot is the median year, and the thin line runs from the earliest to the latest year, 1991 to 2020. The number on each green bar is the middle of the yearly frost-free counts, each counted from that year's own last spring freeze to its first fall freeze, so it can differ by a few days from the distance between the two dots. 32 °F is a freeze; 28 °F and 24 °F are hard and severe freezes; at 36 °F, frost can still form on leaves under a clear, calm sky. Spring is the last such night before August, and fall is the first one after July.

Threshold	Last freeze in spring					First freeze in fall					Frost-free days
	Earliest	1 in 10 before	Median	1 in 10 after	Latest	Earliest	1 in 10 before	Median	1 in 10 after	Latest	
≤ 36 °F frost possible	Jun 14	Jun 19	Jun 27	Jul 13	Jul 30	Aug 3	Aug 18	Sep 3	Sep 18	Sep 20	39 / 67 / 87
≤ 32 °F freeze	May 10	May 31	Jun 17	Jun 24	Jul 11	Aug 9	Aug 31	Sep 9	Oct 1	Oct 6	74 / 90 / 113
≤ 28 °F hard freeze	Apr 27	May 2	May 26	Jun 17	Jun 21	Sep 6	Sep 13	Sep 30	Oct 12	Oct 22	113 / 131 / 151
≤ 24 °F severe freeze	Mar 28	Apr 16	May 4	May 13	May 23	Sep 22	Sep 28	Oct 10	Oct 27	Oct 31	146 / 165 / 183

Based on 25 springs and 26 falls at 32 °F (24 and 25 at 28 °F, 23 and 23 at 24 °F), between 1991 and 2020; years with too many missing readings are left out. The percentiles are the same dates as the 1 in 10 risk: 32 °F freezes after Jun 24 in spring and before Aug 31 in fall each come in about 1 year of 10. The 28 °F and 24 °F rows run on the same dates for blossom damage and for the end of the growing season.

Chance of a Freeze, Date by Date

These tables turn the year-by-year dates into odds. Plant something that a 32 °F night would kill on Jun 10, and a freeze follows in 80% of years; wait until Jun 30 and it is 4%. In fall, a 32 °F freeze has already come by Sep 10 in 50% of years and by Sep 30 in 88%. Shading marks 10% or more (yellow), 25% or more (orange), and 50% or more (red).

Spring: chance of a freeze after this date

Date	≤ 36 °F	≤ 32 °F	≤ 28 °F	≤ 24 °F
May 10	100%	96%	71%	17%
May 20	100%	96%	63%	4%
May 31	100%	88%	38%	0%
Jun 10	100%	80%	21%	0%
Jun 20	80%	24%	4%	0%
Jun 30	36%	4%	0%	0%
Jul 10	24%	4%	0%	0%

Fall: chance the first freeze has already come by this date

Date	≤ 36 °F	≤ 32 °F	≤ 28 °F	≤ 24 °F
Aug 20	12%	4%	0%	0%
Aug 31	35%	8%	0%	0%
Sep 10	81%	50%	8%	0%
Sep 20	96%	81%	16%	0%
Sep 30	100%	88%	44%	13%
Oct 10	100%	100%	84%	48%
Oct 20	100%	100%	96%	70%

Each percentage is the share of the 25 springs and 26 falls (at 32 °F) between 1991 and 2020 with a usable record, counted from the year-by-year dates in the data, so every step is about 4%. Spring counts years whose last freeze at or below the temperature came after the date; fall counts years whose first one came before it.

What a Cold Night Does to Open Blossoms

The frost table's 28 °F and 24 °F rows are the ones that matter for fruit. At full bloom, 10% of the blossoms are killed at about 28 °F and nearly all at 22 to 25 °F. At Prairie the last 28 °F night is typically May 26 and 1 year in 10 has one after Jun 17; the last 24 °F night is typically May 4, and 1 year in 10 has one after May 13. The date your trees reach full bloom is not recorded yet; read the 28 °F and 24 °F columns of the spring table at that date.

