Lane County, Oregon

CLIMATE ACTION PLAN

Phase 3: Community Climate Resilience Plan

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CALL TO ACTION

The impacts of climate change have and will be felt throughout Lane County. Increased winter storms and flooding, hotter and drier summers, more wildfires, and acidifying oceans. As time progresses, these conditions are projected to get worse due to continued global greenhouse gas emissions.

Lane County must prepare for these coming changes by taking action to address the needs of the community, especially those who are most vulnerable. Ensuring adequate, stable, and efficient housing, hardening infrastructure to minimize the impacts of extreme events, and building resilience hubs as community gathering stations are all prudent strategies that will help Lane County residents not just survive climate-related disasters and also other natural hazards but thrive despite them.

Climate change and its impacts can feel overwhelming, but this plan outlines twenty-one straightforward strategies for the county to act, support, or convene. Lane County will:

- take direct action to increase the resilience of roads and bridges and to decrease the severity of forest fires;
- support other entities like the state government, utilities, and nonprofits as they work to become more resilient; and
- will convene groups of stakeholders when the issues are complicated or controversial to come up with solutions that work for everyone.

Lane County leadership and staff are committed to preparing the county to become more climate resilient and to help the community do their part. The actions described in this plan will need to support of the state and federal governments and other stakeholders to become a reality. We believe that with a sense of partnership and common goals we can work together to make the county a more resilient and adaptable community.

HOW TO READ THIS PLAN

PLAN SECTIONS

Section 1: Strategies
Section 1 provides information on the ways Lane County will *act*, *support*, and *convene* to build resilience and adapt to climate impacts.

Section 2: Background
Section 2 establishes background information. This section is organized into the three ecoregions of Lane County.

Section 3: Impacts
Section 3 discusses the ways the present and future changes will impact Lane County physical, social, and economic systems.

VISUAL KEY

Throughout this plan, colors and icons are used to help identify topics. Keep an eye on the headers & footers of each page, tables, and icons.

VISUAL KEY

General Information	Precipitation & Snowpack	Heat
Coastal Ecoregion	Winter Storms	Oceanic Impacts
Valley Ecoregion	Drought	Transitional Effects
Foothill Ecoregion	Wildfire & Smoke	

ACRONYM KEY

DLCD - *Department of Land Conservation and Development*
DOC - *United States Department of Commerce*
EPA - *Environmental Protection Agency*
FEMA - *Federal Emergency Management Agency*
HUD - *United States Department of Housing and Urban Development*
NOAA - *National Oceanic and Atmospheric Administration*
ODOE - *Oregon Department of Energy*
ODFW - *Oregon Department of Fish and Wildlife*
OHA - *Oregon Health Authority*
ODOT - *Oregon Department of Transportation*
OSHA - *Occupational Safety and Health Administration*
USDA - *United States Department of Agriculture*
USDOE - *United States Department of Energy*
USDOT - *United States Department of Transportation*

EXECUTIVE SUMMARY

Lane County is conducting a three-phase effort to address a changing climate. Lane County has previously completed both an internal and a community plan to reduce carbon emissions in the County. This Community Climate Resilience Plan is the third phase and lays out scientific background for potential local impacts of a changing climate and provides actions for the community to build a more resilient county.

The plan is organized into three sections. First is a set of strategies that have been identified as ways to build resilience. These strategies were developed from a variety of sources, ranging from community workshops and surveys, Climate Advisory Committee recommendations, and best practices from other communities around the country. The second section of this plan provides scientific analysis of the past, present, and future projections of seven different climate categories that are projected to change in Lane County. The third section provides a summary of the ways the projections will impact our local physical, social, and economic systems.

SUMMARY OF STRATEGIES

The 21 strategies in this plan are organized into the different approaches that Lane County will take to implement them. For some, Lane County can **act** to implement the strategy. For others, the jurisdiction falls on many organizations, which provides Lane County an opportunity to **support** or **convene** partner organizations to accomplish these goals. The strategies are:

Strategy	Strategy Type
At risk transportation corridors study and mapping	Act
Increased FireWise program reach and capacity	Act
Capital projects and construction resilience lens	Act & Support
Green infrastructure adoption and development	Act & Support
Mental health resilience programs	Act & Support
Model standards and creation of community resilience hubs	Act & Support
Renewable energy plus storage	Act & Support
Urban heat island mapping and mitigation	Act & Support
Workplace safety during extreme events	Act & Support
Personal emergency and evacuation preparedness programs	Act & Convene
Climate resilience legislation	Support
Coastal watersheds education and network programs	Support
Household air filtration programs	Support

Strategy	Strategy Type
Household energy resilience programs	Support
Household scale vegetation management	Support
Household water source diversification or storage	Support
Resilient housing program support	Support
Water quality testing assistance in wells	Support
Food security and network capacity programs	Support & Convene
Economic development in resilience sectors and practices	Support & Convene
Streamside and estuary ecology and health programs	Support & Convene

As Phase 3 of the Climate Action Plan moves from planning to implementation, Lane County will look to fund the the strategies outlined through Federal, State, and other external resources.

INTRODUCTION

Climate resilience is a relatively new subject that brings together a wide array of different fields. At its core, climate resilience is about recognizing that despite efforts to curb emissions to halt climate change, some level is change is now inevitable. At the local scale, the global shifts in temperature, wind, ocean, precipitation, vegetation, and wildlife patterns will all have measurable impacts in Lane County.

All of these changes will have impacts on the physical, social, and economic systems we all rely on to live, work, and play. This Community Climate Resilience Plan is a framework which maps out a path forward to prepare systems to anticipate, absorb, adapt to, and recover from the growing impacts of climate change.

PARTNERSHIPS

This plan was developed over a process that involved several stages of community engagement. Integral to this process has been our partnership with the community organizations Beyond Toxics and the Eugene-Springfield NAACP. Lane County staff wants to acknowledge and appreciate these partnerships as we move from the planning to implementation phase. Building resilience is not an isolated effort, and organizations of all kinds will be needed to move this work forward.

