Climate adaptation tactics

Holly Prendeville
Coordinator
USDA Northwest Climate Hub


The 4 Steps of
Preparedness
1 Identify Risk
2 Develop A Plan
3 Implement & Train
4 Be a Leader in Your Community

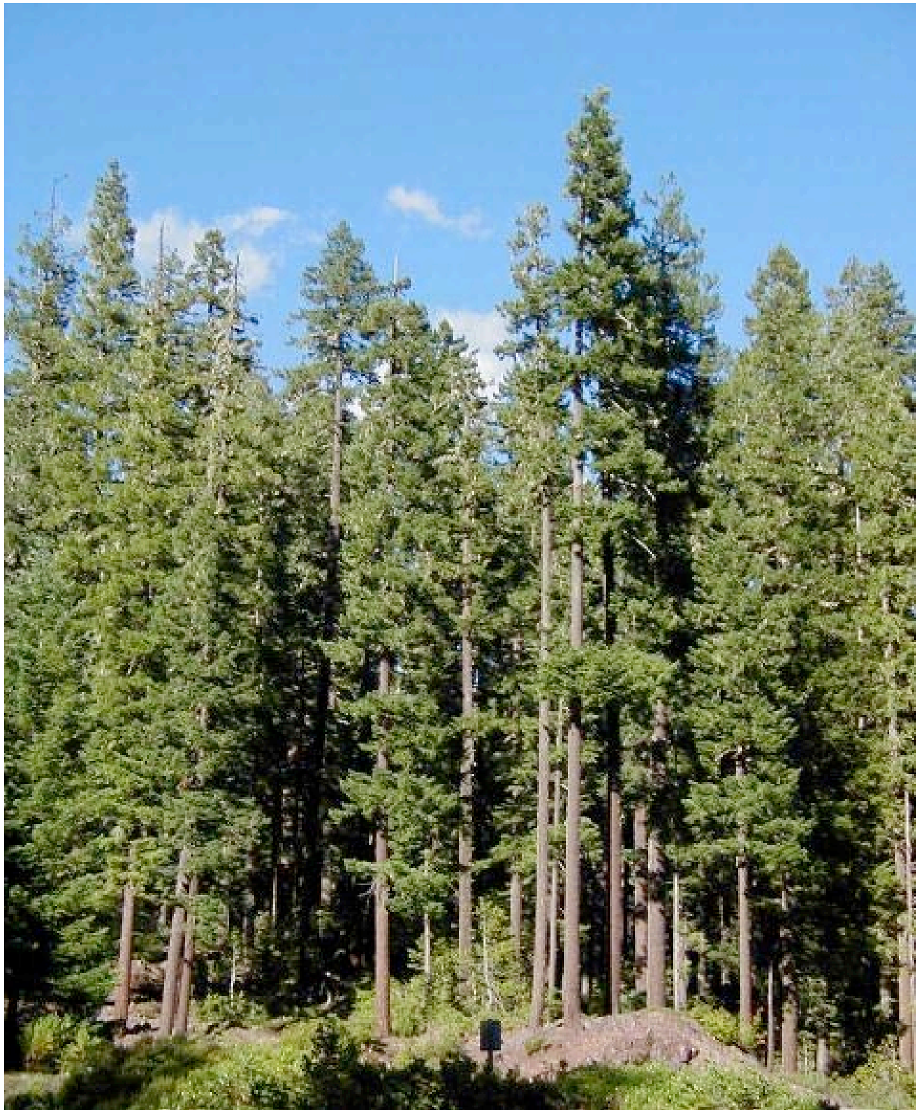
How will trees grow in a warmer climate?

Low elevation, westside forest

Moisture limited

Growth will <u>decrease</u>:

- Douglas-fir
- Western hemlock
- Western redcedar
- Sitka spruce



How will trees grow in a warmer climate?

Eastside coniferous forest

Moisture limited

Growth will decrease:
- Ponderosa pine
- Douglas-fir
- Western larch

How will trees grow in a warmer climate?

High-elevation coniferous forest

Energy limited

Growth will <u>increase</u>:

- Subalpine fir
- Mountain hemlock
- Lodgepole pine

How will plants grow in a warmer climate?

Riparian areas, wetlands, groundwater-dependent systems

Water controlled

Growth and regeneration will <u>change</u>:

- Bogs, fens
- Species composition
- Fire susceptibility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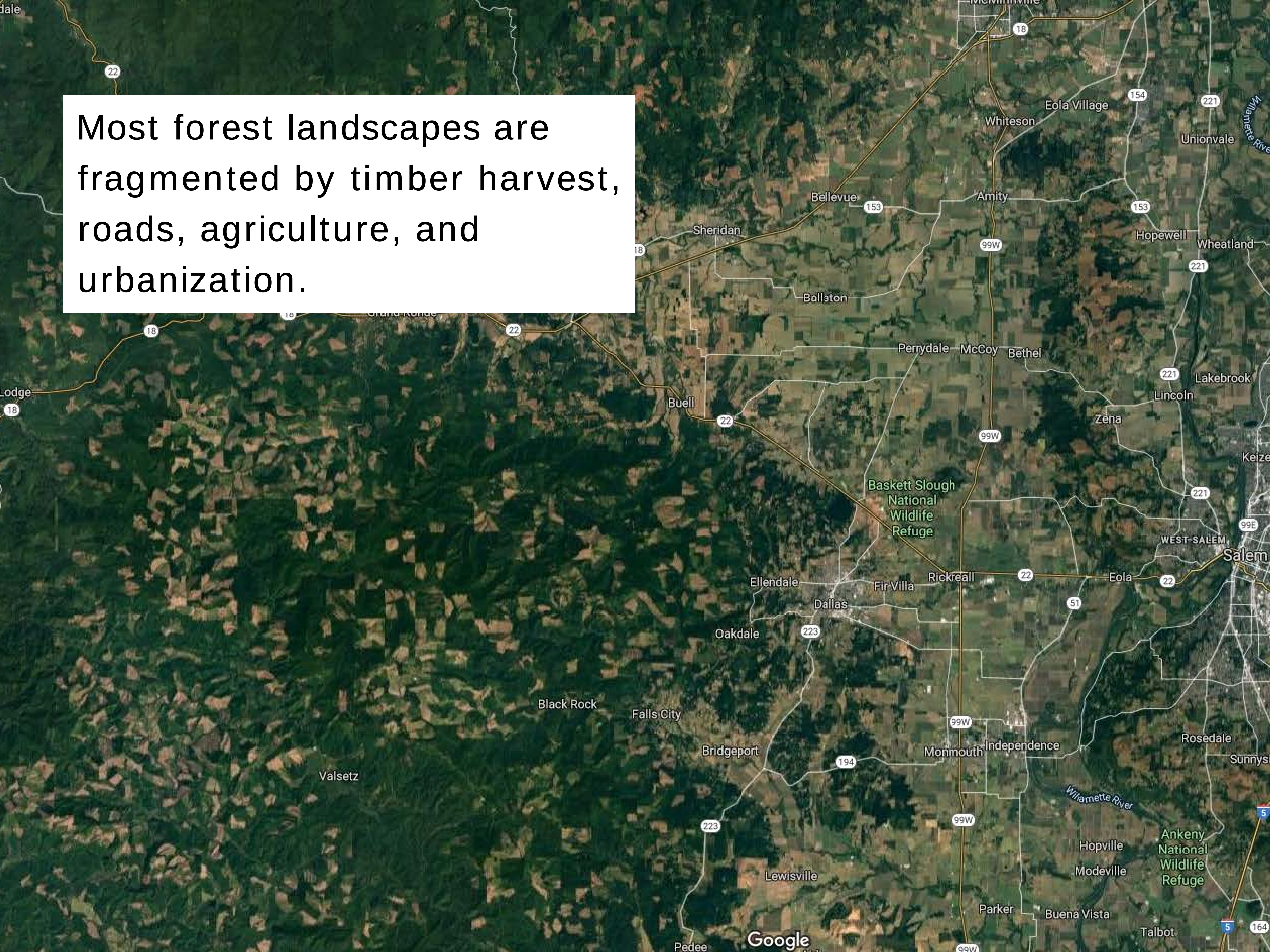
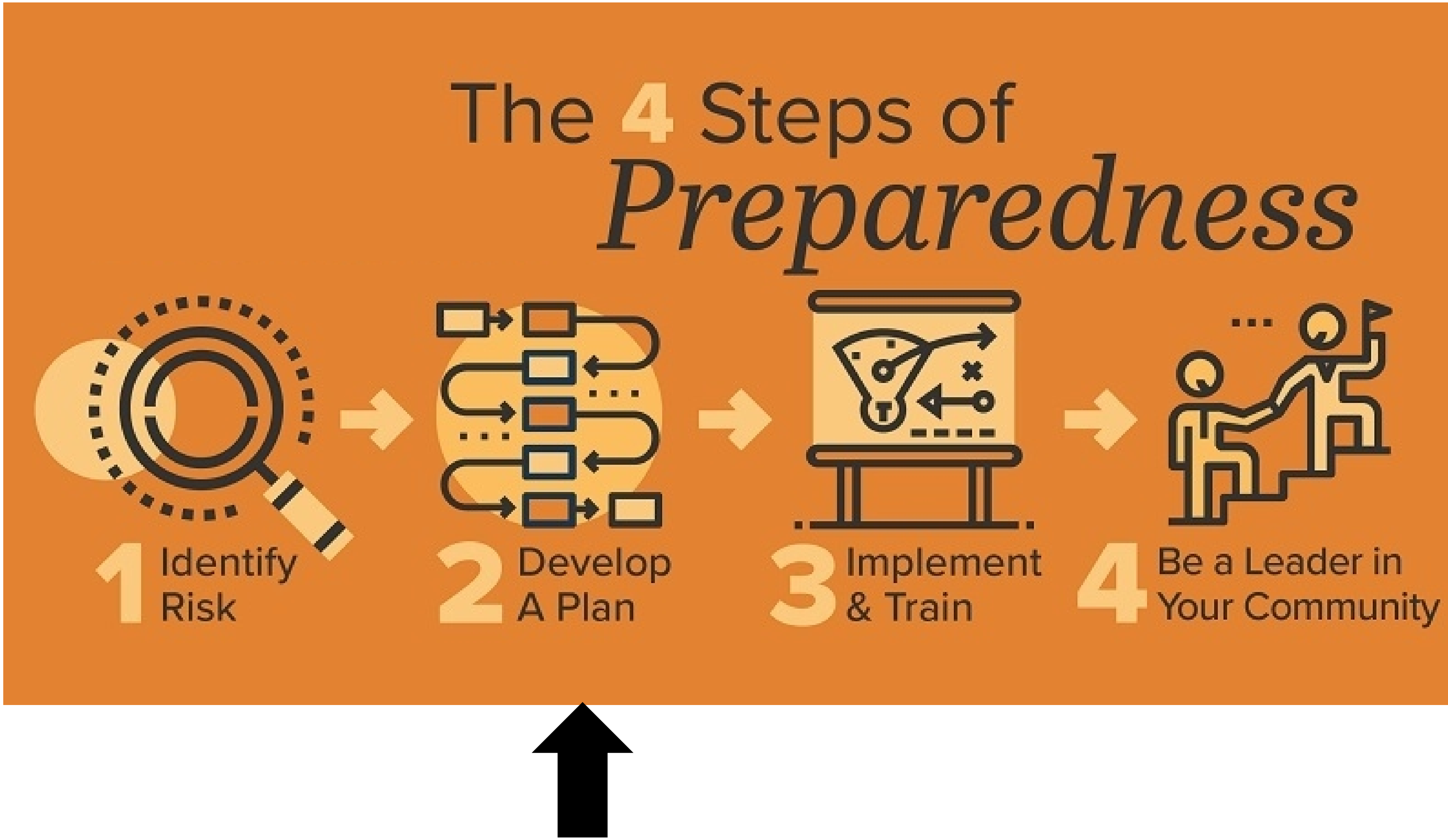
Context


Over 90% of all primary forests at lower
elevation have been harvested at least once.

