Hazard (Susceptibility) and Risk (Loss) Assessment

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- Hazard rating systems measure the susceptibility of forested areas to a particular insect by evaluating the amount of susceptible host.
- Risk involves estimating the extent of mortality likely to be sustained as a result of a disturbance
- Our ratings use a combination approach

What are predictors of mortality at individual tree, stand, and landscape level?

Can we define where DF is highly vulnerable vs. viable in short, medium and long term?

Where can restoration maintain PSME, and where should other species be prioritized?

What is the probability that a given DF tree will die in the next 2 years?

Three factors are used to assess the likelihood of individual tree mortality:

- beetle pressure,
- severity of crown decline, and
- abundance of pitch jewels within bark crevices.

Individual Tree Level Rating

Points	Risk Factor	Score
Beetle pressure		
4	DF mortality from FFB is found within 1-acre plot (120’ radius)	
0	DF mortality from FFB not found within 1-acre plot	
	Beetle pressure points =	———
Crown decline		
3	Severe crown decline	
2	Moderate crown decline	
1	Light crown decline	
0	No recent crown decline	
	Crown decline points =	———
Abundance of pitch jewels		
3	Abundant pitch jewels	
1	Light pitch jewels	
0	Pitch jewels absent	
	Pitch jewels =	_____

Total Points	Relative Risk Category
≥6	2-year mortality probability high
3-5	2-year mortality probability moderate
0-2	2-year mortality probability low

Beetle Pressure

Detection of flatheaded fir borer infestation in green trees. Woodpecker "shaving"/ bark flaking is a symptom of infestation by FFB and indicates the tree will almost certainly die within the next few months.

Photos: Max Bennett, OSU Extension Service, Bill Schaupp (Ret.) and Laura Lowrey, US Forest Service

Crown Decline

Abundance of Pitch

What is the 5-year probability and expected severity of Douglas-fir mortality in a given location?

- The likelihood of observing Douglas-fir mortality in a one-acre plot at a given point on the landscape
- The probability that mortality will increase and intensify at this location
- The expected severity of mortality, measured as the percentage of the Douglas-fir basal area within a 1-acre area surrounding the sample point that is dead/dying.

Stand Level Ratings

Points	Risk Factor	Score
Beetle pressure		
6	DF mortality from FFB is abundant within 1-acre plot	
3	DF mortality from FFB is found within 1/2 mile of plot	
0	DF mortality from FFB not found within 1/2 mile of plot	
	Beetle pressure points =	_____
Topographic factor (heat load)		
2	SW aspect & one or more of following: >35% slopes, ridge/upper slope position, convex terrain	
1	All others	
0	NE aspect, & one or more of following: lower 1/3 slope position, concave terrain	
	Heat/moisture stress points =	_____
Proximity to stand edge		
1	Stand edge is within 100’	
0	Stand interior	
	Edge points =	_____
Soil factor		
1	One or more of the following: poorly drained soils, high clay %, very shallow soils, Oregon white oak present/within 50’	
0	All others	
	Soil factor points =	_____

Total Points	Relative Risk Category
≥5	Probability of mortality/intensification is very high. Very high severity: >50% of DF basal area in 1-acre plot is dead/dying
4	Probability of mortality/intensification is high. Moderate to high severity: 25-50% of DF basal area in 1-acre plot is dead/dying
2-3	Probability of mortality/intensification is moderate. Low severity: 10-25% of DF basal area in 1-acre plot is dead/dying
0-1	Probability of mortality/intensification is low. Severity: Dead/dying DF few or absent, <10% of DF basal area in plot is dead/dying

What is the risk of DF decline and mortality at a watershed or landscape scale?

The likelihood of encountering DF decline and mortality in a ~>1-square mile (640 acre) area, the abundance and severity of mortality, and the probability that mortality will increase in that area.