EQUITY STATEMENT

The impacts of climate change has not been and will not be evenly distributed across the population of Lane County. Community members such as those who identify as black, Native American, or a person of color, are low income, elderly, pregnant, live in rural communities, or are non-English speakers are less likely to have the financial, social, or physical resources to resist the impacts of climate change. These populations are more vulnerable, and will face disproportionate changes to their quality of life than those who do. This consideration of equity is one of Lane County's key values and is especially significant for this plan. As Lane County and partner organizations move towards implementing the strategies of this plan, it will be necessary to center equity and to prioritize the vulnerable communities that have the most to lose from climate change and most to gain from resilience initiatives.

SECTION 1: STRATEGIES

This section discusses the ways Lane County will go about building resilience towards the changing patterns of climate change. Strategies in this section will inform Lane County Staff actions moving forward during implementation of this plan.

HOW THESE STRATEGIES WERE DEVELOPED

Strategies that are presented in this section were developed from a variety of sources. An initial list of strategies was developed from the following sources:

Community Workshops:
Several community strategy workshops were held in partnership with Beyond Toxics and Geos Institute.

Community Strategy Survey:
A survey was run on the Lane County website and widely distributed through Lane County, community member, and partner networks. An analysis of the results can be found in an Appendix.

Climate Advisory Committee:
Climate Advisory Committee members provided guidance and recommendations to this portion of the plan through several different processes including individual meetings and a workbook which allowed them to submit recommendations.

Stakeholder Interviews:
Lane County Staff performed outreach and conducted interviews with a wide range of subject matter experts and sector stakeholders in a one-on-one environment.

Identified Best Practices:
Lane County is not the only community planning for climate resilience. Lane County staff identified plans and strategies from across the country that show promise in building resilience in Lane County's local context.

The strategies presented in this section are those that scored highest in an evaluation process conducted by Lane County staff. This process took into account the level of interest displayed by the community, equity considerations, feasibility of the strategy for Lane County operations, impact on climate vulnerabilities, and how they align with Lane County's strategic goals. The strategies that did not score as highly in this evaluation process are available in an Appendix.

TYPES OF STRATEGIES

Building resilience will require many hands working together towards common goals. Lane County, cities, State and Federal agencies, community organizations, and other groups all have different strengths, jurisdictions, and resources to bring to the table in this effort. Because of this, the strategies in this section are separated into three different categories.

ACT

Lane County has the jurisdiction, capacity, and direction to act. Action can have many different shapes, ranging from providing resources or services to community members to applying for grants to provide energy backups at emergency operation centers.

SUPPORT

Lane County will support other jurisdictions in carrying out actions. Support can take a variety of shapes, assisting with securing funding from grants, providing technical expertise, or performing outreach to community members.

CONVENE

Lane County will act as a convener and bring together many different stakeholders and partners. Many of the strategies that fall into this category are complex projects that require input from a variety of sources. Lane County is positioned with connections with a multitude of partners which makes us excellent conveners.

STRATEGIES

The following pages outline priority strategies that have been identified to build resilience.

LEGEND

Source

- Community Meetings
- Stakeholder Meetings
- Identified Best Practices
- Community Survey
- Climate Advisory Committee

Resilience Plan Topic Areas

- Precipitation & Snowpack
- Heat
- Winter Storms
- Oceanic Impacts
- Drought
- Transitional Effects
- Wildfire

At risk transportation corridors study and mapping

Lane County, especially in rural areas, is often only connected by a handful of roadways. Due to the projected impacts of the changing climate, it will be more likely in the future that these isolated roadways will be inaccessible, heavily congested, or dangerous during storm events.

This strategy will provide additional information to Lane County and partner organizations on the location of these vulnerable roadways. By conducting this study and creating a list and map, Lane County, other jurisdictions, and community members will all be better informed on the communities with the greatest risk of isolation, and can use that information to create funding priorities and community programs.

Source(s):	**Strategy Type:**	**Partners:**
	Act	Cities, ODOT, USDOT, community organizations, FEMA

Resilience Plan Topic Areas:

Increased FireWise program reach and capacity

Lane County operates a FireWise grant program to help community members identify and mitigate the risk of wildfire on their properties.

Lane County will seek out funding opportunities that increase the reach and capacity of the FireWise program throughout Lane County. Securing grants to provide increased financial assistance, increase staff capacity, and promoting the program more widely are all avenues that could be taken dependent on different funding opportunities.

Wildfire risk will continue to shift throughout Lane County, and implementation of this strategy should be especially flexible as conditions shift to prioritize the most vulnerable community members.

Source(s):	Strategy Type:	Partners:
	Act	Cities and towns, Forest Service, NOAA, community organizations

Resilience Plan Topic Areas:

Capital projects and construction resilience lens

Capital projects include the construction, improvement, or maintenance of physical infrastructure owned by Lane County.

Lane County will act by adopting a climate resilience lens for the Capital Improvement Plan. Lane County will support other organizations to develop and adopt similar climate lens framework and assessments for their capital projects.

During implementation of this strategy, providing this lens to critical infrastructure which vulnerable community members rely on frequently should be prioritized.

Source(s):	Strategy Type:	Partners:
	Act & Support	Essential service providers, ODOT, ODOE, cities and towns

Resilience Plan Topic Areas:

Green infrastructure adoption and development

When deployed at a large scale, green infrastructure can help mitigate the impacts of some of the extreme conditions Lane County is projected to experience.

Lane County will install green infrastructure, such as bioswales and planting trees for parking lots, at properties the County owns. Lane County will also support other entities such as businesses, community organizations, and other governments to adopt similar infrastructure or codes and seek out funding sources for implementation.

Green infrastructure will be especially impactful in urbanized areas without sufficient existing green space. Many of these areas are also areas where vulnerable populations live, and should be priorities when developing green infrastructure code and projects.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	Cities and towns, community organizations, developers

Resilience Plan Topic Areas:

Mental health resilience programs

Lane County as the mental health authority will support community partners to provide community members address the trauma associated with climate related impacts.

Lane County will support mental health providers by creating resources that address climate change and mental health trauma. Lane County will support mental health resources at community events, emergency shelters, and resilience hubs. Lane County will also support primary and secondary education providers in developing climate related mental health programs and curriculum.