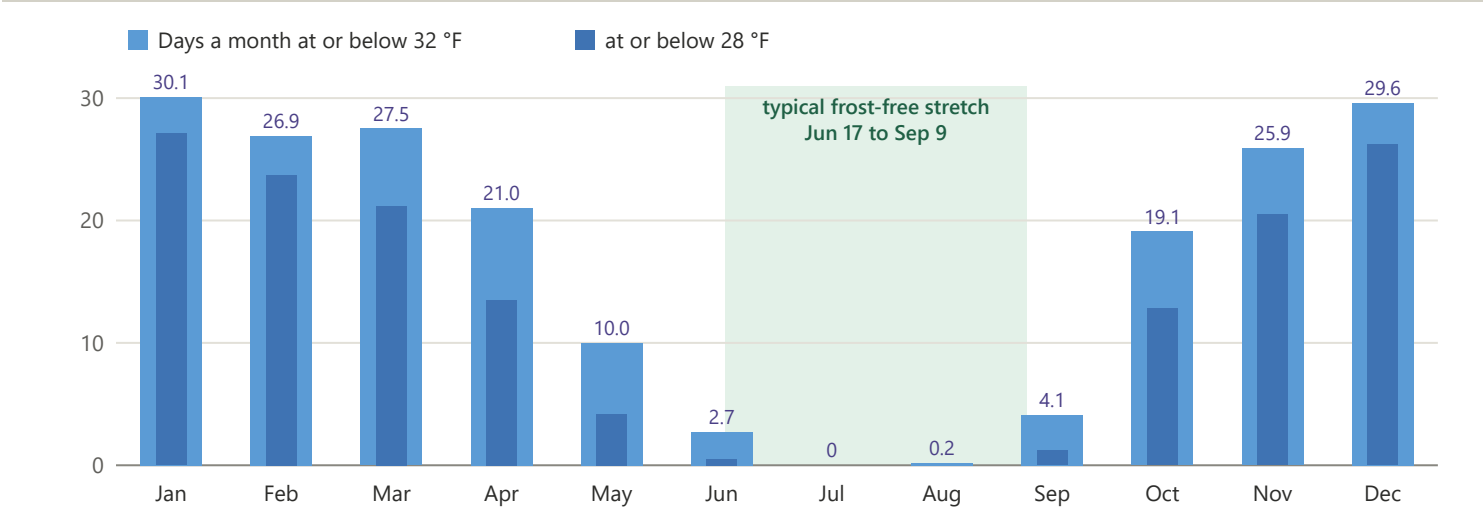
At full bloom	10% of blossoms killed at	90% of blossoms killed at
Apple	28 °F	25 °F
Pear	28 °F	24 °F
Sweet cherry	28 °F	25 °F
Plum	28 °F	23 °F
Peach	27 °F	24 °F
Apricot	27 °F	22 °F

Utah State University Extension, Critical Temperatures for Frost Damage on Fruit Trees (Marion Murray, IPM-012-11, March 2020), a table developed by Washington State University: the temperature that kills that share of blossom buds after 30 minutes. Buds are hardier before they open (an apple at green tip is hurt at 18 °F, not 28 °F) and tolerate less as they develop. The table notes that a full crop needs well over half the cherry buds to survive, but only 10 to 15% of the apple, pear, and peach buds.

What It Means for the Orchard

- **Bloom frost is the biggest orchard risk.** A night at 28 °F or colder comes after May 20 in 63% of years, and after Jun 10 in 21%, so some blossoms will meet a hard freeze in most years. Favor the later-blooming cultivars where there is a choice, and keep frost cloth or row cover on hand for the years it matters. UC IPM also notes that bacterial canker is worse after spring freezes, and the inventory flags canker on many of the stone-fruit trees.
- **The late apples are a gamble.** The first 28 °F night arrives on Sep 30 in a typical year and before Sep 13 in 1 year in 10; the first 24 °F night arrives on Oct 10 in a typical year. Apples that ripen after about Oct 25 will often meet a hard freeze on the tree. See the ripening watch in the 2027 planting plan.
- **Tender garden plants need protection at both ends.** Wait until Jun 24 to set out frost-tender plants (a 10% chance of a freeze afterward), and choose kinds that finish in about 74 days or less, since 1 year in 10 has a season that short. A freeze before Aug 31 comes in about 1 year of 10.
- **Summer freezes happen.** 89% of years have a 32 °F night in June, 15% in August (3% in July), and 89% in September, so cover is not just a spring chore.
- **Cold air runs downhill.** The orchard sits on a slope that falls to the northwest. Cold air drains the same way water does and pools in the low northwest corner by the road, so that corner is the frost pocket and the upper rows are the safest.
- **These are the cautious numbers.** They come from a measured station about 2.4 miles away at nearly the same elevation. Nothing measured on the lot itself has shown it to be milder, so plan on them until your own log says otherwise.