Landscape-level Rating

Mean annual climatic water deficit (mm)	Average annual precipitation (inches)	Relative risk level	Interpretation
>400mm	<25”		Too hot and dry for DF; DF seldom encountered
350-400mm	25”-35”	Very high	DF decline abundant; some favorable sites (e.g., northeasterly aspects with deep soils) may serve as refugia
300-350mm	35”-45”	High	DF decline common; particularly on harsh sites
250-300mm	45”-60”	Moderate	DF decline observed occasionally, especially on marginal sites, e.g., borders of oak woodlands
<250mm	>60”	Very low	DF decline is seldom encountered

https://osugisci.maps.arcgis.com/

Webmap

1995-2019 Douglas-fir mortality & climate, SW Oregon

Overview

This webmap depicts general locations (polygons) of Douglas-fir mortality in SW Oregon attributed to the flatheaded fir borer, as mapped during the annual cooperative ODF/USFS aerial detection surveys. Mortality polygons include a mosaic of live and dead trees and are classified by damage level, from light (4-10%) to very severe (greater than 50%). While directly attributed to the flatheaded fir borer in the surveys, these mortality detections can be considered to represent Douglas-fir mortality related to the effects of drought and opportunistic insects, principally the flatheaded fir borer. Also shown is cumulative Douglas-fir mortality from the flatheaded fir borer for the period 1975-2019, based on estimated trees killed per acre in mapped polygons, and averaged for 1 km gridcells. This layer is useful for identifying mortality "hotspots". Other layers include mean annual precipitation (1990-2020), mean annual climatic water deficit (1980-2010), projected 2055 climatic water deficit, and historic vegetation (1936). The precipitation and climatic water deficit layers can be used to assess near-term Douglas-fir mortality risk and the projected climatic water deficit can be used to assess future mortality risk.

Web Map by bennemax@oregonstate.edu_OSUGISci

Item created: Nov 7, 2022 Item updated: Apr 25, 2023 View count: 129

Open in Map Viewer

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Description

An in-depth description of the item is not available.

Layers

- Average annual precipitation (1990-2020)
  Feature Layer
- Climatic water deficit (1980-2010)
  Feature Layer
- Climatic water deficit (2055 projected)
  Feature Layer