As Lane County acts and supports, providing resources to vulnerable populations that have restricted access to existing mental health resources can amplify the reach of this strategy.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	Community organizations, OHA, private healthcare providers

Resilience Plan Topic Areas:

Model standards and creation of community resilience hubs

Resilience hubs are public or centrally located places where community members can gather and be safe during emergency events or extreme conditions.

Lane County will develop model standards and minimum requirements for Community Resilience Hubs. Lane County will also work towards creating hubs throughout the county. Lane County will support other jurisdictions and community organizations in providing resilience hubs by creating model codes and minimum guidelines for the creation of resilience hubs. These guidelines can allow organizations with limited funds and capacity to jump-start their process and move quickly from planning to construction or development of the resilience hub locations.

Resilience hubs will be especially critical in areas with high densities of vulnerable populations or in locations identified as especially vulnerable.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	Community organizations, cities and towns, local utilities, ODOE, FEMA, LTD

Resilience Plan Topic Areas:

Renewable energy plus storage

As climate related hazards increase, there will continue to be times where the reliability or availability of electricity will be threatened at critical facilities.

Lane County will work to develop renewable energy plus energy storage systems at County facilities that offer critical services, ensuring their function during a power outage. Lane County will develop priority lists, secure funding, and construct renewable + backup storage capabilities. Lane County will support other critical facilities, such as hospitals, fire stations, and others by partnering on grant applications or connecting organization leaders with utilities and other stakeholders.

While supporting this strategy, prioritizing critical facilities that serve communities most at risk from power outages will be key.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	Local utilities, ODOE, EPA, cities and towns, community organizations, essential service providers

Resilience Plan Topic Areas:

Urban heat island mapping and mitigation

The urban heat island effect occurs on hot days and causes urbanized areas to be significantly hotter than surrounding natural or rural areas despite similar air temperatures.

Lane County will support cities and other entities in mapping urban heat islands and work collaboratively to mitigate the impacts. Lane County will support cities to bring in resources and experts to evaluate and map the urban heat island effect across the County to better understand where the risks present are.

Many areas in which urban heat islands are most impactful are disproportionately home to more vulnerable community members. These areas will be key to both mapping urban heat islands and developing plans to address them.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	Cities and towns, community organizations, universities

Resilience Plan Topic Areas:

Workplace safety during extreme events

Extreme temperatures and wildfire smoke present both significant health risks to employees and operational risks to employers to maintain functioning businesses. The Occupational Safety and Health Association (OSHA) adopted rules in June of 2022 to protect employees who interact with these extreme conditions during their workdays.

Lane County will enforce OSHA rules for their workforce and encourage other employers to do the same. Lane County will support employees, employee associations, and employers in understanding their rights and navigating the necessary precautions to take during extreme events.

Support of these rules will be especially crucial in outdoor workplaces and with employees who are less likely to know their protections.

Source(s):	**Strategy Type:**	**Partners:**
	Act & Support	OSHA, businesses, community organizations, employee associations, Chambers of Commerce

Resilience Plan Topic Areas:

Personal emergency and evacuation preparedness programs

Personal emergency preparedness and evacuation preparedness plans and supplies will continue to be critical during extreme events.

Lane County will update existing emergency management materials to include climate-related risks. Lane County will also convene community organizations and associations to promote personal preparedness and provide guides on how to prepare households and neighborhoods.

Key to this strategy will be implementing it in accessible ways to vulnerable populations, especially those without necessary capital resources to develop personal emergency preparedness supplies or community connections that support their mobility during extreme events.

Source(s):	Strategy Type:	Partners:
	Act & Convene	Community organizations, FEMA, cities and towns, ODOT

Resilience Plan Topic Areas:

Climate resilience legislation

Lane County will support legislative action at the federal, state, and local levels that promotes climate resilience.

Lane County will support legislation that provides additional funding for local or state capacity, or rules that expand opportunities to accomplish resilience planning and implementation programs.

While supporting legislation, Lane County will also support measures that promote distribution of resources and implementation of rules that enhance climate resilience for vulnerable communities, such as those that protect outdoor and undocumented workers.

Source(s):	Strategy Type:	Partners:
	Support	Community organizations, state and federal agencies, state and federal legislative bodies

Resilience Plan Topic Areas:

Coastal watershed education and network programs

Coastal watersheds are projected to see impacts that have not been present in these environments in significant ways before.

Lane County will work to enhance the understanding of climate related weather events on coastal watersheds. Lane County will support community organizations and associations to provide information and to build resilience network programs amongst community members, organizations, businesses, and jurisdictions in coastal watersheds.

Especially critical to this strategy is the creation of resilience networks in the coastal watershed region amongst vulnerable populations and in high risk areas. Compounding effects of precipitation pattern shifts and oceanic impacts will need to be centered to implement this strategy effectively.

Source(s):	**Strategy Type:**	**Partners:**
	Support	Community organizations, NOAA, cities and towns, universities

Resilience Plan Topic Areas:

Household air filtration programs

Wildfire smoke can have significant impacts on the health of community members, especially over long periods of exposure. Air purification through HVAC retrofits or portable air purifiers can drastically improve indoor air quality, reducing health impacts from hazardous outdoor air.

Lane County will support air filtration system upgrade incentive programs by connecting community members to resources that can offset costs. Lane County will also support community organizations that seek to promote air filtration system upgrades and distribute portable air filtration devices that require less capital than infrastructure upgrades.

Community members without sufficient resources or property rights to secure these upgrades or with preexisting health conditions are especially vulnerable to the hazards of wildfire smoke and will be most significant in the deployment of this strategy.

Source(s):	**Strategy Type:**	**Partners:**
	Support	Community organizations, universities, EPA, cities and towns, ODOE

Resilience Plan Topic Areas:

Household energy resilience programs

There are many incentive programs available from federal, state, and local sources to increase the resilience of household infrastructure.

Lane County will work with state and federal partners, along with utilities, to encourage homeowners and landlords to make residences more climate resilient. Lane County will support utilities in their efforts to reach homeowners and landlords, especially those who are most vulnerable to the coming changes. Lane County will also support cities as they develop policies that further protect community members from climate impacts. Lane County can also emphasize rollout of these programs in new ways to expand their use by vulnerable populations that may not have the property rights or capital necessary to utilize their current structure.