Most forest landscapes are fragmented by timber harvest, roads, agriculture, and urbanization.



Some forests have a significant complement of non-native plant species, insects, and pathogens.



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Climate-tolerant species have…

High production of seeds and other propagules

High seed dispersal or vegetative propagation

Tolerant of low soil moisture

high air temperature

wildfire

High competitive ability

Broad environmental tolerance

High genetic diversity

What is climate change adaptation?

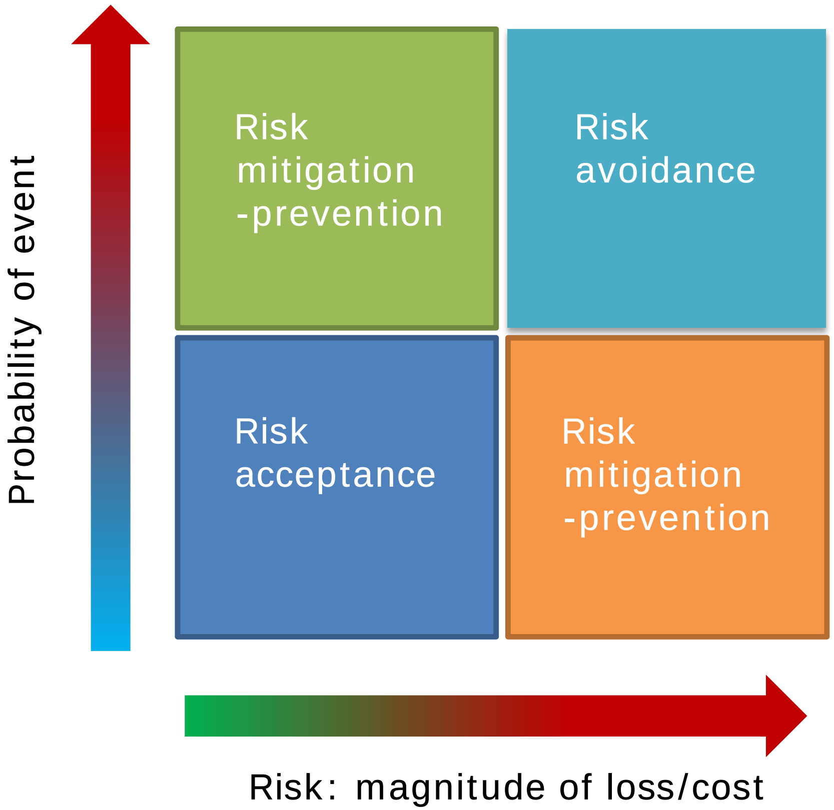
An effort to reduce the potentially negative consequences of climate change
AND
transition species and ecosystems to a warmer climate.

What is climate change adaptation?

Fine tuning and prioritizing current planning and management

Component of *sustainable resource management*

A form of *risk management*




How do we manage for resilient forests in a warmer climate?

Change the restoration paradigm

Older concepts

- Natural (historic) range of variation as a guide
- Species as targets for success
- Typically done at small spatial scales

Change to resilience building

Newer concepts

- Incorporate climate change information in planning and management
- Use <u>current</u> & <u>future</u> range of variation as a guide
- Implement across large spatial scales

Regeneration is a critical stage

Tree establishment in a warmer climate following disturbance will determine the forest

Seedlings must cope with variation in temperature and moisture at the soil surface

Pamper seedlings and saplings

Retain soil moisture for summer growth

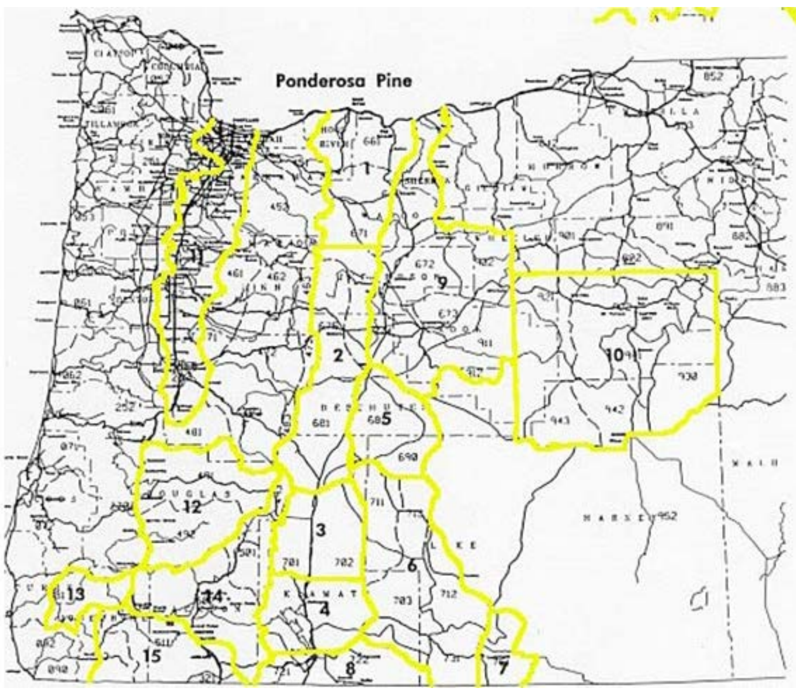
Protect trees from herbivory

Consider recent weather & climate to time plantings

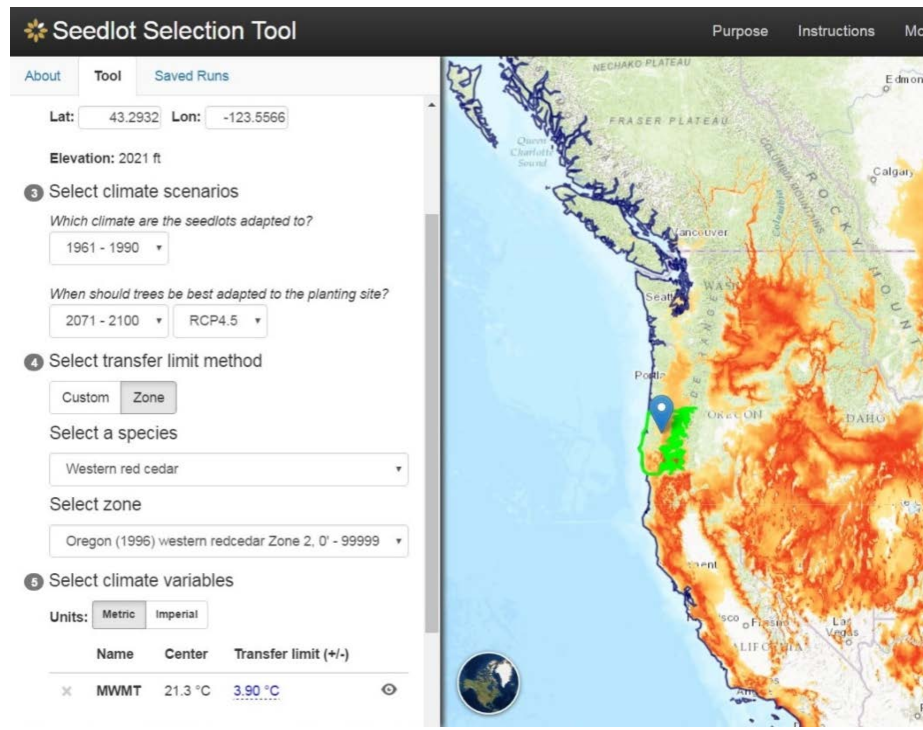
Jones' Farmer Blog

Be more flexible with seed zones

Ponderosa pine
seed zone map



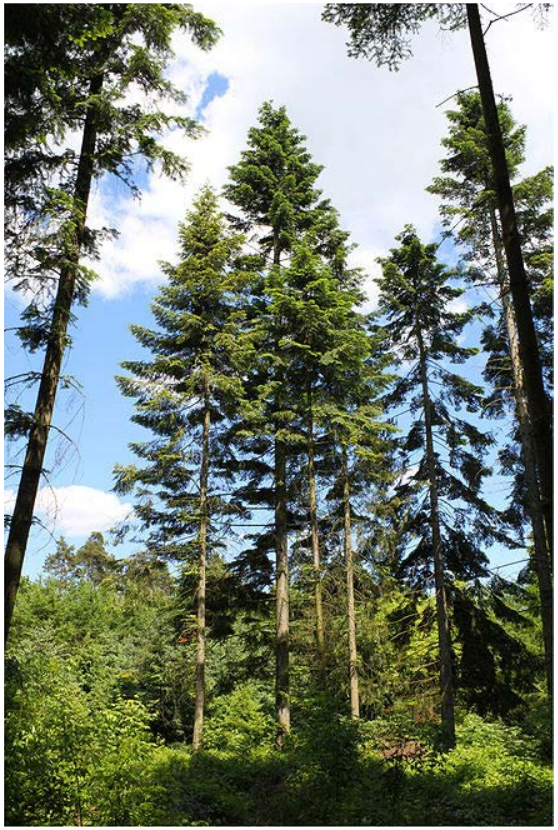
Seedlot Selection Tool



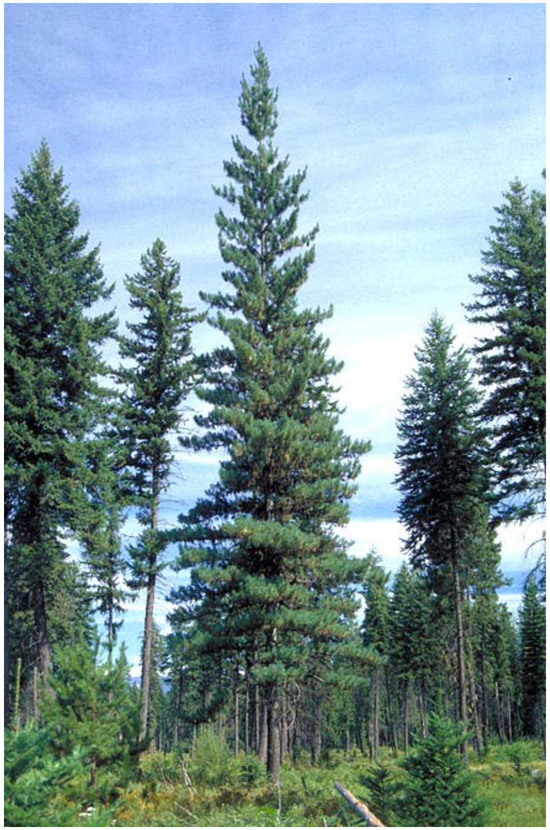
Assisted migration or managed relocation