Details

Size: 38.155 KB
ID: 8ca96deae6e449648a5ce580dc443d3f

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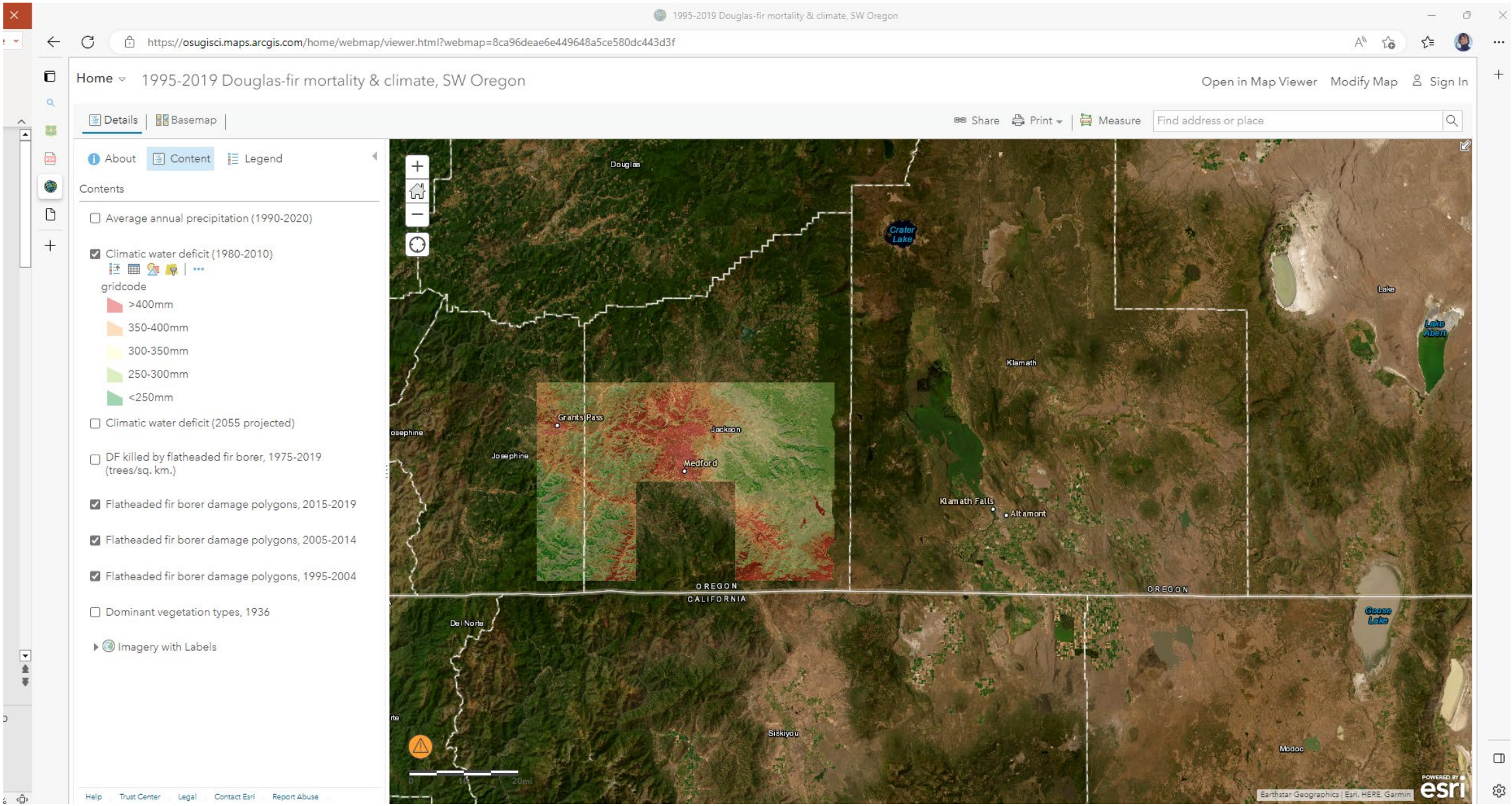
1995-2019 Douglas-fir mortality & climate, SW Oregon
https://osugisci.maps.arcgis.com/home/webmap/viewer.html?webmap=8ca96deae6e449648a5ce580dc443d3f
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Contents
Average annual precipitation (1990-2020)
Climatic water deficit (1980-2010)