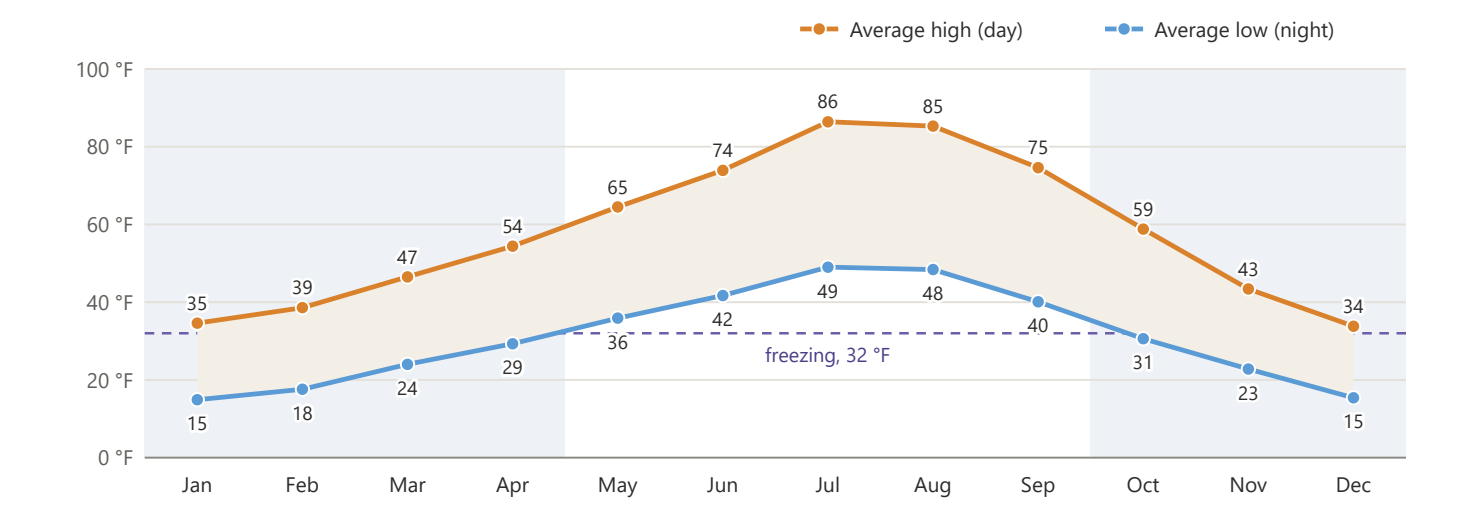
Freezes Month by Month



Average number of nights a month with a low at or below the temperature, 1991 to 2020, measured at the Prairie SNOTEL. The green band is the median frost-free stretch at 32 °F. The month table below also gives the share of years with at least one such night.

Temperature by Month

July is the warmest month, with days averaging 86 °F and nights 49 °F, and January the coldest, at 35 °F by day and 15 °F by night. The average night is at or below freezing in 7 months of the year (Oct to Apr), and even from June to September the nights run 32 to 37 degrees below the days.