Select drought tolerant species where possible

Douglas-fir



Grand fir



Western white pine

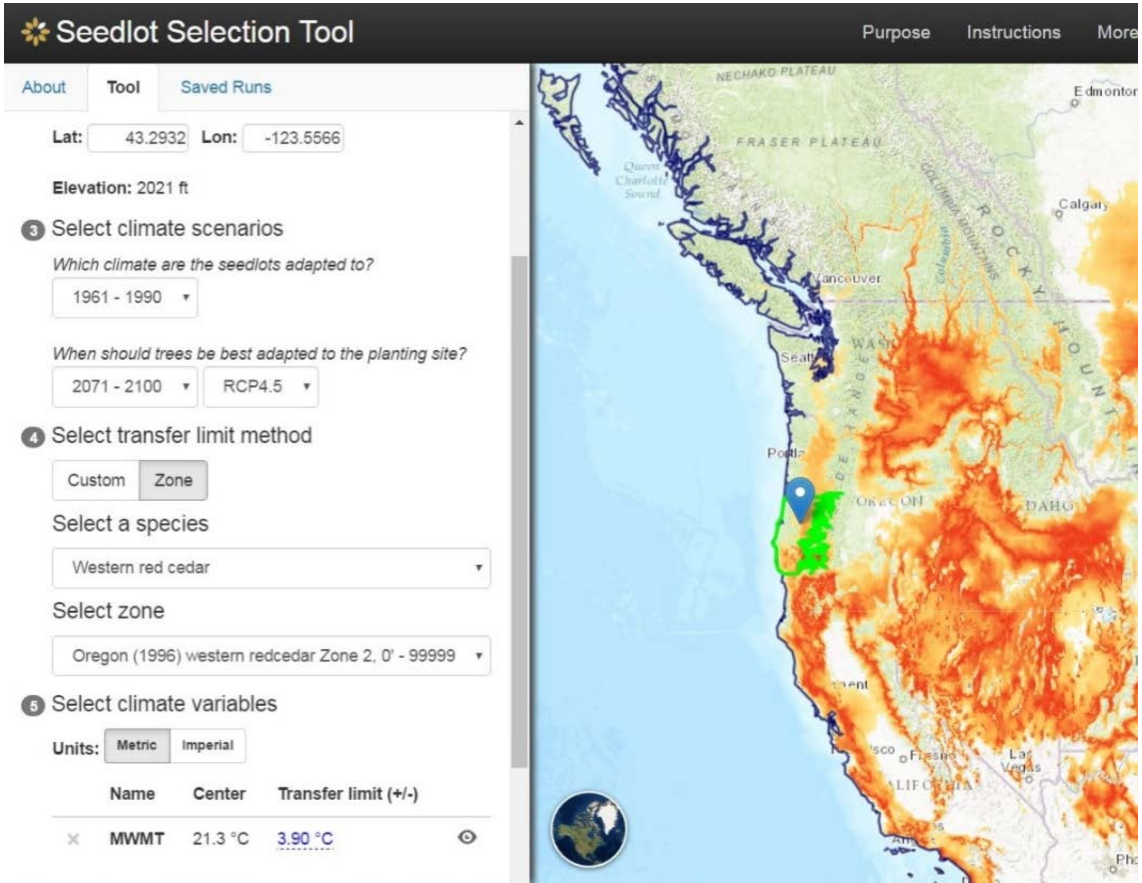
TREE SPECIES	DROUGHT TOLERANCE	HIGH RISK SCENARIOS
Western redcedar Western hemlock Pacific silver fir Subalpine fir Engelmann spruce Sitka spruce Red alder Black cottonwood	Low	Western redcedar in sun-exposed areas with soils having poor moisture retention
Grand and noble fir Quaking aspen	Low – Medium	Grand and noble fir at low elevations in the Willamette Valley and on overstocked Christmas tree farms
Douglas-fir Lodgepole pine Western white pine Western larch Bigleaf maple	Medium	Douglas-fir growing in oak/pine-dominated habitat or open-grown on poor sites
Ponderosa pine Incense cedar Western juniper Oregon white oak Pacific madrone	High	Even some of these species may be at risk during droughts if they are open-grown on poor sites such as rocky soils

Oregon Department of Forestry

Manage for future climate,
including drought stress

Plant native species from sources suited for your region & conditions at planting site.

Seedlot Selection Tool



Manage for future climate,
including drought stress

Maintenance: <u>space</u> between trees to handle future drought, reduce competition, & do not fertilize during a drought.

Manage for future climate,
including drought stress

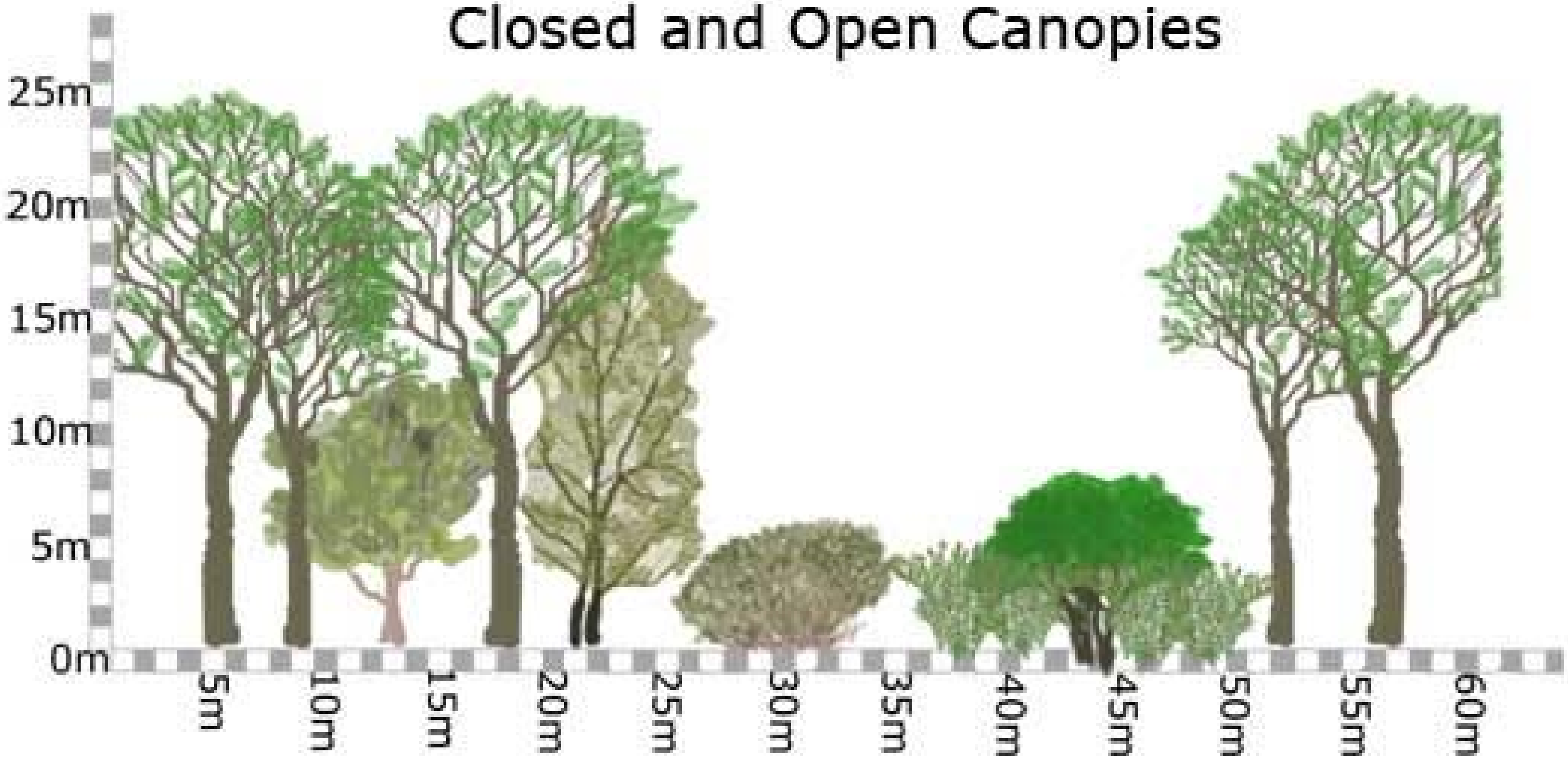
Prevent and control: be aware of insects and diseases. Remove weak, injured or extremely stressed trees that may risk spreading insects & disease to healthy trees.

Select drought tolerant understory and edge species

In praise of hardwoods

- Hardwoods add diversity, especially in riparian areas
- Wildlife habitat
- Red alder and bigleaf maple have high value for wood products
- Firewood
- *Resistance to conifer diseases*
- Red alder fixes nitrogen
- Can underplant western redcedar and grand fir

Increase species diversity and structure



Diversify landscape pattern: partition species by water needs

Keep forests healthy: Manage stand density (and fuels)

Thin dense stands to reduce competition

Manage forest density and fuels across landscapes

Collaborate with neighbors

Variable density thinning

Various spatial patterns of different tree densities

75
TPA

Target:

20% open stands

20% dense stands

60% standard thin

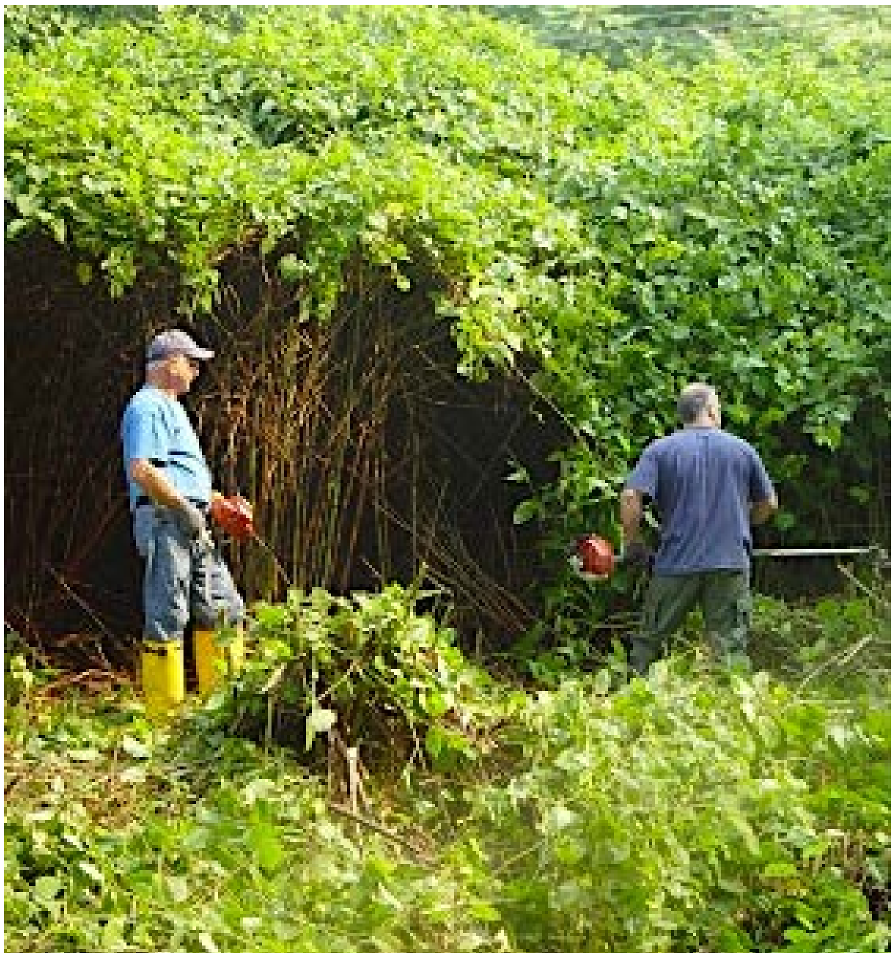
150
TPA

75
PA

Skip

This can vary – there are no rules.