Source(s):	**Strategy Type:**	**Partners:**
	Support	USDOE, ODOE, local utilities, community organizations, community associations, Universities

Resilience Plan Topic Areas:

Household scale vegetation management

Vegetation and other landscape features can both present risks and provide benefits on individual properties. Education and best practice management can increase native habitat, passive cooling, water quality, and other benefits and minimize the risks posed by unmanaged vegetation.

Lane County will support property owners to participate in riparian protection programs and to manage vegetation near critical infrastructure such as powerlines. There are programs available at the state level, such as the Riparian Lands Tax Incentive Program, that Lane County can promote and help community members navigate. Lane County can also provide educational materials that promote landscaping that mitigates heat and drought impacts.

Vegetation management at the household scale can be focused on rural areas to have the biggest impact or in vulnerable urban areas to mitigate flooding, storm surges, and power outages.

Source(s):	**Strategy Type:**	**Partners:**
	Support	Community organizations, local utilities, ODFW, ODOT

Resilience Plan Topic Areas:

Household water source diversification or storage

There are several State or Federal programs that provide incentives or technical assistance to water reuse, storage, and water source diversification.

Lane County will support regional water resilience by raising the awareness of programs among community members, connecting community members with program managers, and helping them naviagate the paperwork or incentive process.

Key to the implementation of this strategy will be centering vulnerable community members and those that are on decentralized water supply systems and in rural areas.

Source(s):	Strategy Type:	Partners:
	Support	Community organizations, DOE, EPA, NOAA, local utilities, OHA

Resilience Plan Topic Areas:

Resilient housing program support

Oregon is in the midst of a housing shortage that impacts the availability of resilient housing stock. Lane County will work to both expand housing stock and ensure existing stock is resilient to climate related impacts.

Lane County will support programs to build housing units that are resilient or to upgrade existing housing to become more resilient by partnering with housing providers to verify the resiliency of the development. Lane County will support cities and towns to implement policies that expand housing stocks, and providing resilience lens materials to developers.

For many climate hazards, housing is a necessary step towards resiliency. While implementing these supports programs that emphasize affordable housing and housing access will be key.

Source(s):	Strategy Type:	Partners:
	Support	Cities and towns, community organizations, HUD, DLCD

Resilience Plan Topic Areas:

Water quality testing assistance in wells

Several State and Federal agencies administer programs that focus on providing technical or financial assistance to community members reliant on well water. Wells have been a traditional water source in rural areas where they remain prevalent.

Lane County will support partner agencies to expand water quality testing programs for wells. Lane County will support community members by providing information about the relevant programs through County channels and providing information about resources for next steps once results are gathered.

During implementation of this strategy, support to the most vulnerable community members and assistance with creating regional solutions to water quality issues can help mitigate the worst impacts of the water quality issues.

Source(s):	**Strategy Type:**	**Partners:**
	Support	Local utilities, OHA, community organizations

Resilience Plan Topic Areas:

Food security and network capacity programs

Food security is an increasing concern as the ability to grow, store, and distribute food locally and transportation systems between population centers become increasingly stressed.

Lane County will support local agencies such as Food for Lane County as they address climate-related food security issues. Lane County will also convene regional partners to develop both short term and long term strategies and networks that address climate related food security.

Supporting and convening these groups will be especially critical in areas where vulnerable populations live or where transportation connections with the rest of Lane County are especially at risk.

Source(s):	**Strategy Type:**	**Partners:**
	Support & Convene	Community organizations, USDA, cities and towns

Resilience Plan Topic Areas:

Economic development in resilience sectors and practices

Implementation of resilience efforts will require additional and sector-specific workforce participation, knowledge, and skills.

Lane County will seek out new opportunities for economic development that enhances climate resilience. Lane County will support the development of new technologies, workforce participation, and knowledge by assisting trade & educational institutions in promoting their programs or securing grant funding to operate their programs. Lane County will also convene groups of businesses adjacent to resilience demand markets to promote expansion of their portfolios into these emerging consumer demand fields.

Key to the implementation of this strategy will be partering with programs that provide opportunities to all community members to engage with the programs.

Source(s):	**Strategy Type:**	**Partners:**
	Support & Convene	Businesses, Chambers of Commerce, community organizations, universities, trade schools, DOC

Resilience Plan Topic Areas:

Streamside and estuary ecology and health programs

The integrity and health of waterways and adjacent areas that run throughout Lane County can have significant impacts on ecosystem health and on the mitigation of extreme events.

Lane County will support partner agencies as they work to protect the river, streamside, and estuary environments that provide resilience benefits. Lane County will support grant applications and partner on relevant projects.

These programs will have a range of effects depending on their location and scale. Programs with high correlations to mitigating extreme climate hazards in areas with significant vulnerable populations provide numerous benefits beyond those that do not impact vulnerable populations and will be key during implementation of this strategy.

Source(s):	**Strategy Type:**	**Partners:**
	Support & Convene	Community organizations, NOAA, cities and towns, EPA

Resilience Plan Topic Areas:

CURRENT RESILIENCE ACTIVITIES

Within Lane County, there are many people and organizations that are already thinking about resilience to climate change. It is important to acknowledge and connect with these efforts. Creating resilient systems demands a regional approach that builds upon efforts without repeating them. This list is a sample of some of the resilience efforts going on in the county and is not necessarily a comprehensive list.

- Lane County Emergency Management Natural Hazard Mitigation Plan
- Lane County Land Management Community Wildfire Protection Plan
- Local Jurisdiction and Municipality Hazard Mitigation Plans
- Lane County Climate Equity and Resilience Taskforce
- Lane County Community Organizations Active in Disaster
- Insitute for Policy Research and Engagement Lane Regional Resilience Collaborative