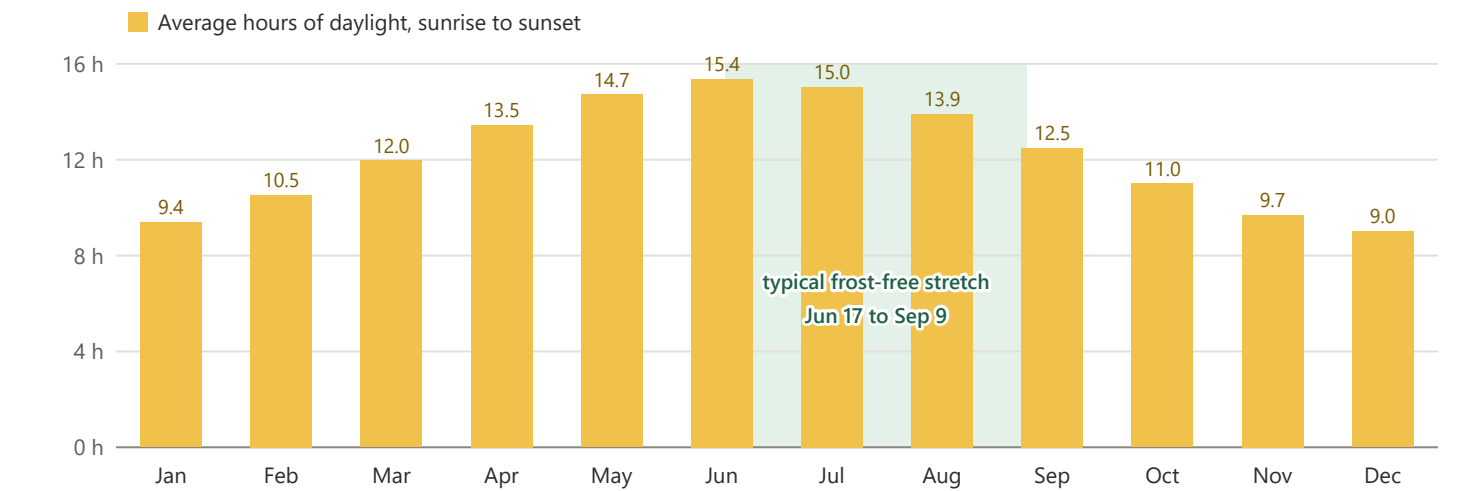


Average of the daily highs and lows, 1991 to 2020, measured at the Prairie SNOTEL. The shaded months are the ones whose average night is at or below 32 °F. Compare the rainfall chart in the water-harvesting plan, which uses the same months.

Winter cold. The coldest night of the year averages −11 °F over 27 winters, which is USDA zone 5b. The coldest of those winters bottomed out at −22 °F (Jan 6, 2017), and the station's lowest reading since 1988 is −32 °F (Dec 22, 1990). The old Prairie weather station, from 1926 to 1941, averaged −22 °F (zone 4b) and recorded −39 °F on Jan 21, 1937, so the recent record is not a ceiling on how cold a bad winter can get. The PRISM model, which runs warmer at night, puts the lot at −6 °F (zone 6a). Zones here are worked out from these readings with the USDA's 5 °F bands; the official map's own answer for the lot is recorded under Still to Check.

Daylight by Month

The sun is up 15 h 25 m at the June solstice and 8 h 57 m at the December solstice. Days are at least 10 hours long from Feb 3 to Nov 6, at least 12 hours from Mar 17 to Sep 25, at least 14 hours from Apr 28 to Aug 14, and at least 15 hours from May 24 to Jul 18. The typical frost-free stretch at 32 °F (Jun 17 to Sep 9) opens on the longest days of the year, and days average 15.4 hours in June but 12.5 in September, so the growing season runs mostly on long days and ends as they shrink.



Average of the day lengths (sunrise to sunset) for every day of each month, computed for the lot's latitude (43.4737° N). The green band is the typical frost-free stretch at 32 °F. Day length also tells many plants when to flower, bulb, and go dormant.

Date	Sunrise	Solar noon	Sunset	Day length	Noon sun height	Sunrise / sunset direction
March equinox, Mar 20, 2026	7:45 am MDT	1:50 pm	7:55 pm	12 h 10 m	46.6°	E 89° / W 271°
June solstice, Jun 21, 2026	6:02 am MDT	1:44 pm	9:27 pm	15 h 25 m	70.0°	NE 56° / NW 304°
September equinox, Sep 22, 2026	7:30 am MDT	1:35 pm	7:40 pm	12 h 10 m	46.6°	E 89° / W 271°
December solstice, Dec 21, 2026	8:12 am MST	12:41 pm	5:09 pm	8 h 57 m	23.1°	ESE 122° / WSW 238°

Clock times are local (Mountain Daylight Time from March through October, Mountain Standard Time in December) for the lot center. Noon sun height is the angle above the horizon, and the directions are compass bearings from north (90° is due east, 270° due west). A flat horizon is assumed; the real sun clears the hills and trees later and sets behind them sooner. The December noon sun stands only 23° up, so a 10 ft tree casts a shadow about 23 ft long at midday then, against about 4 ft in June.