Keep vegetation healthy, remove stressors quickly



In summary — What can be done

- Manage for warmer temperatures & more extremes.
- Diversify plant species, genotypes, and spatial patterns.
- Use disturbances as an opportunity for changing trajectories and experimenting.
- Implement risk assessment and risk management.
- Monitor, learn, and adjust as needed.


Oliver Tract
Lowndes County, GA
CONTACT

Tools

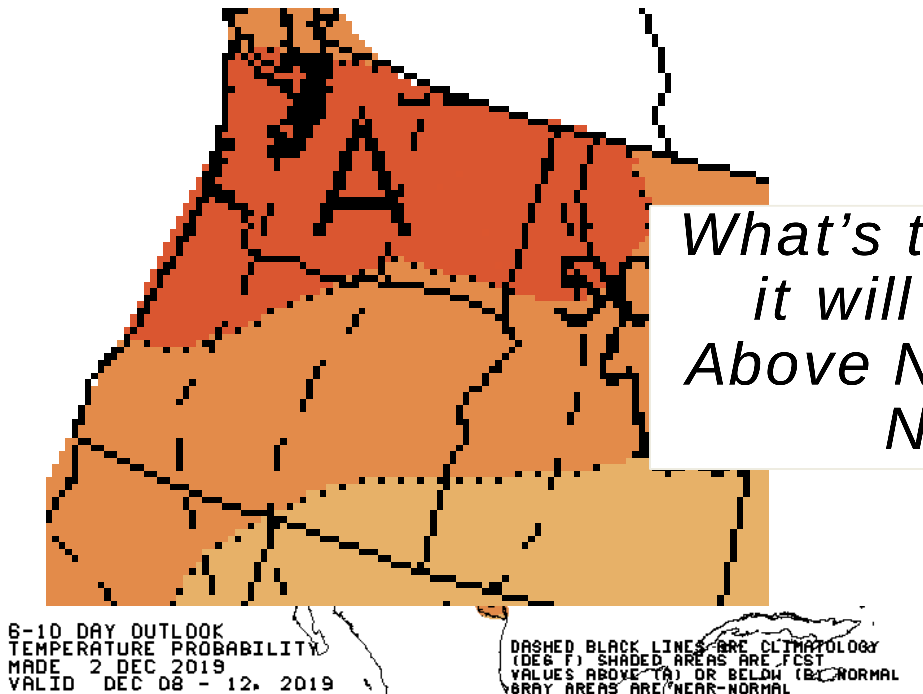

DOLMAR
6100
STIHL
Husqvarna

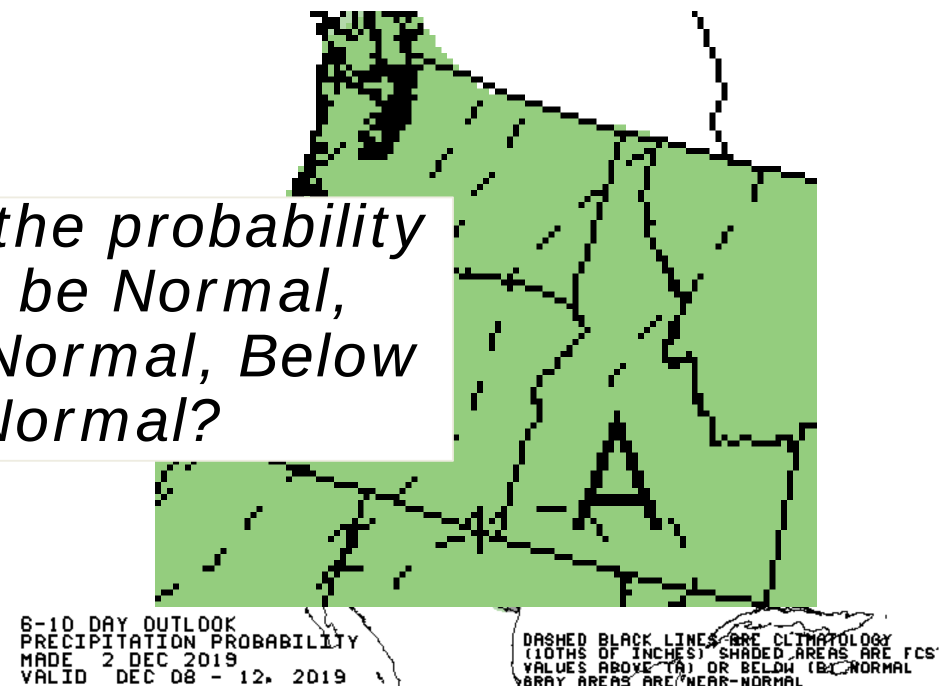

Panasonic
TOUGHPAD

Consider short-term projections prior to management actions

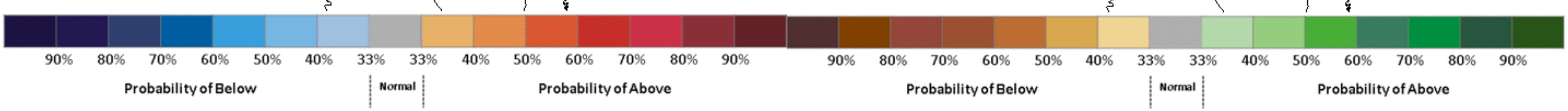
6-10 day temperature probability outlook

6-10 day precipitation probability outlook





What's the probability it will be Normal, Above Normal, Below Normal?



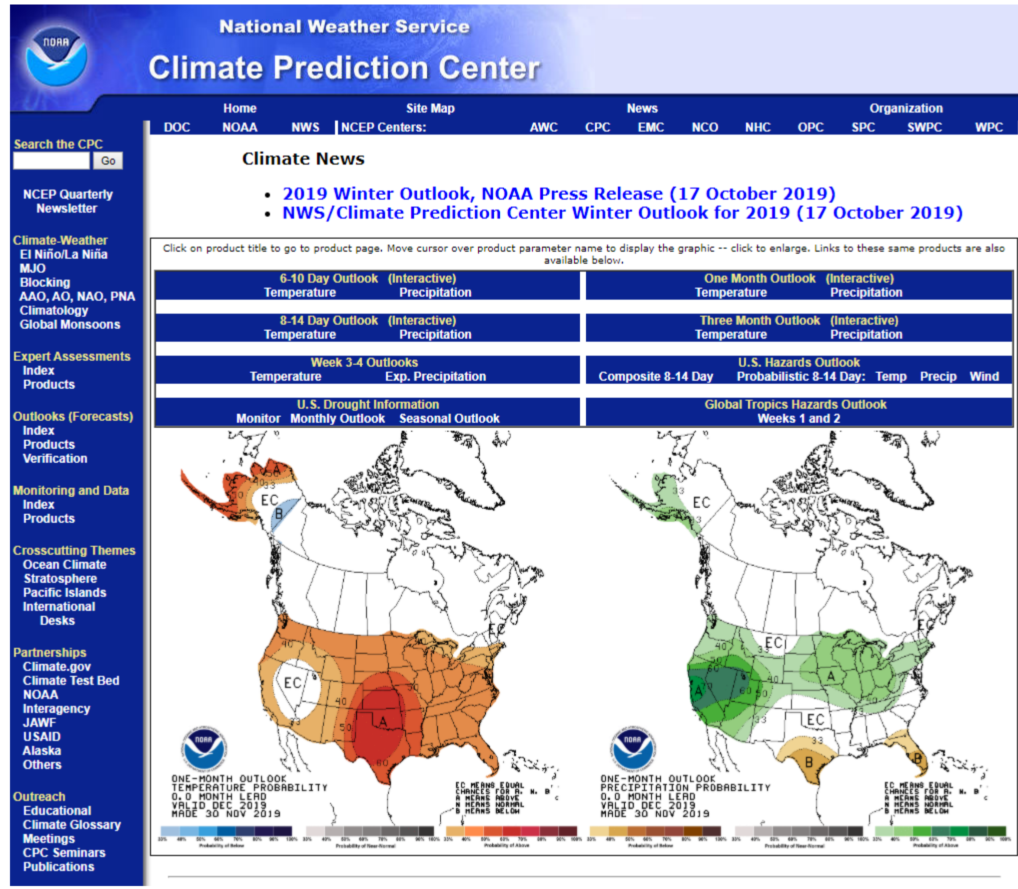
http://www.cpc.ncep.noaa.gov/

NOAA National Weather Service Outlooks

Temperature & Precipitation

6-10 Day Outlook
8-14 Day Outlook
Week 3-4 Outlook
One Month Outlook
Three Month Outlook

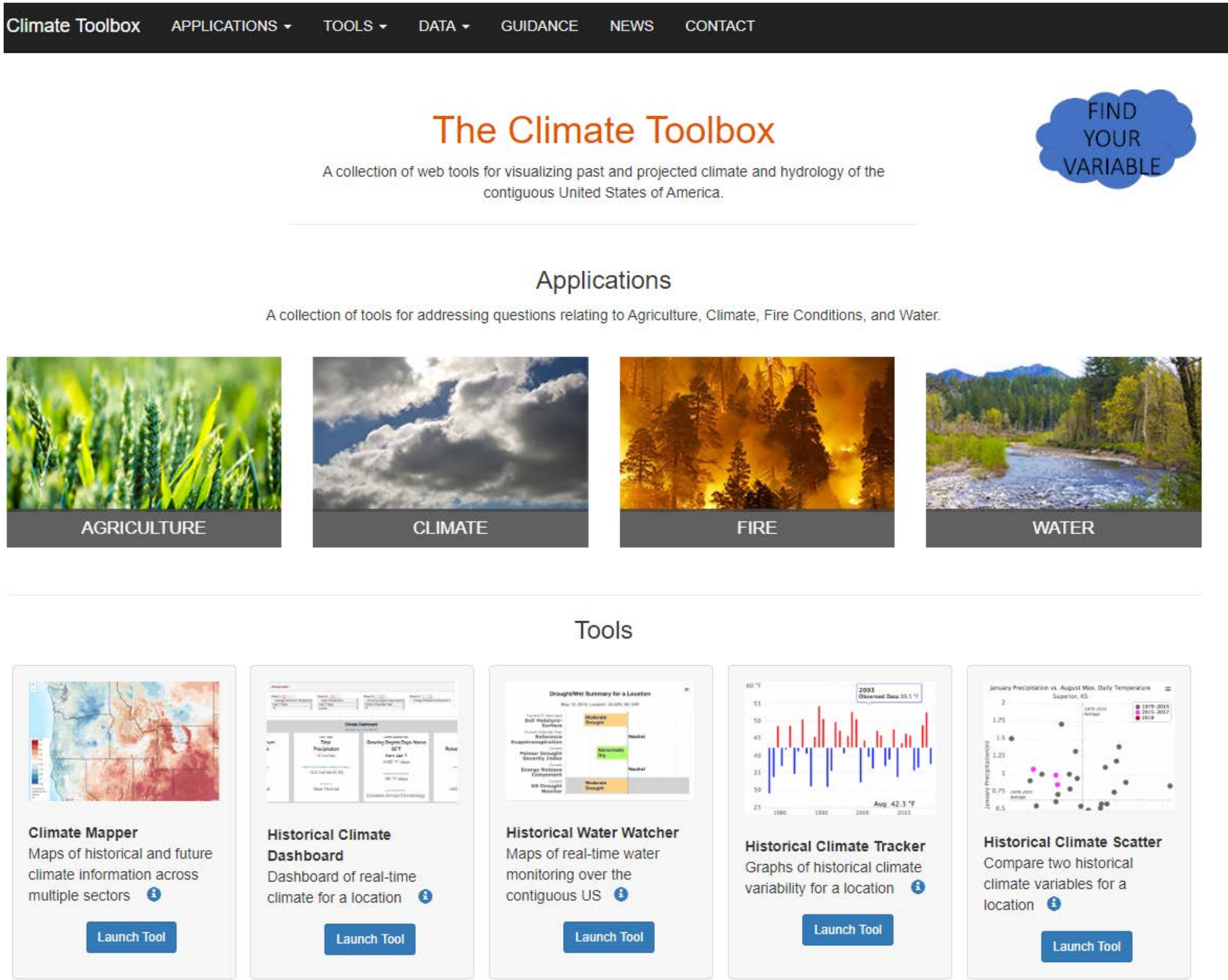
US Hazard Outlook
(8-14 days)



