

# Degree-day estimates for wild parsnip & Japanese knotweed phenology in Minnesota

A brief guide for getting location-specific estimates using [USPest.org](https://USPest.org)



Minnesota Invasive Terrestrial  
Plants & Pests Center

# USPEST.org

- The USPest.org site has many features.

This is a simple guide for using the **phenology model/degree day calculator** in order to access phenology data for **Japanese knotweed** or **wild parsnip** that resulted from the MITPPC-funded project, [\*Improve invasive plant management using climate based phenology models\*](#)

The model will show you the number of growing degree days that have accumulated for an area on a given date, relative to certain phenological events of each species.

The data informing these models came from only Minnesota sites. Estimates for other regions should be interpreted with caution.

- To go directly to this feature, use:

[https://uspest.org/dd/model\\_app](https://uspest.org/dd/model_app)

## Online Phenology and Degree-day Models for agricultural and pest management decision making in the US

[Intro](#) | [Station](#) | [Model](#) | [Output](#) | [Graph](#)






### Introduction:

This phenology model/degree-day calculator uses weather data to calculate degree-days, also known as heat units that are used to estimate development of many organisms, such as insects and plants.

This app is a re-designed, mobile-friendly, member of a family of online model/calculators at: [USPEST.ORG](#) (home page). The numerous models served by this app are all driven only by daily maximum and minimum temperatures, using one of many different degree-day calculation formulas, many of which are described at this [UC Davis IPM](#) website. Note that this app **requires an internet connection** and will not work in airplane or off-line mode.

### + Instructions for Use:

- + The Station Tab:
- + The Model Tab:
- + The Output Tab:
- + The Graph Tab:
- + Email Subscriptions:
- + Credits:



All data provided "as is" and users assume all risk in its use - see full [disclaimer](#). All [NWS](#) derived data is not subject to copyright protection.

This app is produced by uspest.org at the Integrated Plant Protection Center at Oregon State University with support from the USDA National Plant Diagnostic Network, The OSU Agricultural Experiment Station, various USDA CSREES/NIFA grants, USDA SARE, USDA RMA, and USDA IPM Centers - Western Region. Climate map data provided by OSU PRISM Group, real-time public weather data provided by U. Utah Mesowest and other networks including WSU AgWeatherNET, AGRIMET, CPS Adcon Networks, IFPNet Automata, California CIMIS, California PestCast, and others. Geo-coding (location search using place names) by OpenCage, using data © OpenStreetMap contributors.

Previous versions online since May 16, 1997; this is app version 0.05, updated 18 Nov 2022

Contact Len Coop at [coopl@science.oregonstate.edu](mailto:coopl@science.oregonstate.edu) or 541-737-5523 if you have any questions about this program.

## Enter Your Location

- Click the *Station* tab.
- Here, you will select the area for which you are interested in seeing the phenology estimates for the plant.
- The degree-day tool gives phenology estimates based on individual weather station data. *Only one station* can be selected at a time.
  - If you don't know the weather station code, enter a zip code or place name
- Once your location is entered (e.g., 55108), click "search for stations"
  - This allows you to search the large database of weather stations within USPest.org for the location nearest your area of interest.
- Based on your search, you may need to refine your selection.
  - **See next slide**

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Intro **Station** Model Output Graph

Weather Station

Currently selected: (none)

You can search for stations by city, other place name, ZIP code, or station code.

place name, zip code, or station code search for stations

About Quality Scores

Weather data is normally from a station, but you can upload your own if you prefer.

☒ Weather station ☐ Upload file

Next

Select the "Model" tab to choose the model to use and related details.

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Intro Station Model Output Graph

Weather Station

Currently selected: (none)

You can search for stations by city, other place name, ZIP code, or station code.

55108 search for stations OK

- + Saint Paul, MN 55108, USA lat: 44.9821 long: -93.1890 (MAP)
- + Léger / Sainte-Gertrude, Blvd Léger, Montreal, QC H1G 5W2, Canada lat: 45.6061 long: -73.6354 (MAP)
- + Stevenson Boulevard & Stevenson Common, Stevenson Blvd, Fremont, CA 94538, USA lat: 37.5439 long: -121.9728 (MAP)
- + 133A Ave (SB) at 114 Ave, 133A St, Surrey, BC V3T 0G4, Canada lat: 49.2094 long: -122.8522 (MAP)

About Quality Scores

Weather data is normally from a station, but you can upload your own if you prefer.

☒ Weather station ☐ Upload file

Next

Select the "Model" tab to choose the model to use and related details.

Additional options will appear if your search was not specific enough.