Month by Month at Prairie

Month	Average high, °F	Average low, °F	Days at or below 32 °F	Years with a night at or below 32 °F	Days at or below 28 °F	Daylight, hours	Precipitation, in	ET _o , in
Jan	34.6	14.9	30.1	100%	27.1	9.39	3.12	0.83
Feb	38.6	17.6	26.9	100%	23.7	10.53	2.22	1.22
Mar	46.5	24.0	27.5	100%	21.2	11.96	2.73	2.28
Apr	54.4	29.3	21.0	100%	13.5	13.46	2.11	3.38
May	64.5	35.9	10.0	100%	4.2	14.72	1.99	4.97
Jun	73.9	41.7	2.7	89%	0.5	15.36	1.02	6.25
Jul	86.4	49.0	0.0	3%	0.0	15.03	0.31	7.86
Aug	85.3	48.4	0.2	15%	0.0	13.91	0.27	6.88
Sep	74.6	40.1	4.1	89%	1.2	12.48	0.64	4.68
Oct	58.8	30.6	19.1	100%	12.8	11.00	1.50	2.70
Nov	43.4	22.8	25.9	100%	20.5	9.69	2.40	1.22
Dec	33.8	15.4	29.6	100%	26.2	9.01	3.62	0.72
Year	57.9	30.8	197		151	12.21	21.9	43.0

Temperatures and frost days are measured at the Prairie SNOTEL, 1991 to 2020. The Year row averages the temperatures and daylight and adds up the frost days, precipitation, and ET_o. Precipitation is the PRISM 1991–2020 normal and ET_o is ERA5 reference evapotranspiration, both from the water-harvesting plan and sampled near the SNOTEL (43.50° N, 115.57° W). The same table is the SQL view `site_climate_months`.

How Well the Sources Agree

The measured record and the soil survey agree: a typical season of 90 days is inside the survey's 60 to 100. The two climate models, which smooth over mountain valleys where cold air pools on clear calm nights, put the season 4 weeks (PRISM) and 6 weeks (Daymet) longer, and warmer nights by 2 to 4 °F. The 1926 to 1941 station is colder than all of them. That spread is the real uncertainty about the orchard itself: it stands 50 ft below the station on a slope that drains cold air northwest, so it may do better than the station; how much better, only a thermometer on the lot can say.

Source	Last 32 °F, typical	First 32 °F, typical	Frost-free days, typical (1 in 10 under – over)	Average coldest night	Hardiness zone
Prairie SNOTEL (used on this page) measured, 4,800 ft, 1991 to 2020	Jun 17	Sep 9	90 (74 – 113)	–11 °F	5b
PRISM model at the lot model, 4,688 ft, 1991 to 2020	Jun 2	Sep 24	117 (81 – 134)	–6 °F	6a
Daymet model at the lot model, 4,718 ft, 1991 to 2020	May 21	Oct 3	133 (106 – 163)	–2 °F	6b
Prairie weather station, 1926 to 1941 measured, 4,780 ft, 1926 to 1941	Jun 23	Aug 31	73 (39 – 89)	–22 °F	4b
NRCS soil survey for this soil Simonton loam, map unit 149; a range, not dates	—	—	60 – 100	—	—

Typical means the median: the middle date, or the middle season length, of the years in each record. The season length is counted year by year, so it is not always the exact gap between the two typical dates. The coldest night is the average, over the winters in each record, of the lowest reading of the year; zones use the USDA 5 °F half-zone bands. The models are built from weather-station data and smooth over mountain valleys, where clear, calm nights let cold air pool, so they understate frost here.

Still to Check

The lot has no weather station of its own, so some of what this page says rests on estimates and assumptions. 7 of the 8 checks below are still open and 1 is settled. Each says what is unverified, why it matters, and how to settle it; a settled check keeps its result.