http://www.cpc.ncep.noaa.gov/

Climate Toolbox

-collection of tools



climatetoolbox.org/tool/Climate-Mapper

Climate Toolbox

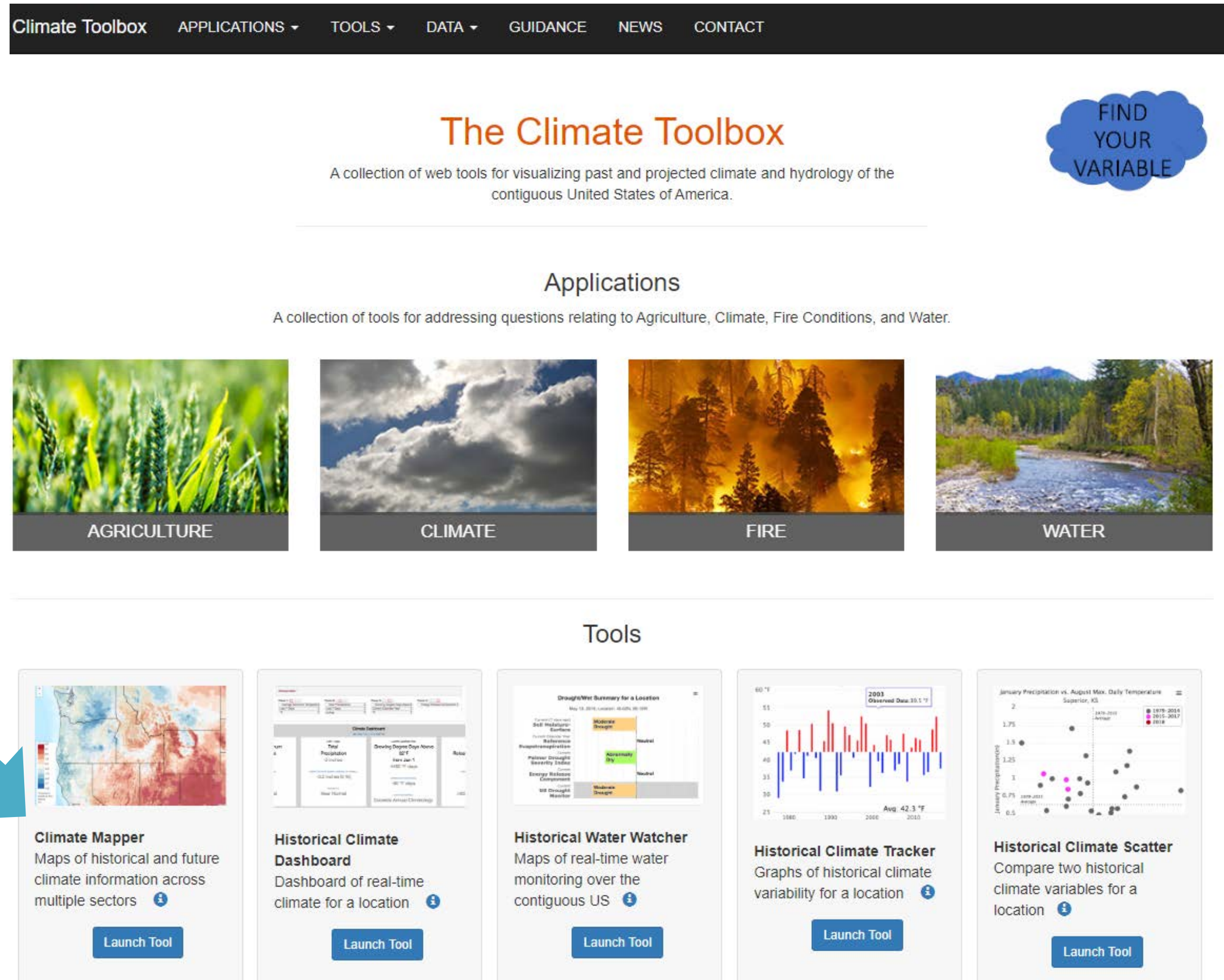
Climate mapper

Past/Real-time observations

Forecasts
-30 days*
- 7 months*

*experimental

Future: climate projections 2100



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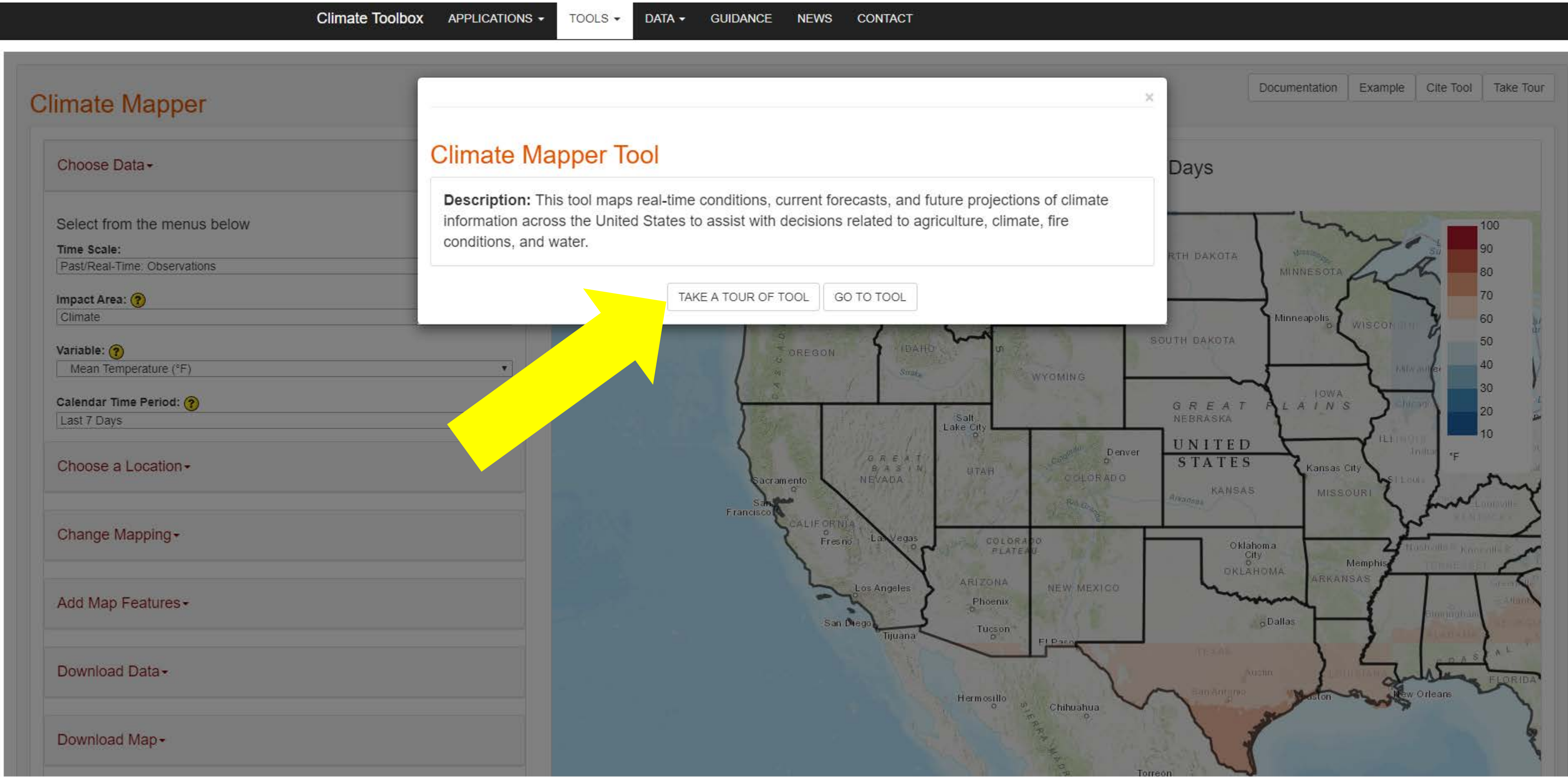
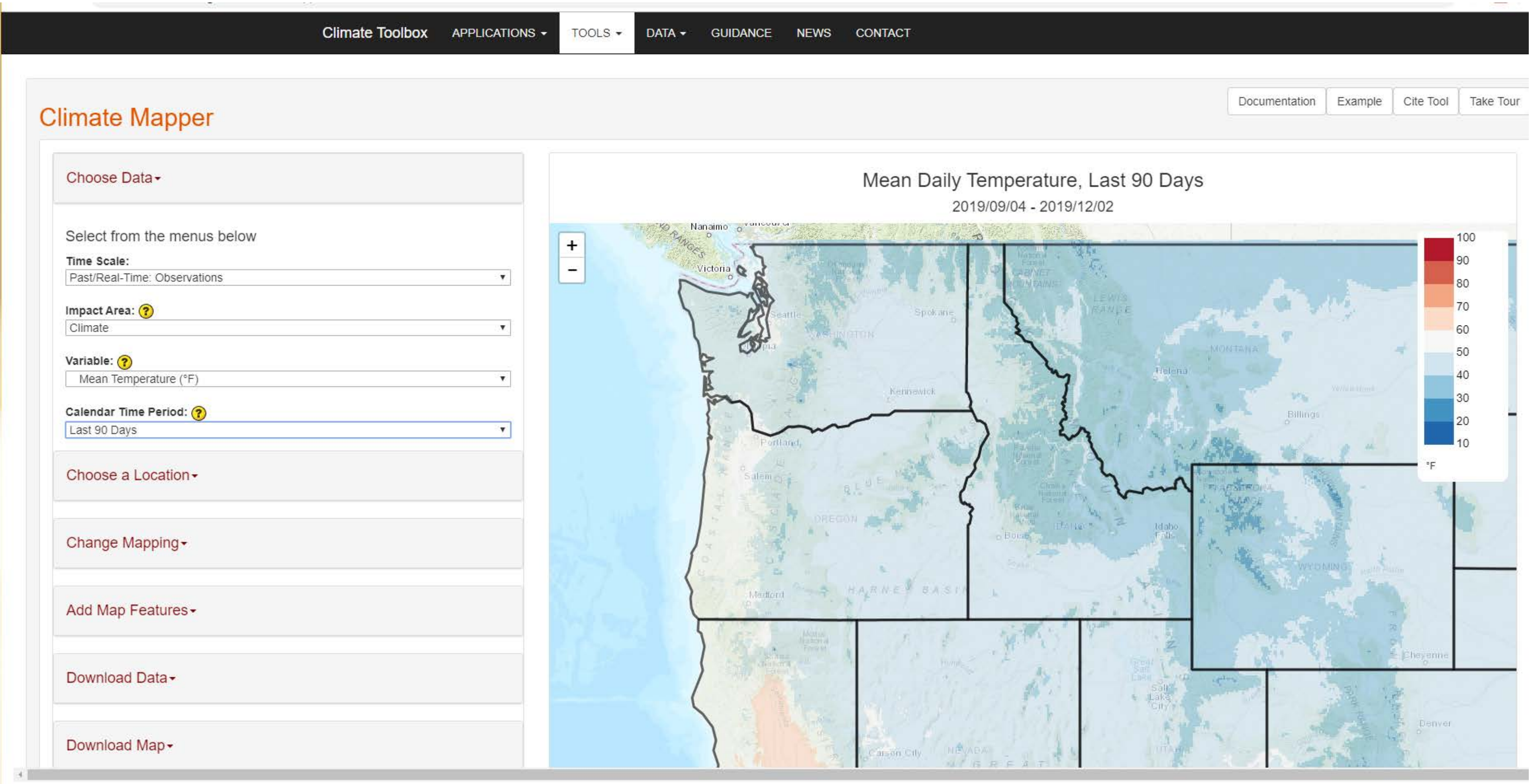