CLIMATE RESILIENCE & LANE COUNTY'S STRATEGIC GOALS

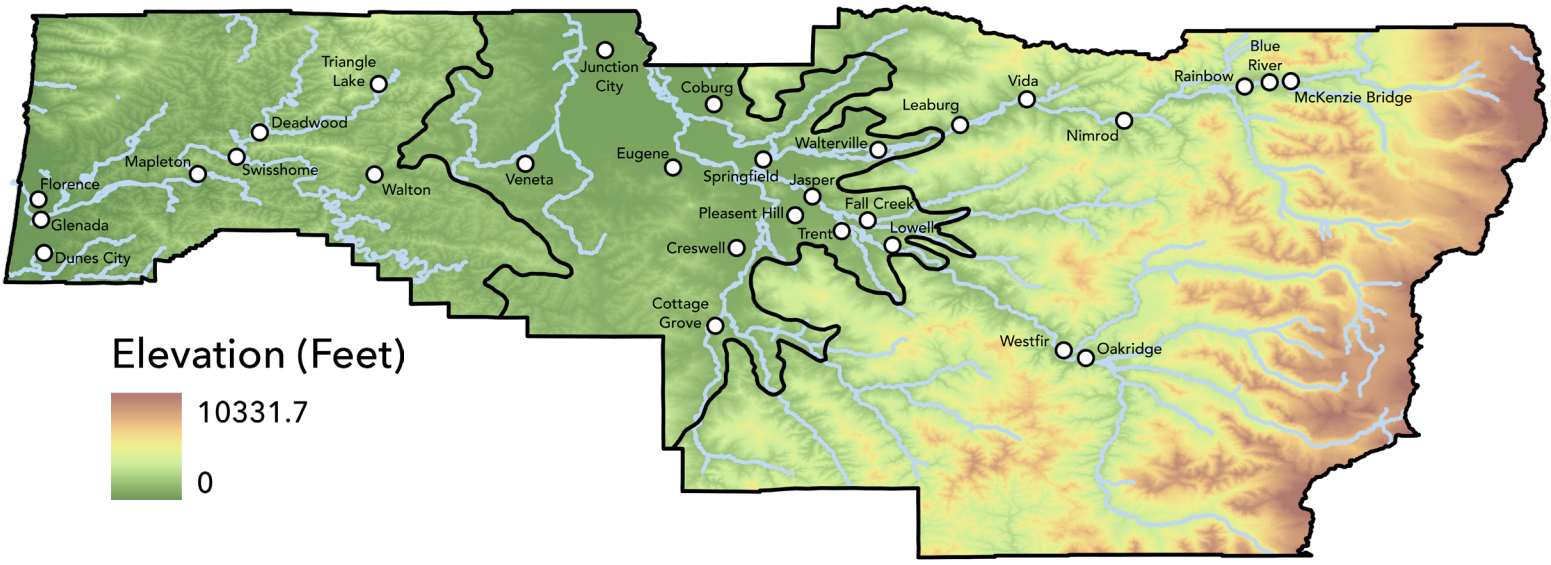
The goals of the Lane County Strategic Plan are at the heart of the Community Climate Resilience Plan. Strategic Priority 2: Vibrant Communities provides directive to the County to "Invest in a resilient, diverse, and sustainable regional economy" and "Protect and enhance our natural and built environments." These two goals are deeply set within the purpose and scope of the Community Climate Resilience Plan.

SECTION 2: BACKGROUND

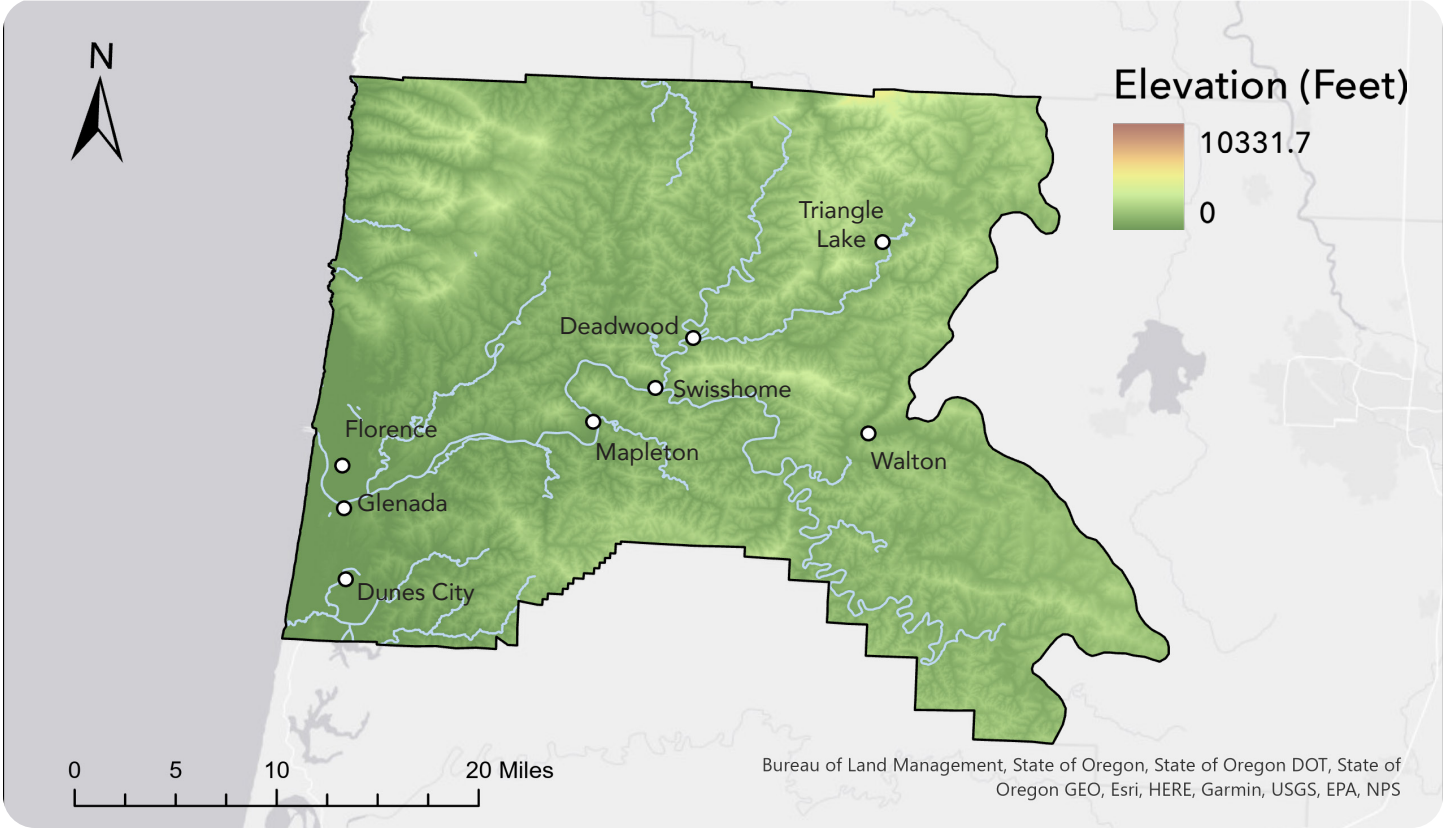
The purpose of this section is to explore about seven different climate change patternsthat are expected within Lane County ecoregions. The following pages are a summary of a full analysis which can be found in an Appendix. To read about how these patterns will impact Lane County see Section 3: Impact.