# Enter Your Location

- Click the plus sign (+) to see a list of weather stations nearby a region (here, Saint Paul, MN).
- Click the **MAP** link to view an interactive map displaying all weather stations within the viewing area.
  - Clicking any of the station pins will provide information on that station and automatically enter the station code into the search field.
  - Zooming out will display additional stations.
- Select your desired station. Ensure it appears in the *currently selected* field.
- Click **OK**.

Online Phenology and Degree-day Model  
for agricultural and pest management decision making in the

Intro | Station | Model | Output | Graph

### Weather Station

Currently selected: (none)

You can search for stations by city, other place name, ZIP code, or station code.

55108 search for stations

- + Saint Paul, MN 55108, USA lat: 44.9821 long: -93.1890 (MAP)
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About Quality Scores

Weather data is normally from a station, but you can also upload your own data.

☒ Weather station ☐ Upload file

### Next

Select the "Model" tab to choose the model you want to use.

Weather Station

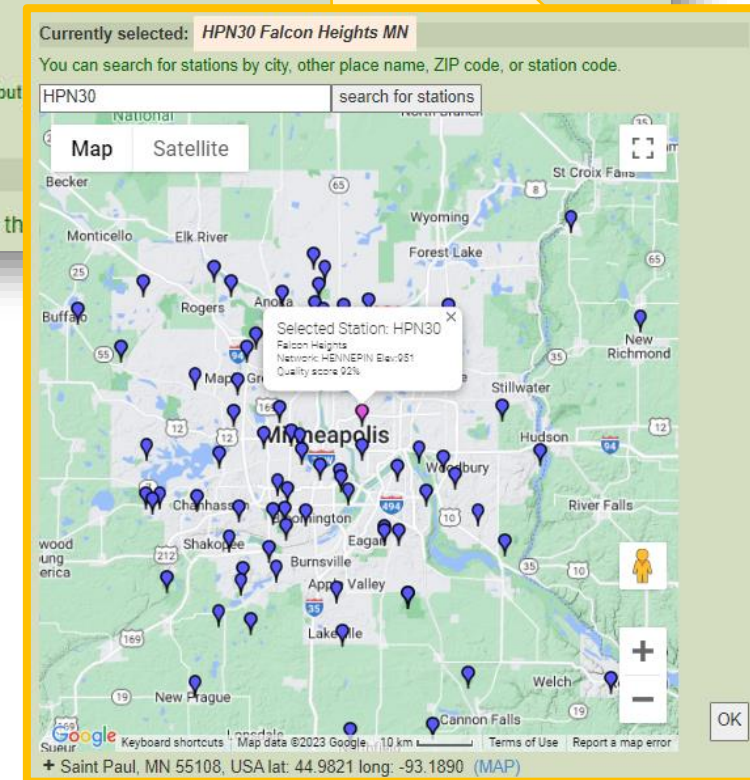
Currently selected: HPN30 Falcon Heights MN

You can search for stations by city, other place name, ZIP code, or station code.