climatetoolbox.org/tool/Climate-Mapper

Mean Daily Temperature, Last 90 Days



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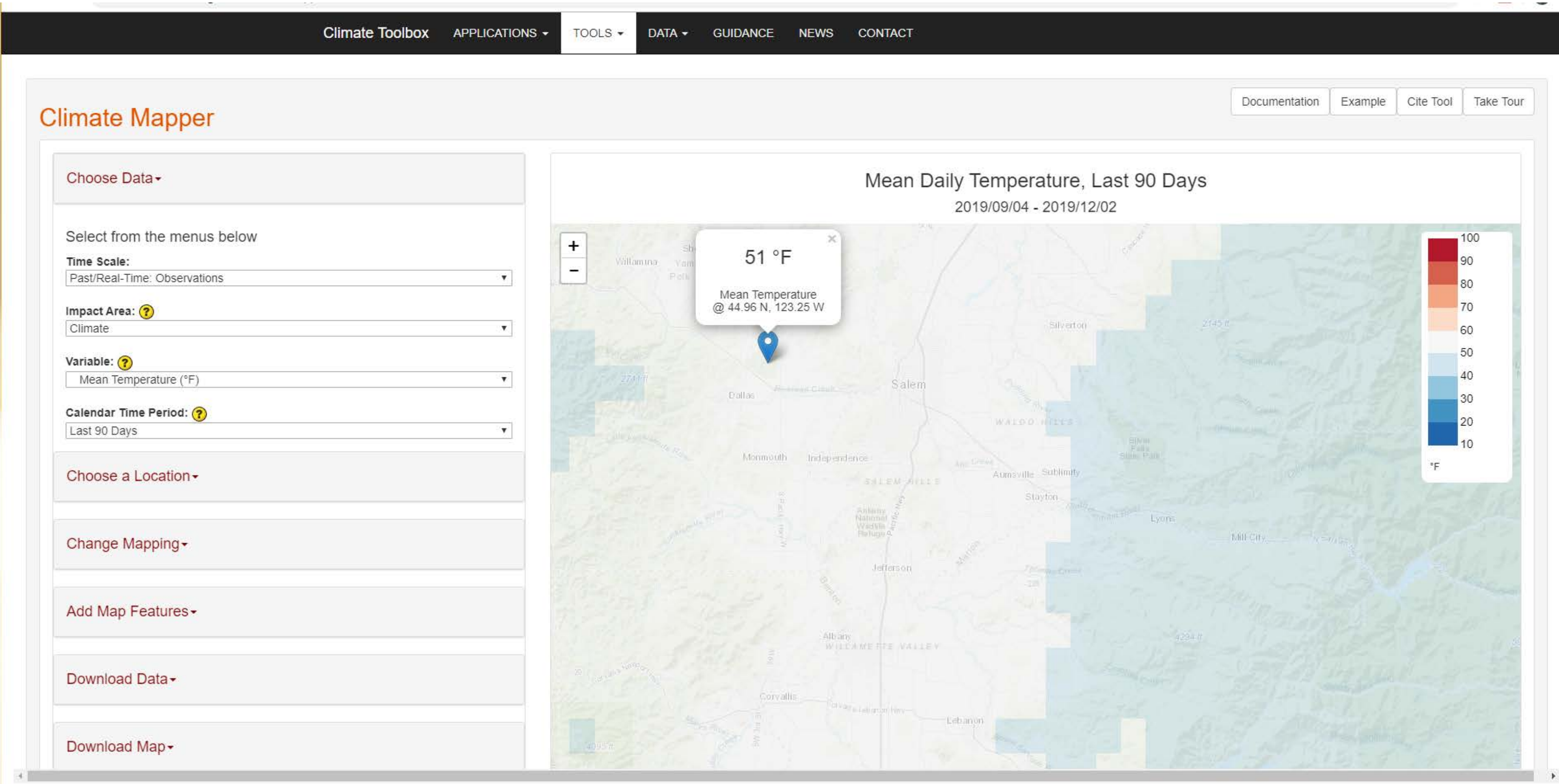


climatetoolbox.org/tool/Climate-Mapper

Historical simulation, 1971 – 2000 (mean) Mean Temperature, Winter

Climate Toolbox APPLICATIONS ▾ TOOLS ▾ DATA ▾ GUIDANCE NEWS CONTACT

Choose Data

Select from the menus below

Time Scale: Future: Projections (through 2100)

Impact Area: Climate

Variable: Mean Temperature

Calendar Time Period: Winter (Dec-Jan-Feb)

Future Scenario: Historical simulation, 1971-2000 mean

Model: Multi-model mean derived from 20 downscaled CMIP5 models

Choose a Location ▾

The data is available as a mean value over a grid cell. Select a point location to view the value of the containing grid cell.

- **GeoLocate:** Type a location description: Enter Place or Location
- **Drag:** Click on the map to get a marker and drag the marker to your desired location.
- **Enter:** Enter coordinates of a location:

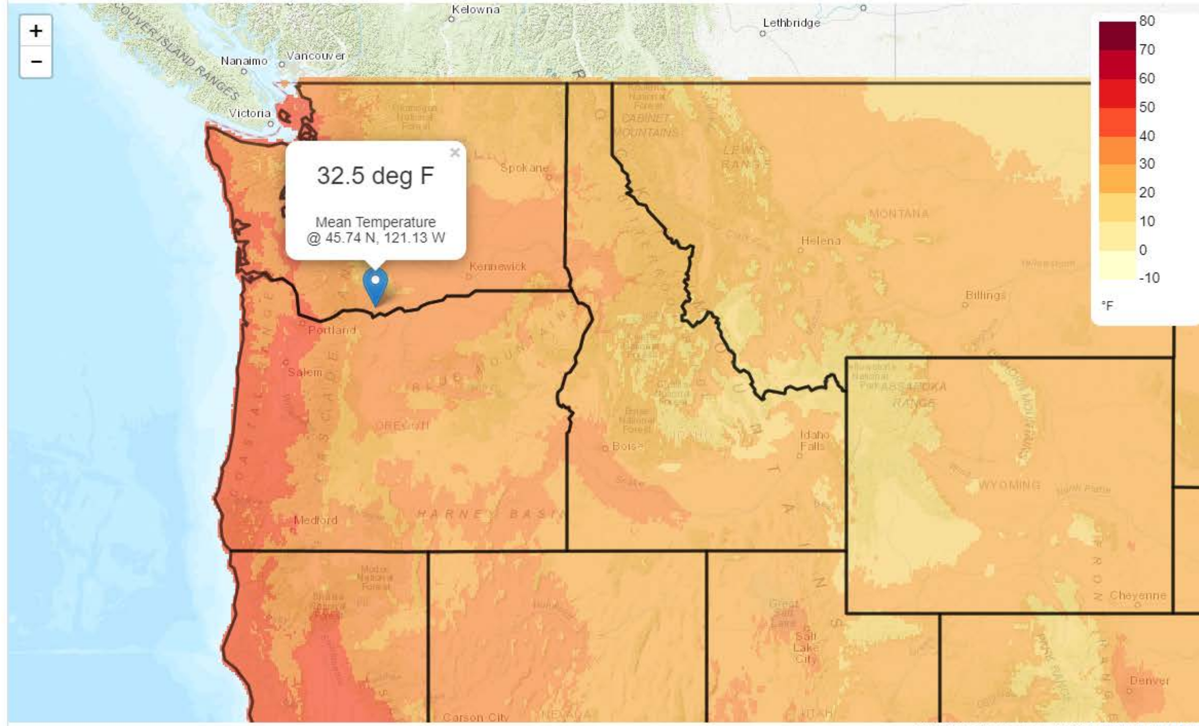
Latitude: 45.74 N
Longitude: 121.13 W

Change Mapping ▾

Mean Temperature, Winter (Dec-Jan-Feb)