INTRODUCTION TO ECOREGIONS

Lane County covers a range of climates and landscapes stretching from the Pacific Ocean to the Cascade Mountains. The impacts of climate change are already and will continue to be felt differently across this diverse area. To reflect that fact, the county has been divided into three regions, the Coastal, Valley, and Foothill Ecoregions. These regions are defined based on their physical and ecological characteristics.



COASTAL ECOREGION



Precipitation & Snowpack

Average annual precipitation falling as rain, snow, sleet, etc.[1]	**Past:** Very high & consistent rainfall from November through March. **Current:** Consistent rainfall from November through March. **Projections:** Rainfall comes less consistently but in larger storm events.
Water levels in key rivers and other waterways.[2]	**Past:** High water levels from November to May. Large floods. **Current:** High water levels from November to May. Large floods. **Projections:** Higher winter flood risks, but overall flow regime change is small to moderate.
Snowpack storage levels.	**Past:** No long-term snowpack storage. **Current:** No long-term snowpack storage. **Projections:** No long-term snowpack storage.

Winter Storms

Average days with temperatures below 32° F.[3]	**Past:** 0.14° F colder low temperatures on average during winter months than current conditions. **Current:** 49.5 days per year with temperatures below 32° F. **Projections:** Low temperatures increasing up to 3.3° F by 2050.
Average snowfall per year.[3]	**Past:** Similar rates of snowfall to current levels. **Current:** 4.9 inches of snowfall per year. **Projections:** Less frequent and predictable snowfall. Chances for larger individual storm events
Snowfall proportion of total winter precipitation.[3]	**Past:** 1.3% less precipitation falling as snow than current levels. **Current:** 13.8% of precipitation falling as snow. **Projections:** Smaller proportion of precipitation as snow.

Drought

Average weeks per year with drought conditions present.[4]	**Past:** 26 weeks per year. **Current:** 21 weeks per year. **Projections:** Increase in drought weeks per year as short-term and long-term droughts increase in frequency.
Average drought strength* from 0 to 500. (DCSI)[4]	**Past:** Drought strength of 137. **Current:** Drought strength of 154. **Projections:** Increase in drought strength as multiple drought types occur at the same time more often.

*See Appendix for an explanation of drought strenght and DCSI.

Wildfire	
Average frequency of wildfires >1 acre in area.[5]	**Past:** 3.5 wildfires >1 acre in area per year. **Current:** 2.3 wildfires >1 acre in area per year. **Projections:** Moderate to high increase in wildfire frequency as "very high" risk days increase up to 12 additional days per year.
Average area of wildfires >1 acre in area.[5]	**Past:** 24.5 acres burnt per wildfire. **Current:** 23.7 acres burnt per wildfire. **Projections:** Wildfires more likely develop into larger fires. Small to moderate increase in average area.
Large wildfire frequency.[5]	**Past:** 0.5 large wildfires per year. **Current:** 0.4 large wildfires per year. **Projections:** Small increase in large wildfire frequency and size. Wildfires more likely to develop into large wildfire complexes.

Heat	
Average days per year with temperatures above 90° F.[6]	**Past:** 0.6 days above 90° F per year. **Current:** 1.5 days above 90° F per year. **Projections:** Up to 19.7 days above 90° F per year by the 2050s.