What to check	Why it matters	How to settle it	When	Status
Record when each kind of tree blooms at the lot Bloom dates at the lot are unknown. The risk tables on this page say how often a freeze follows a date, but not which date matters for each tree.	A freeze hurts when it meets open blossoms (Utah State's table puts the first losses at 27 F for apricots and 28 F for apples), so each tree's risk depends on its own bloom date at your elevation.	Log first bloom and full bloom for every tree as plant events (the first_bloom and full_bloom stages), then read the bloom_frost_risk view to see how often a freeze followed each date.	March to June 2027, then every spring.	Open
Find out how cold air behaves on the orchard slope The orchard slope may drain cold air better than the station's spot does, or the low northwest corner by the road may pool it. Nothing measured on the lot shows how much.	It decides which rows are safest for frost-tender trees such as apricots and peaches, and whether the station's frost dates are too cautious or too hopeful for the orchard.	Compare minimum temperatures at an upper row and in the low northwest corner on clear, calm nights (see the thermometer check), and note where frost lies on the grass and leaves each morning.	March to October 2027, especially clear, calm nights in spring and fall.	Open
Put a minimum thermometer in the orchard from March to October The lot has no thermometer, so every temperature on this page is a station or model estimate, not a reading on the ground.	A minimum thermometer at tree height would settle how the lot compares with the station, and it supplies the readings the cold log and the cold-air check need.	Mount one at about tree height in the orchard, shaded and away from buildings, and a second in the low northwest corner. Read and reset them each morning and write the lows in the cold log on this page.	March to October 2027.	Open
Measure which way the wind blows at the lot No wind has been measured at the lot. The measured station closest in height, Pine Turnoff 20 miles away, shows west wind as the most common in every season, while the weather model at the lot (35 percent of windy winter hours) and Mountain Home Air Force Base (23 percent) show east wind as the most common in winter.	Which side of the orchard takes the cold, drifting winter wind decides where a windbreak and snow fence help. The water-harvesting plan counts on west winds dropping snow east of the hazelnut row, and an east wind in winter would put the drift on the other side.	Run the weather station's wind sensor for a full year, then compare its seasonal wind rose with the three on the site baselines page, and note the answer here.	One full year of readings, so winter 2027 to 2028 at the earliest.	Open
Confirm the design snow load for a building at the lot The county's snow load map puts Prairie in the 120 pound per square foot zone, but the county's permit application ties the engineered 120 pound design to buildings above about 5,000 ft, and the lot is at about 4,750 ft. The 30 pound zone covers the rest of the county.	A barn, greenhouse, or house designed for 30 pounds may not meet the county's rule, and one designed for 120 pounds when 30 would do costs far more.	Ask the Elmore County Land Use and Building Department (208-587-2130, extension 6500) which snow load applies to a building at 4,750 ft at the lot, and write the answer and the date here.	Before any building is designed.	Open
Confirm what the county's 30 inch frost depth means The county's frost depth map puts Prairie in the 30 inch zone, but its permit page words the footing depth as '30 in below frost line'.	It decides how deep footings and posts must go: 30 inches below ground, or deeper.	Ask the Land Use and Building Department whether a footing bottom must be 30 inches below grade or 30 inches below the frost line, and write the answer and the date here.	Before any footing or post is set.	Open
Compare a year of weather station readings with the baselines The baselines for wind, humidity, sunshine, rain, and heat come from stations and models away from the lot, and none of them is a reading on the ground.	How far the lot differs from them tells how much to trust the models for planting and water decisions.	After the weather station has run for a full year, compare its monthly averages with the site_baseline_months view or the tables on the site baselines page, and write the largest differences here.	After one full year of readings.	Open