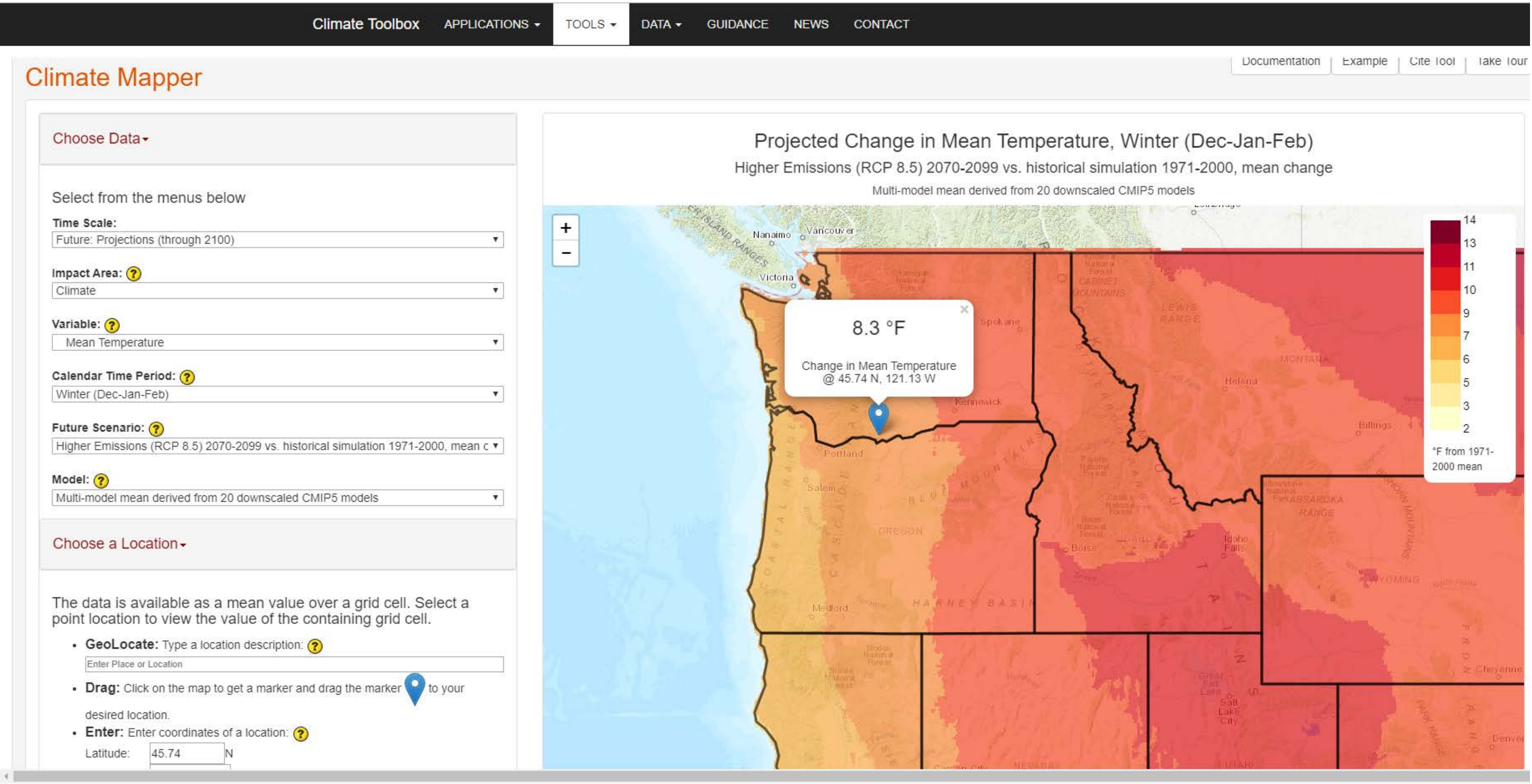
Historical simulation, 1971-2000 mean

Multi-model mean derived from 20 downscaled CMIP5 models



NW Climate Toolbox, Data: MACAv2-METDATA

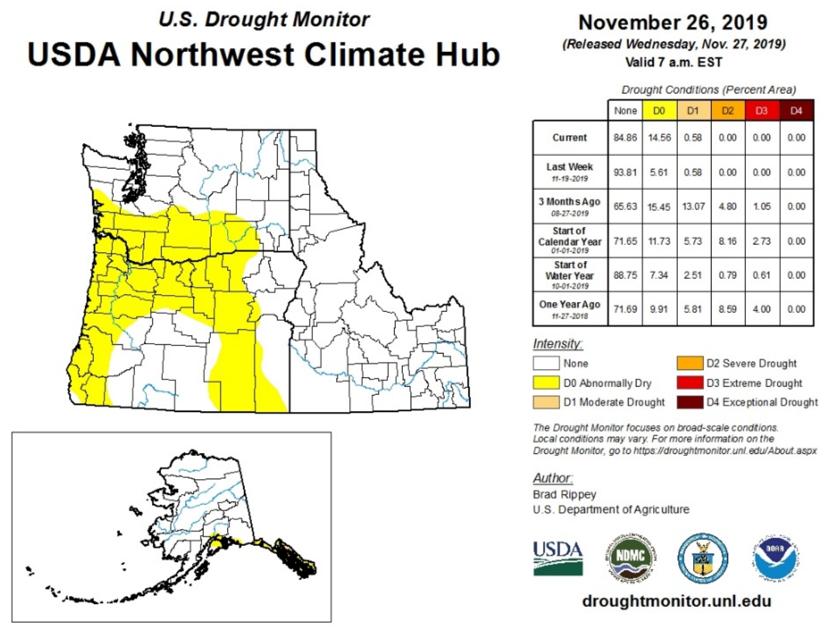
Higher emissions RCP 8.5 2070-2099 vs historical simulation 1971 – 2000 (mean **change**) Mean Temperature, Winter



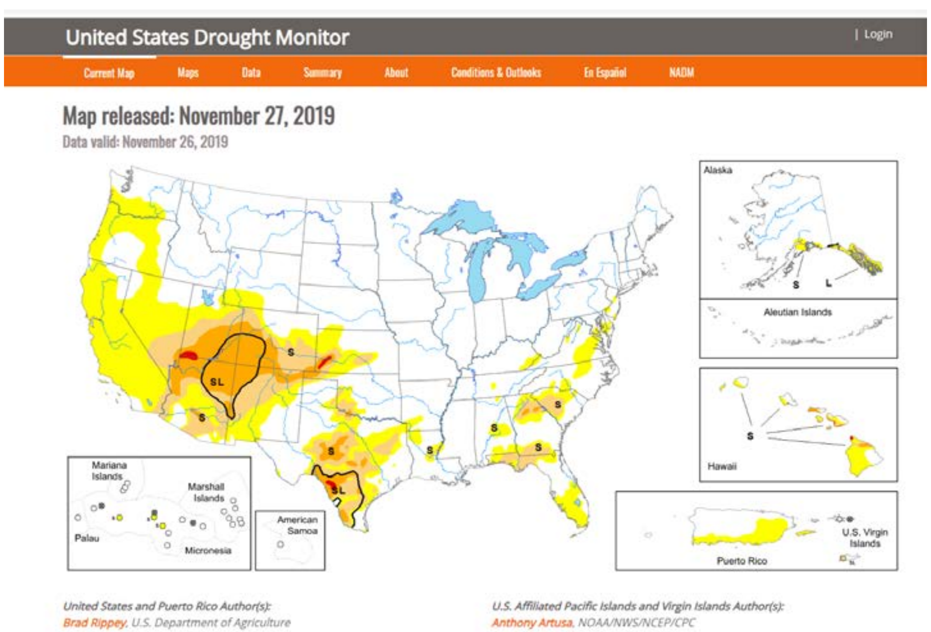
US Drought Monitor

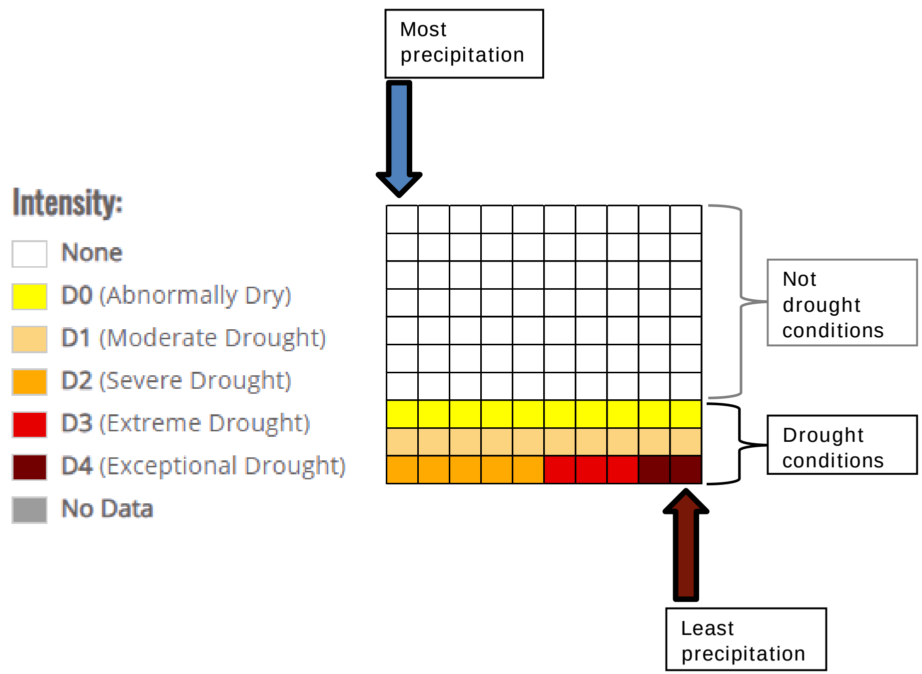
Weekly map indicating dry conditions to aid in planning

droughtmonitor.unl.edu/



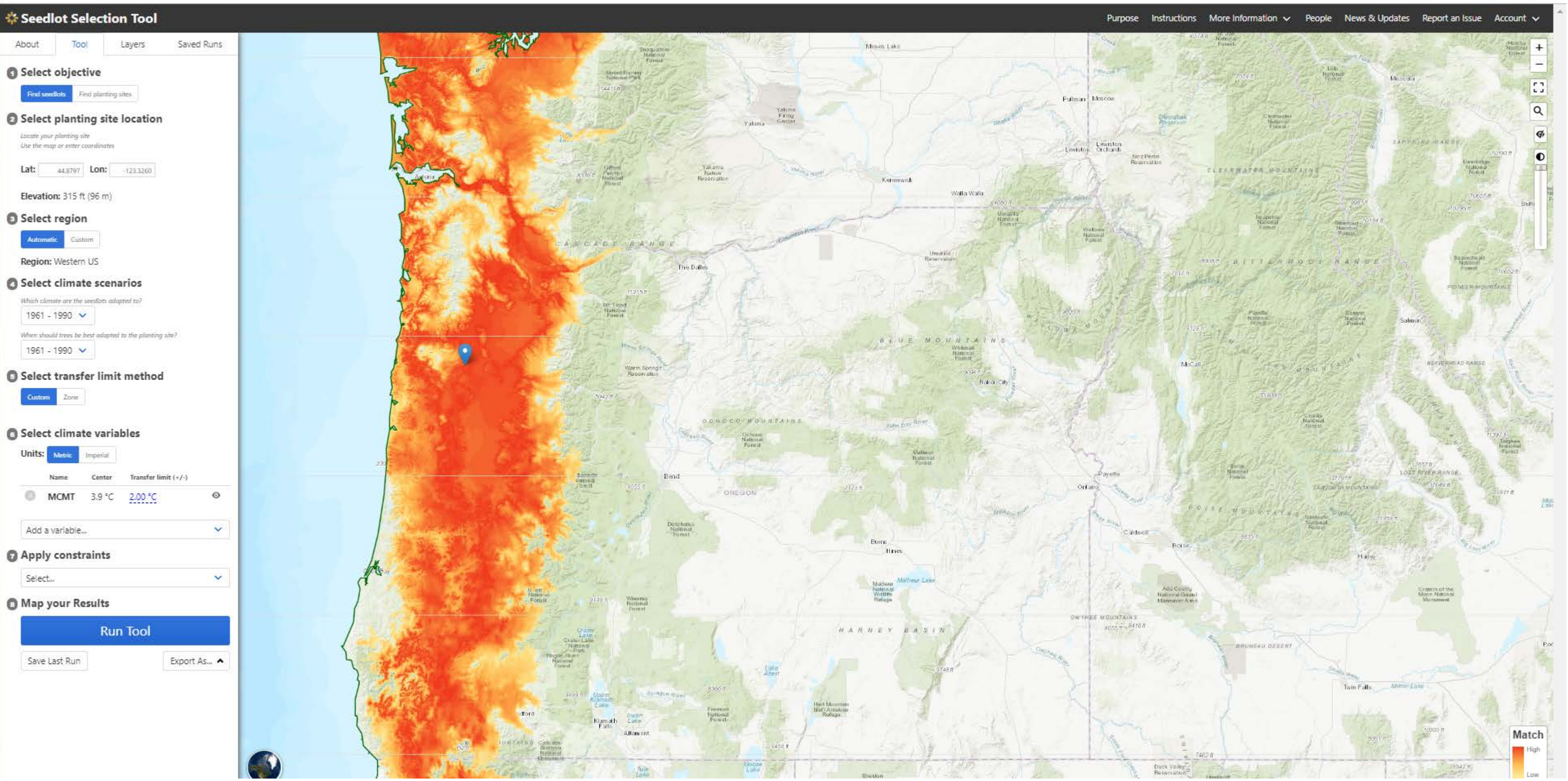
	None	D0	D1	D2	D3	D4
Current	84.86	14.56	0.58	0.00	0.00	0.00
Last Week 11-19-2019	93.81	5.61	0.58	0.00	0.00	0.00
3 Months Ago 08-27-2019	65.63	15.45	13.07	4.80	1.05	0.00
Start of Calendar Year 01-01-2019	71.65	11.73	5.73	8.16	2.73	0.00
Start of Water Year 10-01-2019	88.75	7.34	2.51	0.79	0.61	0.00
One Year Ago 11-27-2018	71.69	9.91	5.81	8.59	4.00	0.00