HPN30 search for stations

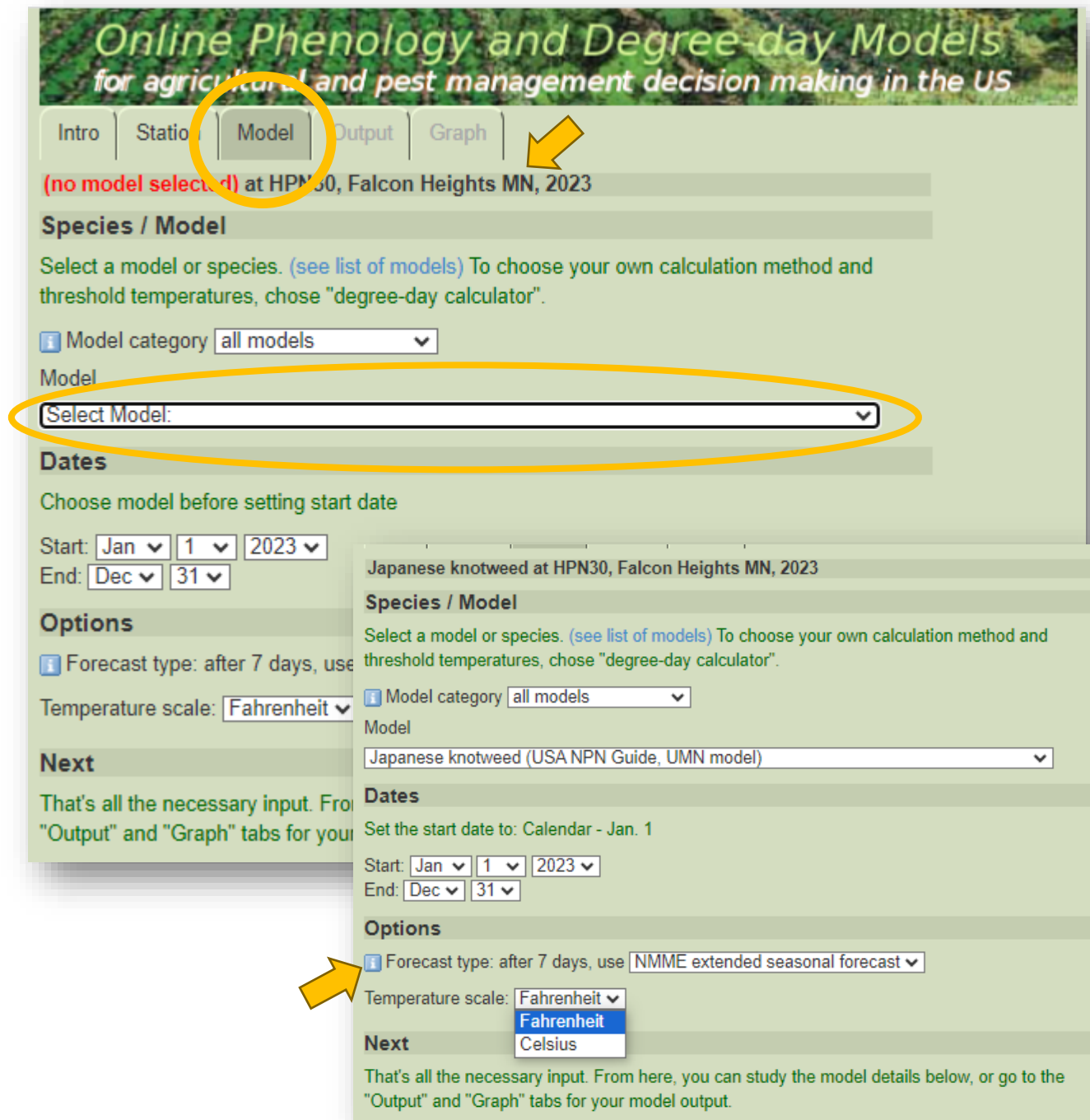
- station HPN30 MN lat: 44.9903 long: -93.1797 (MAP)
- HPN30 Falcon Heights (elev: 951 ft Quality 92%)
- D0937 DW0937 St. Paul (elev: 918 ft Quality 95%)
- HPN21 Fridley (elev: 834 ft Quality 92%)
- MN088 Little Canada I694 MP (elev: 936 ft Quality 78%)
- HPN07 MSP Airport (elev: 841 ft Quality 96%)
- G0687 GW0687 West Saint Paul (elev: 1017 ft Quality 95%)
- E3700 EW3700 Minneapolis (elev: 892 ft Quality 95%)
- KSTP St. Paul Downtown Holm (elev: 702 ft Quality 93%)

OK



# Select Model

- Click the *Model* tab.
- Verify your weather station of interest is still selected.
- Use the **Select Model** dropdown menu to go directly to the Japanese knotweed or wild parsnip model
- You can also adjust:
  1. the dates of interest (e.g., do you want phenological data from last year? Do you want a forecast of the coming season?)
  2. the temperature units
  3. the dataset used for forecasting dates in the future (if applicable)
    - For more information on the forecast datasets, click the  icon



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Intro Station **Model** Output Graph

(no model selected) at HPN30, Falcon Heights MN, 2023

**Species / Model**

Select a model or species. (see list of models) To choose your own calculation method and threshold temperatures, chose "degree-day calculator".

Model category: all models

Model: **Select Model:**

**Dates**

Choose model before setting start date

Start: Jan 1 2023  
End: Dec 31

**Options**

Forecast type: after 7 days, use

Temperature scale: Fahrenheit

**Next**

That's all the necessary input. From here, you can study the model details below, or go to the "Output" and "Graph" tabs for your model output.

Japanese knotweed at HPN30, Falcon Heights MN, 2023

**Species / Model**

Select a model or species. (see list of models) To choose your own calculation method and threshold temperatures, chose "degree-day calculator".

Model category: all models

Model: Japanese knotweed (USA NPN Guide, UMN model)

**Dates**

Set the start date to: Calendar - Jan. 1

Start: Jan 1 2023  
End: Dec 31

**Options**

Forecast type: after 7 days, use NMME extended seasonal forecast

Temperature scale: Fahrenheit  
Fahrenheit  
Celsius

**Next**

That's all the necessary input. From here, you can study the model details below, or go to the "Output" and "Graph" tabs for your model output.