What to check	Why it matters	How to settle it	When	Status
Look up the official USDA hardiness zone for the lot The zones on this page (5b from the Prairie SNOTEL, 6a from the PRISM model at the lot, 6b from Daymet) are worked out from temperature readings. The USDA Plant Hardiness Zone Map itself had not been read for the lot's own spot. Result, Oct 18, 2026: Read from the official 2023 grid file (phzm_us_grid_2023, 1991 to 2020, 30 arc-second or 800 m cells). The lot's cell has an average coldest night of -6.6 F, zone 6a (-6.5 F interpolated to the exact point; the 7 by 7 cells around it run from -8.2 to -3.6 F). That agrees with the PRISM sample on this page (-6.3 F, 6a), the same family of model, and not with the measured Prairie SNOTEL: the map's cell at the station reads -7.8 F against the -10.9 F the station recorded (zone 5b), about 3 F colder. Nursery zone ratings are written against the map, so where a rating is borderline, use the station's 5b rather than the map's 6a until a thermometer on the lot says otherwise.	Nursery tags and cultivar zone ratings (such as zone 4 to 7) are written against that map. If the map and the station disagree, you need to know which one a rating really matches.	Look up 43.4737 N, 115.5942 W on the USDA map (planthardiness.ars.usda.gov), or sample its downloadable grid for that cell. Record the zone and its temperature range here and compare it with the 5b from the station.	Any time; it needs no growing season.	Done

When you settle a check, set its status to done in data/climate.json with the date and the result; the SQL table climate_checks and this page follow. Bloom dates and survival go in as plant events (see the data guide).

Frost and Cold Log

The lot has no thermometer record yet. A minimum thermometer at tree height, plus one in the low northwest corner by the road, read each morning from March through October, would show how the orchard really compares with the station. Note when each tree type blooms, so the date can be checked against the risk tables.

Date	Lowest temperature (°F) and where	Bloom stage or growth	Damage seen (trees, buds, blossoms, fruit)	What you did, or would do next time

Sources and Method

- USDA NRCS National Water and Climate Center, Prairie SNOTEL, site 704 (Elmore County, 4,800 ft, 43.505° N, 115.573° W): daily minimum and maximum air temperature, 1988 to 2026. This is the measured record behind every frost date, monthly average, and coldest night above.
- NOAA Regional Climate Centers, ACIS web services: the SNOTEL record, the old Prairie weather station (NOAA cooperative observer 107327, 1925 to 1942, cooperative observer network), and the PRISM grid, all retrieved October 18, 2026.
- PRISM Climate Group, Oregon State University: daily minimum and maximum temperature on a 4 km grid, sampled in the cell around the lot (43.458° N, 115.583° W, 4,688 ft). A model, not a measurement.
- Daymet, Oak Ridge National Laboratory: daily temperature on a 1 km grid (Thornton, Shrestha, Wei, Thornton, Kao, and Wilson, 2022, Daymet version 4 R1, doi:10.3334/ORNLDAAC/2129), sampled at the lot center. A model, not a measurement.
- USDA NRCS Web Soil Survey report for the property (soil folder): frost-free period of 60 to 100 days for map unit 149, Simonton loam, 2 to 12 percent slopes.

- Utah State University Extension, Critical Temperatures for Frost Damage on Fruit Trees (IPM-012-11, 2020): the blossom-kill temperatures above. UC IPM, Bacterial Canker (cherry): the disease is worse after spring freezes.
- USDA Plant Hardiness Zone Map (2023 edition, built by the PRISM Group at Oregon State University, data and terms): the 5 °F half-zone bands used to turn the average coldest night into a zone. The official grid was also read for the lot's own cell on October 18, 2026; the result is under Still to Check. The zones in the tables above are worked out from the readings, so they can differ from the map's answer.
- Daylight: the NOAA solar position formulas (Meeus, *Astronomical Algorithms*) at the lot's latitude and longitude, with sunrise and sunset at the sun's upper edge after standard refraction over a flat horizon. Checked against the U.S. Naval Observatory sunrise and sunset service for 12 dates, all within one minute. Hills, trees, and the windbreak shorten the direct sun on the ground.
- Method: the last spring freeze is the last day from January 1 to July 31 whose lowest temperature was at or below the threshold, and the first fall freeze is the first such day from August 1 to December 31. Percentiles are interpolated across the years from 1991 to 2020 with usable records (the year-by-year dates are in `data/climate.json`). A year's spring or fall date is left out when a missing day could be hiding a later or earlier freeze: the SNOTEL record has too many gaps in 1989 to 1993 and 2022 to date both freezes. Daily values come from hourly readings, so they can miss the coldest moment.

Prairie Plants · Site climate: frost, temperature, and daylight · created October 18, 2026 · data in `data/climate.json`, shared with the SQLite database (`frost_summary`, `frost_years`, `site_climate_months`, and related tables).