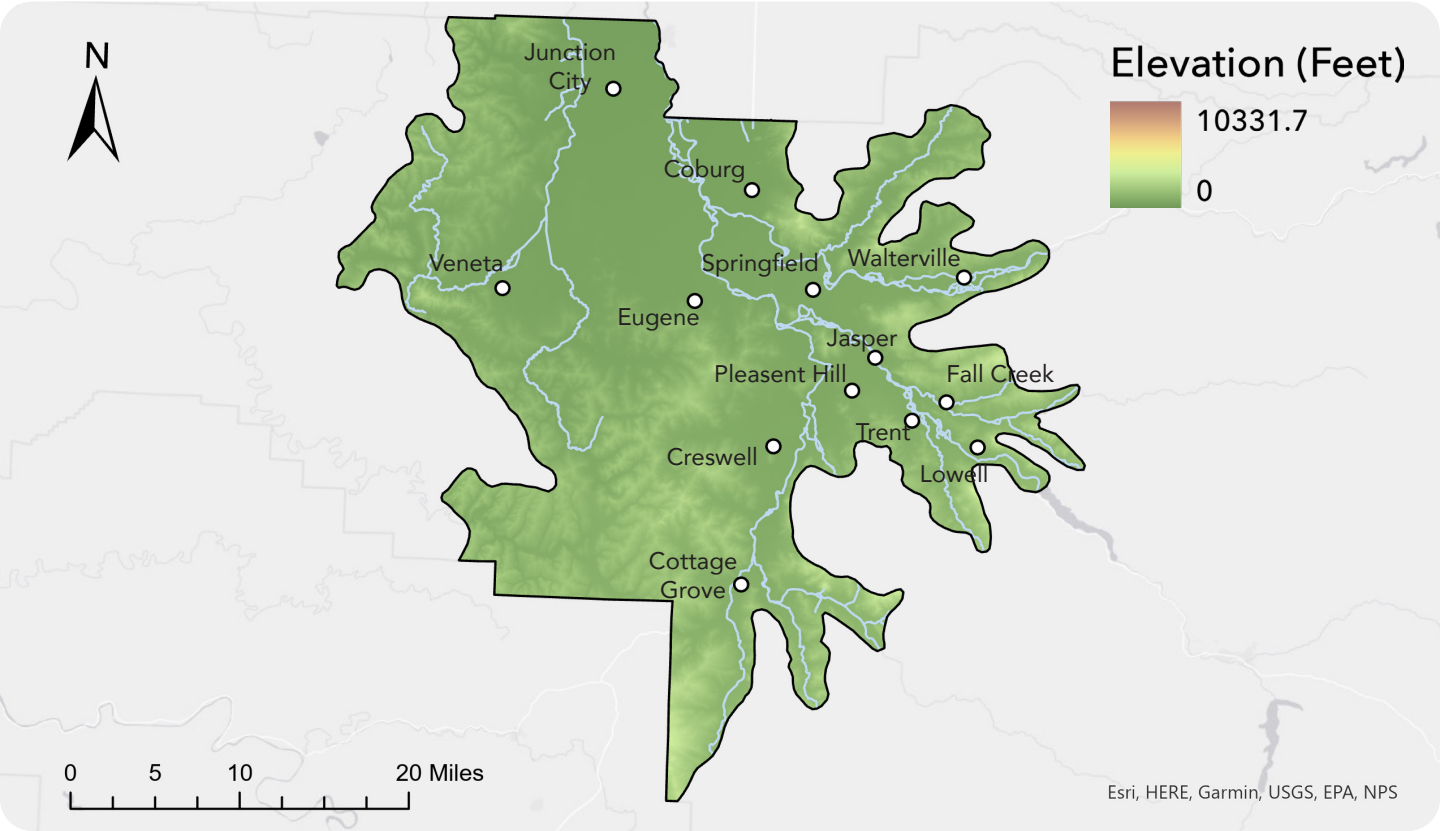
Oceanic Impacts

Sea level rise from melting ice caps and ocean temperature increases.[7]	**Past:** Cooler ocean temperatures, little concern of sea level rise. **Current:** 4.5° F warmer over the last 50 years. Sea level rise not a concern as geologic uplift is occuring faster than water levels are rising. **Projections:** Local sea level rise expected to be between 0.8-1.8 feet by 2050 and 1.7-5.7 feet by 2100. Chance of floods >4 feet higher than average high tide occuring at least once per year is 93-100% by 2050.
Hypoxia & anoxia event frequency.[8]	**Past:** No hypoxia events recorded before 2000. **Current:** 80% of the coastline affected by hypoxia or anoxia since 2000. **Projections:** More frequent and longer lasting hypoxia & anoxia episodes as overall oxygen levels decline by up to 17% by 2100.
Ocean acidification levels.[8]	**Past:** Little concern over carbonic acid levels in aquatic environments. **Current:** Higher carbonic acid levels due to greenhouse gas emissions and ocean upwelling events. **Projections:** Ocean acid levels increase 1-1.5x compared to current levels by 2100.

Transitional Effects

Population growth and climate migration.[9]	**Past:** Population growth generally aligns with economic conditions. **Current:** Growing by 1% annually from 2010-2020. **Projections:** Unknown levels of growth, but limited by housing availability.
Changes in infectious disease & pest patterns.[10]	**Past:** Most diseases and pests die off in cold winter months. **Current:** Most diseases and pests die off in cold winter months. **Projections:** More diseases and pests persist and grow as temperature increases and drought persists.
Changes in vegetation & agriculture patterns.[11]	**Past:** Heavily forested in the Coast Range, farming is dependent on soil types. **Current:** Heavily forested in the Coast Range, farming is dependent on soil types. **Projections:** Coast Range forests become less healthy. Agriculture shift to warmer and drier tolerant crops.

VALLEY ECOREGION



Precipitation & Snowpack

Average annual precipitation falling as rain, snow, sleet, etc.[12]	**Past:** 23% less rainfall than present day. **Current:** Consistent rainfall from November through March. **Projections:** Rainfall comes less consistently but in larger storm events.
Water levels in key rivers and other waterways.[13]	**Past:** High levels year round, little drop off during dry months. **Current:** Highest from December to March. Stay fairly high during summer. **Projections:** Higher winter flows and flood risk. Steeper flow fall off in spring and summer.
Snowpack storage levels.	**Past:** No long-term snowpack storage. **Current:** No long-term snowpack storage. **Projections:** No long-term snowpack storage.

Winter Storms

Average days with temperatures below 32° F.[14]	**Past:** 0.39° F colder low temperatures on average during winter months than current conditions. **Current:** 59.7 days per year with temperatures below 32° F. **Projections:** Low temperatures increasing 3.1-3.3° F by 2050.
Average snowfall per year.[14]	**Past:** Slightly lower annual snowfall levels than currently observed. **Current:** 6 inches of snowfall per year. **Projections:** Less average snowfall. Less predictable storm events and higher chances of large storms.
Snowfall proportion of total winter precipitation.[14]	**Past:** 1.3% less precipitation falling as snow than current levels. **Current:** 23.7% of precipitation falling as snow. **Projections:** Smaller proportion of precipitation as snow.

Drought

Average weeks per year with drought conditions present.[4]	**Past:** 26 weeks per year. **Current:** 24 weeks per year. **Projections:** Increase in drought weeks per year as short-term and long-term droughts increase in frequency.
Average drought strength* from 0 to 500. (DCSI)[4]	**Past:** Drought strength of 137. **Current:** Drought strength of 142. **Projections:** Increase in drought strength as multiple drought types occur at the same time more often.