## Select Model

- Scroll down the page to view the *Model Inputs* and *Events Table*

The **Model Inputs** summarizes details of the model. Some inputs can be modified in the dropdown menus above. Others are specifications of the model/research.

The **Events Table** gives a summary of the phenological events that will be highlighted for this species' model.

- Text in **bolded blue** indicate hyperlinks to other information, which typically take you to a site external to the USPest.org.

Data resulting from the  
UMN-MITPPC study

Intro

Station

Model

Output

Graph

Forecast type: after 7 days, use 


NMME extended seasonal forecast

Temperature scale: 

Fahrenheit

Next

That's all the necessary input. From here, you can study the model details below, or go to the "Output" and "Graph" tabs for your model output.



Japanese knotweed  
weed model of [USA NPN Guide](#), [UMN model](#)

Model Inputs

Model species/general links

Japanese knotweed

Type

weed

Model source/other links

[USA NPN Guide](#), [UMN model](#)

Calculation method

single sine

Lower threshold

32°F

Upper threshold

86°F

Directions for starting/BIOFIXCalendar - Jan. 1

Starting date

standard date 1-1 2023

Ending date

default date 12-31 2023

Model validation status

research model - not yet validated

Region of known use

Minnesota

Extended forecast type

After 7 days, use 7-month NMME based seasonal climate forecast

Events Table

DDs(F) after Jan. 1:Model Event

318

First emergence

357

Peak emergence

607

First leaves

664

Peak leaves

4227

First flower buds

4581

Peak flower buds

4822

First open flowers

5229

Peak open flowers

5510

First fruit

5732

Peak fruit



# View Output

- Click the *Output* tab.
- The default view provides a summary table of the dates when the modeled phenological events occurred or are forecasted to occur at the selected site.
- Three other data tables can be toggled to display:
  - The **Model Inputs** table is the same summary information seen in the *Model* tab.
  - The **Data Comparison** table shows a comparison between the total degree-days in current year versus past years *This will only show if the current year is selected for the model.*
  - The **Model Output** table shows the weather data, degree-days, and phenological events for each day of the time period selected in the model.
- Text in **blue** can be clicked for more options/information.

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Intro | Station | Model | **Output** | Graph

Japanese knotweed at HPN30, Falcon Heights MN, 2023

**Model Inputs**  
☐ show model inputs table

**Date Comparison**  
☐ show Date Comparison table

**Model Output**  
☐ show full table

Temperatures (and degree-days) are in F; rain in inches.

date	max	min	rain	DDs today	DDs cumu	QA	events
1-1	31	21	0.00	0.0	0		* START *
4-14	83	55	0.00	37.0	331		First emergence
4-18	55	31	0.00	11.1	363		Peak emergence
5-6	61	55	0.00	26.0	612		First leaves
5-8	74	51	0.00	30.5	675		Peak leaves
8-9	78	61	0.00	37.5	4248		First flower buds
8-19	85	67	0.00	44.0	4618		Peak flower buds
8-24	85	67	0.00	44.0	4835		First open flowers
9-3	96	73	M	49.7	5235	Vx	Peak open flowers
9-11	72	52	0.00	30.2	5518	Hx	First fruit
9-19	79	61	0.00	38.0	5753		Peak fruit

To get this information by email, log in to or sign up for [USPEST.org email notifications](#).  
 To see the model output together with relevant weather inputs, go to [MyPest Page](#).  
 To use this information in your a spreadsheet, download it in [CSV format](#).

**Date Comparison**  
☒ show Date Comparison table

Accumulation for HPN30 from 1-1-2023 through 7-24: 3573 DDs(F)  
data quality is ok.

This year is about	versus	QA
1 day behind	2022	ok
DDs exceed full year	2021	missing 78% data
NA	30-yr normal	ok