Future climate information to aid with reforestation

Seedlot Selection Tool



seedlotselectiontool.org/sst/

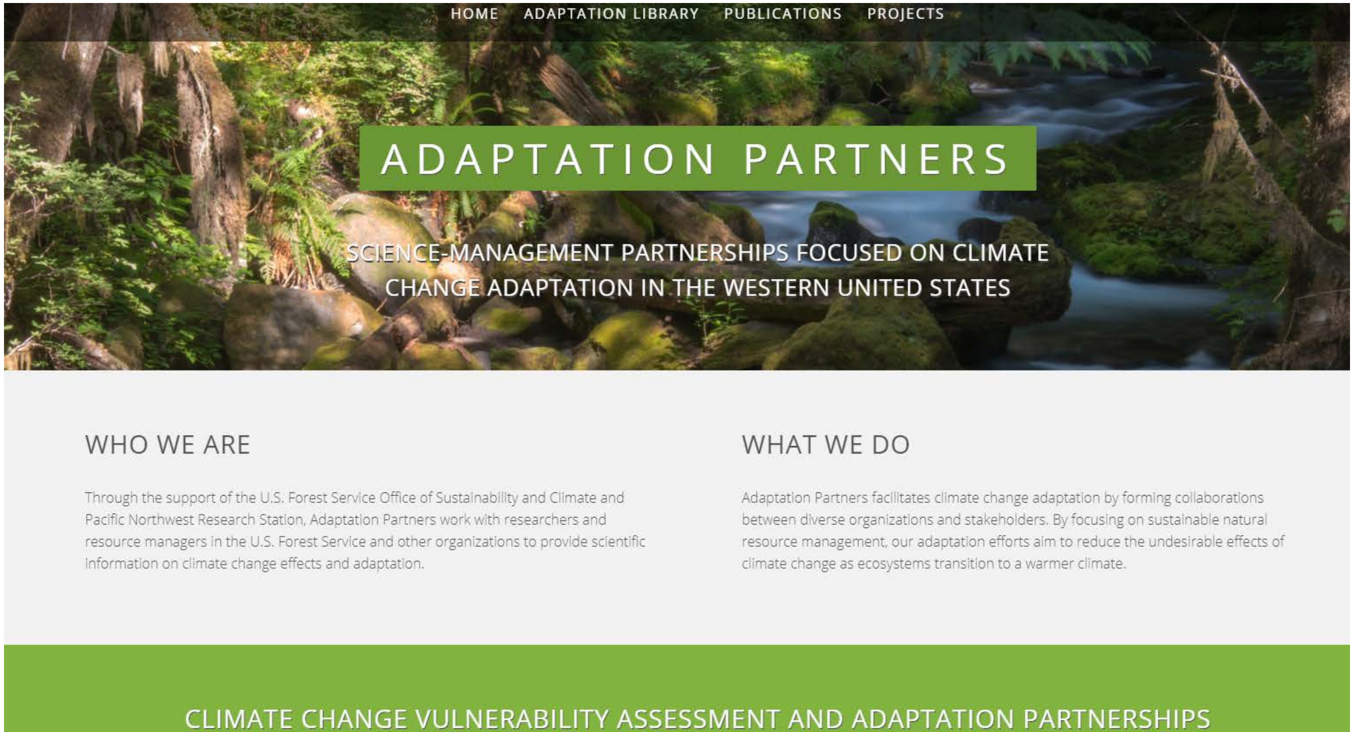
Adaptation planning

Adaptation partners- Adaptation library

-Information from multi-resource assessments

-Based on coordinated science-management expertise

adaptationpartners.org/

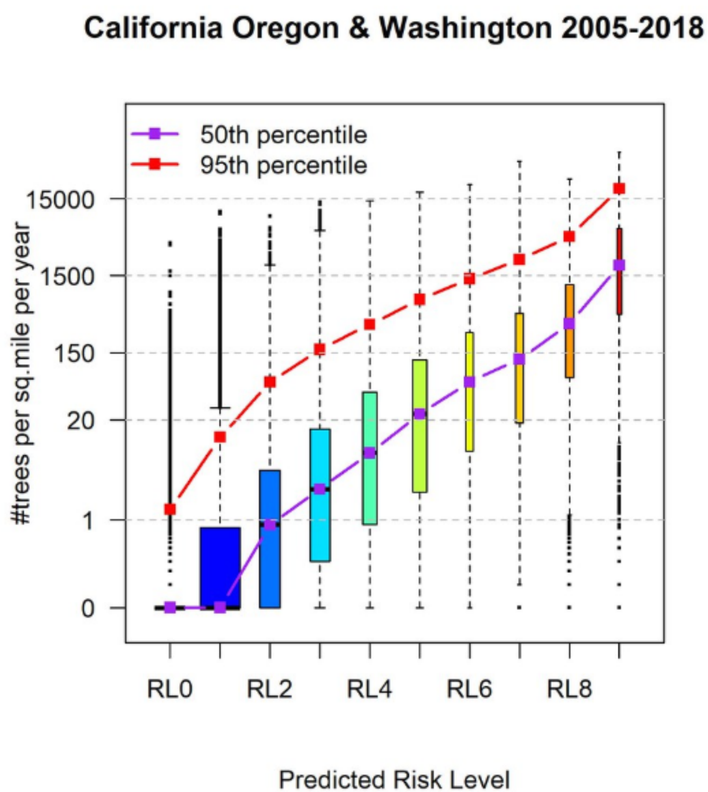


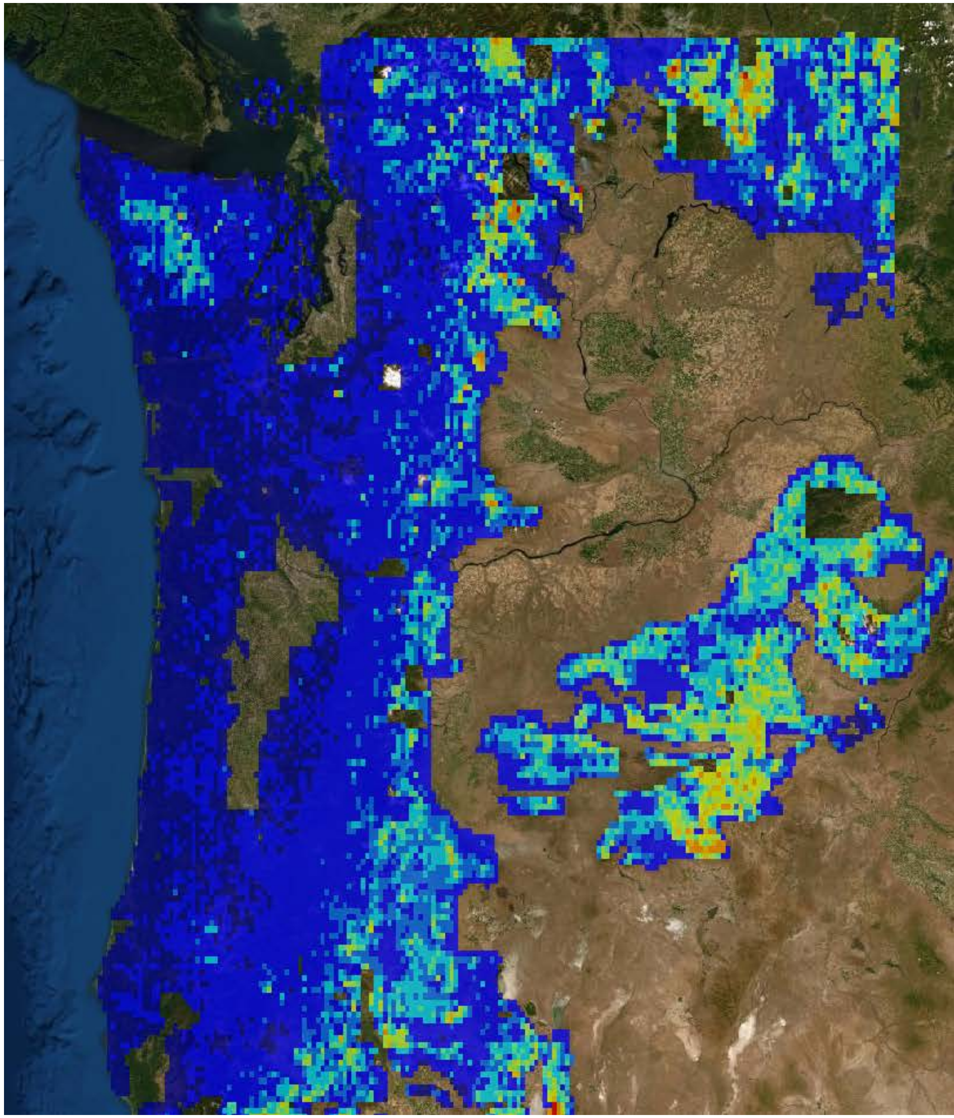
Bark Beetle Forecasts

USFS, Pacific Northwest Region

2019 Bark Beetle Forecast for California, Oregon and Washington

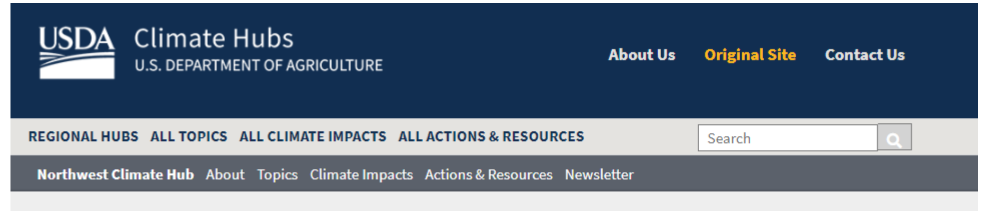
The forecast is based on history of drought (amount of precipitation) and bark beetle attacks in each 2.5′ (6.5 square mile) grid cell from 1993 to 2018 for California and 1966 to 2018 for Oregon and Washington. Cells with similar histories of bark beetle activity and precipitation were then grouped together into ten risk (color) groups. These risk groups (R) forecast a range of the likely number of trees expected to die from bark beetles by the end of summer 2019.





https://www.arcgis.com/apps/MapJournal/index.html?appid=7b78c5c7a67748808ce298efefceaa46

USDA Northwest Climate Hub



- Monthly newsletter
- Tools
  - Seedlot Selection Tool
  - Climate mapper

- Pacific Northwest Drought Early Warning System Webinars
  - Bi-monthly (December, February, April, June, August, October)

- USDA Resources and Program for Tribes to Adapt to Climate Change

USDA Northwest Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

Thank you

For more information:
holly.prendeville@usda.gov

https://www.climatehubs.oce.usda.gov/hubs/northwest