gridcode
>400mm
350-400mm
300-350mm
250-300mm
<250mm
Climatic water deficit (2055 projected)
DF killed by flatheaded fir borer, 1975-2019 (trees/sq. km.)
Flatheaded fir borer damage polygons, 2015-2019
Flatheaded fir borer damage polygons, 2005-2014
Flatheaded fir borer damage polygons, 1995-2004
Dominant vegetation types, 1936
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Report Abuse
Douglas
Crater Lake
Lake
Lake Abert
Klamath
Grants Pass
Jackson
Medford
Josephine
Klamath Falls
Altamont
OREGON
CALIFORNIA
OREGON
Del Norte
Goose Lake
Siskiyou
Modoc
20mi
Earthstar Geographics | Esri, HERE, Garmin
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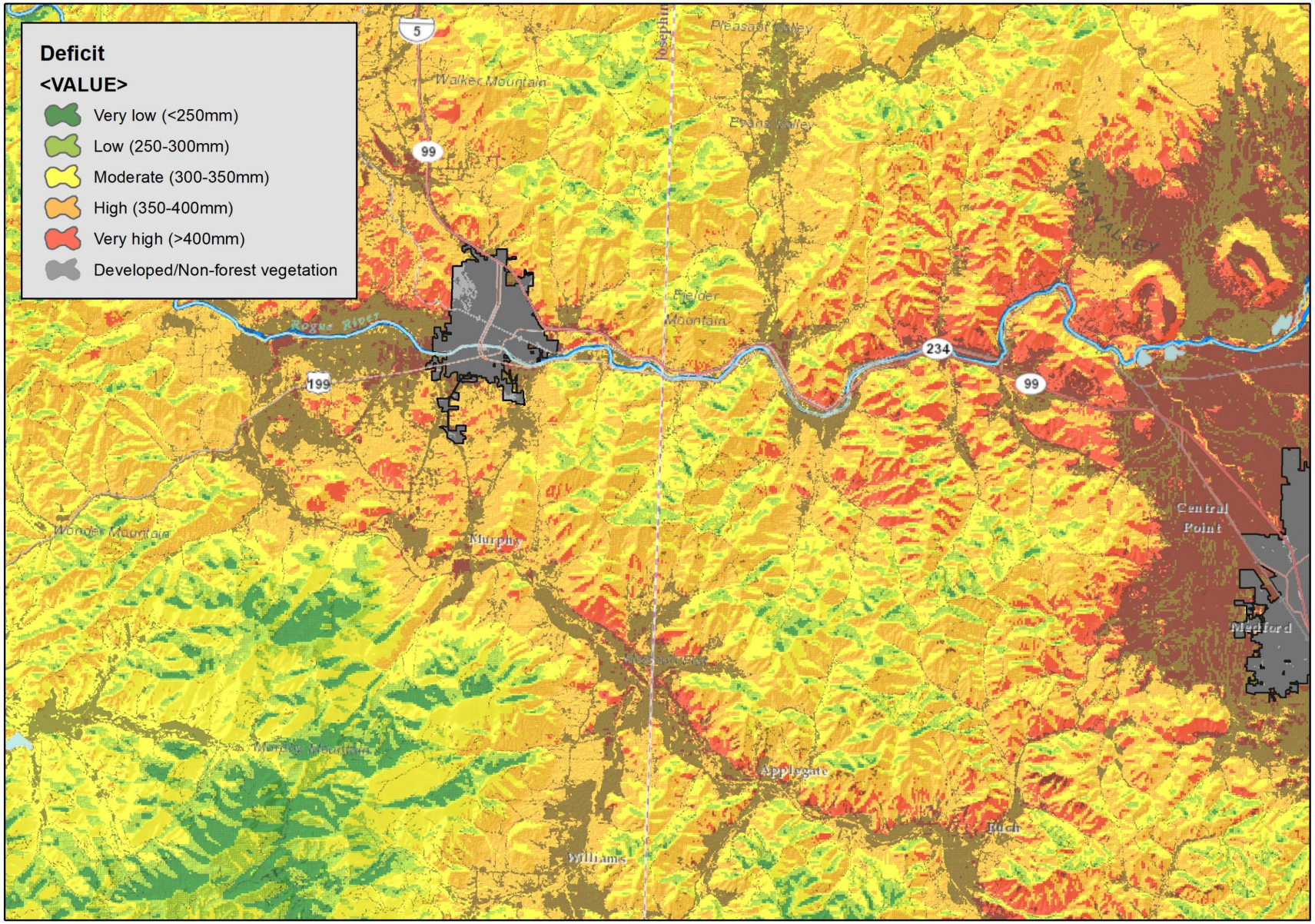
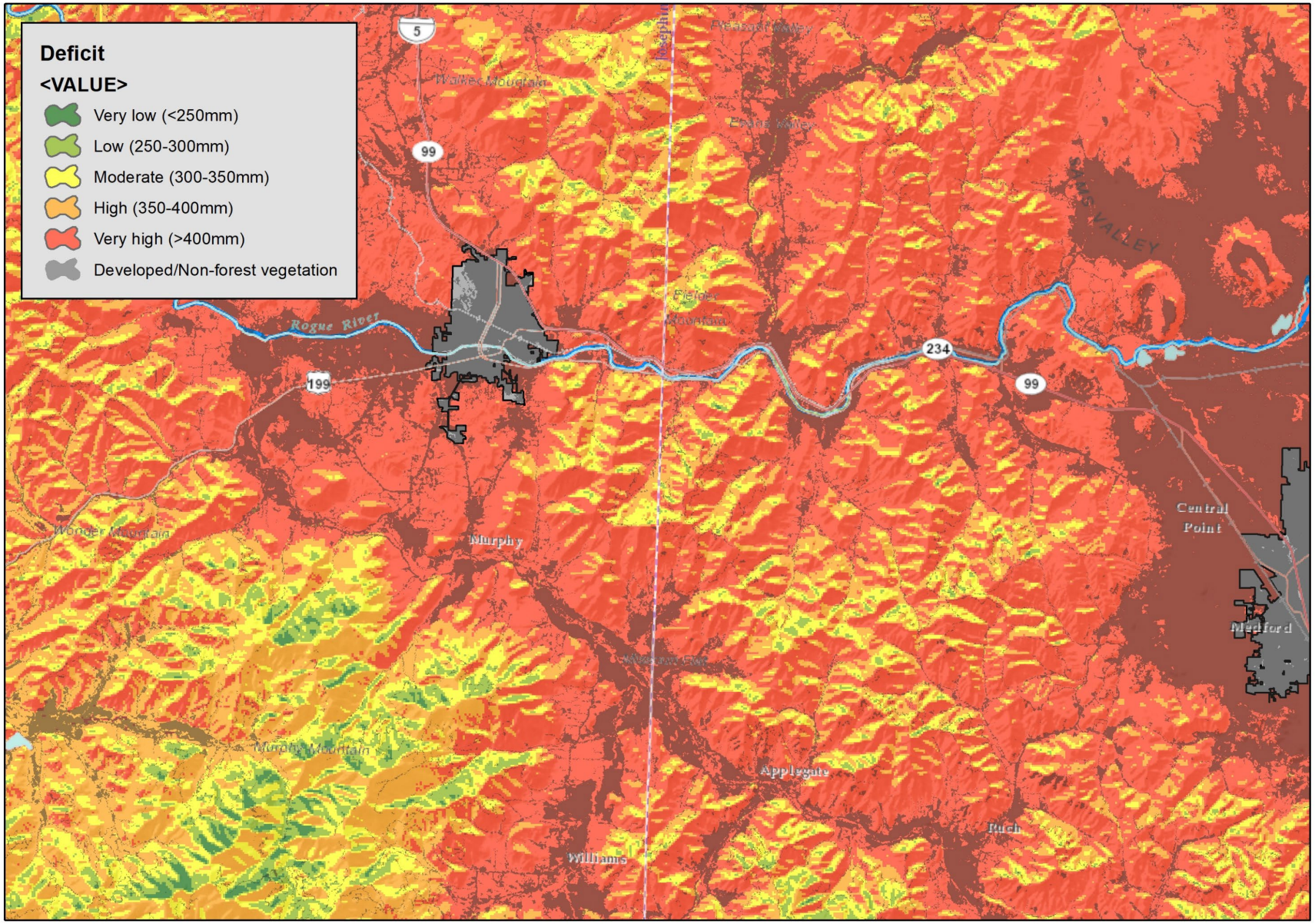
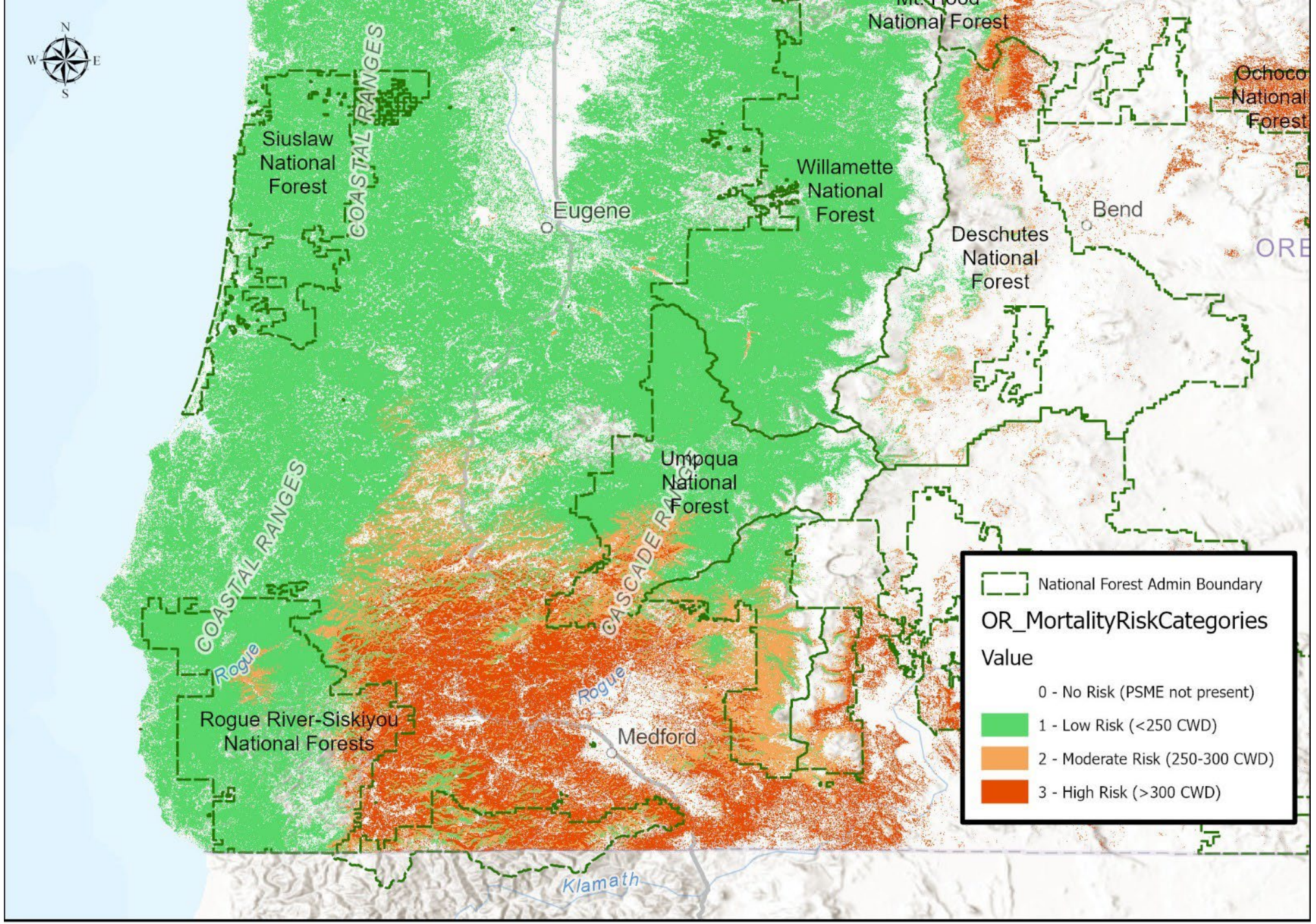
Climatic Water Deficit (1980-2010)



Climatic Water Deficit (projected 2055)




N
W
E
S
Siuslaw National Forest
COASTAL RANGES
Eugene
Willamette National Forest
Mt. Hood National Forest
Ochoco National Forest
Bend
Deschutes National Forest
ORE
Umpqua National Forest
CASCADE RANGE
COASTAL RANGES
Rogue
Rogue River-Siskiyou National Forests
Rogue
Medford
Klamath
National Forest Admin Boundary
OR_MortalityRiskCategories
Value
0 - No Risk (PSME not present)
1 - Low Risk (<250 CWD)
2 - Moderate Risk (250-300 CWD)
3 - High Risk (>300 CWD)