**Model Output**  
☒ show full table

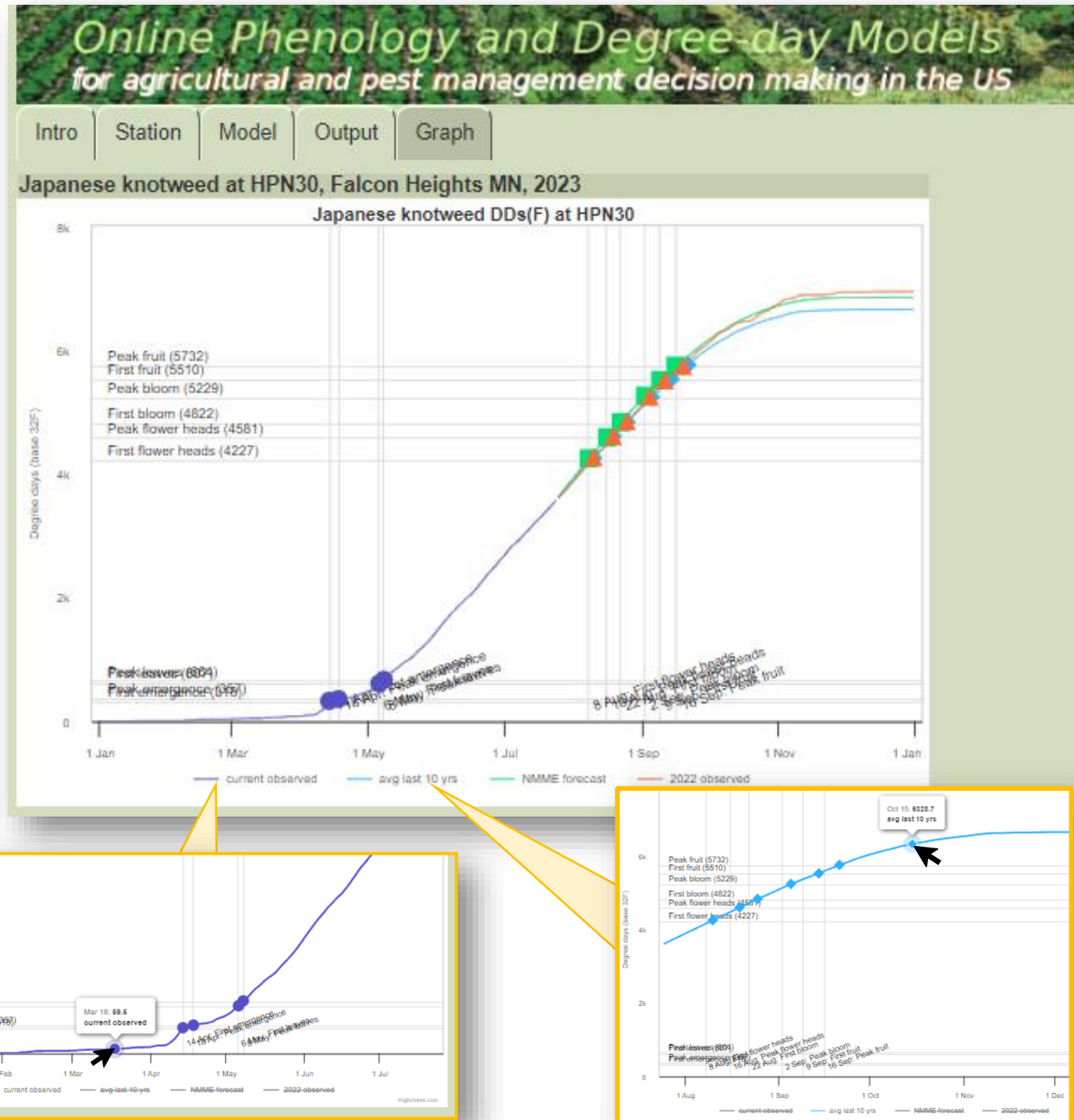
Temperatures (and degree-days) are in F; rain in inches.

date	max	min	rain	DDs today	DDs cumu	QA	events
1-1	31	21	0.00	0.0	0		* START *
1-2	24	22	0.00	0.0	0		
1-3	30	22	0.00	0.0	0		
1-4	32	28	0.00	0.0	0		
1-5	28	16	0.00	0.0	0		
1-6	18	2	0.00	0.0	0		
1-7	21	-1	0.00	0.0	0		
1-8	24	2	0.00	0.0	0		
1-9	31	9	0.00	0.0	0		
1-10	29	22	0.00	0.0	0		
1-11	33	27	0.00	0.0	0		

**DDs today** = degree-days accumulated for that day.  
**DDs cumu** = the degree-days accumulated for that day plus all the days prior.

## View Output

- Click the *Graph* tab.
- This interactive graph displays the accumulated degree-days (vertical axis) for over time (horizontal axis) for the model.
- Depending on the model time period you selected, additional lines and data points will be included that show when the phenological events would occur in the past (e.g., 10-year average) or future (e.g., NMME forecast).
  - Different lines can be toggled on/off by clicking them in legend
  - Hovering your pointer along a line will show the degree-days for a single date
- Phenological events are positioned near the corresponding degree-days (vertical axis) or date (horizontal axis).





For additional information or questions, contact  
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Minnesota Invasive Terrestrial  
Plants & Pests Center