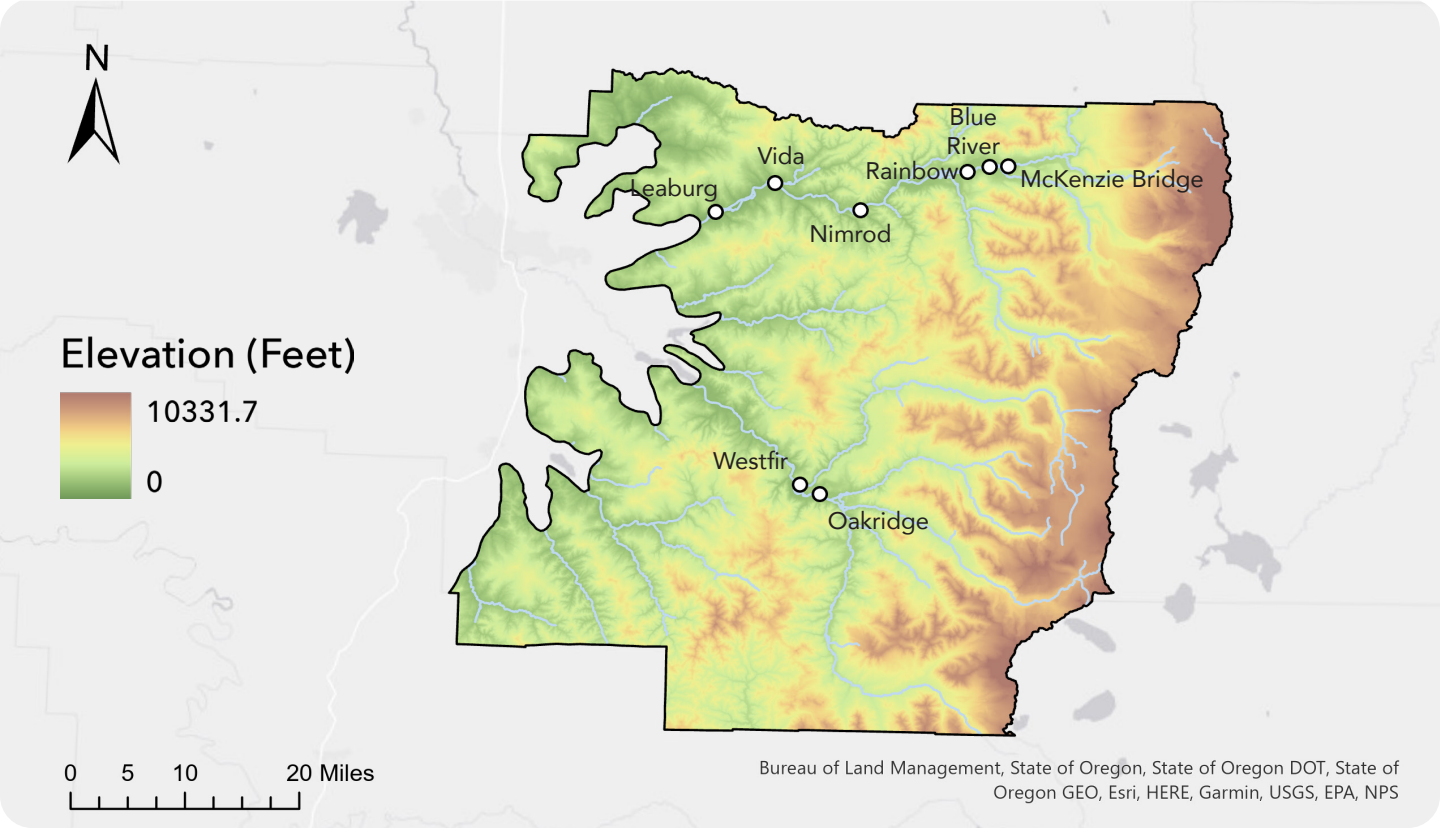
*See Appendix for an explanation of drought strenght and DCSI.

Wildfire	
Average frequency of wildfires >1 acre in area.[5]	**Past:** 7.0 wildfires >1 acre in area per year. **Current:** 6.3 wildfires >1 acre in area per year. **Projections:** Moderate to high increase in wildfire frequency as "very high" risk days increase up to 12 additional days per year.
Average area of wildfires >1 acre in area.[5]	**Past:** 7.8 acres burnt. per wildfire **Current:** 13.1 acres burnt per wildfire. **Projections:** Small to moderate increase in wildfire size.
Large wildfire frequency.[5]	**Past:** 0.7 large wildfires per year. **Current:** 2.2 large wildfires per year. **Projections:** Small to moderate increase in wildfire outlier events.

Heat	
Average days per year with temperatures above 90° F.[6]	**Past:** 12.6 days above 90° F per year. **Current:** 14.6 days above 90° F per year. **Projections:** Up to 32.8 days above 90° F per year by the 2050s.

Transitional Effects	
Population growth and climate migration.[9]	**Past:** Population growth generally aligns with economic conditions. **Current:** Growing by 1% annually from 2010-2020. **Projections:** Unknown levels of growth, but likely to be focused in urban centers.
Changes in infectious disease & pest patterns.[10]	**Past:** Most diseases and pests die off in cold winter months. **Current:** Most diseases and pests die off in cold winter months. **Projections:** More diseases and pests persist and grow as winter months warm.
Changes in vegetation & agriculture patterns.[11]	**Past:** Efficient and productive agriculture is possible for an extremely wide range of crops. **Current:** Efficient and productive agriculture is possible for an extremely wide range of crops. **Projections:** Agriculture shifts to warmer and drier tolerant crops. New practices needed to cope with shifts in water, soil, and temperatures.

FOOTHILL ECOREGION



Precipitation & Snowpack

Average annual precipitation falling as rain, snow, sleet, etc.[15]	**Past:** Varies depending on specific location within region. **Current:** Consistent rainfall from November through March. **Projections:** Rainfall comes less consistently but in larger storm events.
Water levels in key rivers and other waterways.[16]	**Past:** Stays moderately high year round. Less concern of winter flooding. **Current:** Stays moderately high year round. Less concern of winter flooding. **Projections:** Higher winter flows and increased flood risk. Steeper flow fall off in spring and summer.
Snowpack storage levels.[17]	**Past:** Snowpack was bigger, lasted longer, and accumulated earlier. **Current:** Significant snowpack contributions between December and February. **Projections:** Less than 25% of precipitation days falling as snow. 50% reduction in annual snowpack from 1950 levels.

Winter Storms

Average days with temperatures below 32° F.[18]	**Past:** 1.24° F colder low temperatures on average during winter months than current conditions. **Current:** 102.8 days per year with temperatures below 32° F. **Projections:** Lowest temperatures increasing 3.1-3.7° F by 2050.
Average snowfall per year.[18]	**Past:** Moderately higher snowfall levels than currently observed. **Current:** 21 inches of snowfall per year. **Projections:** Significantly less average snowfall. Less predictable storm events and higher chances of large storms.
Snowfall proportion of total winter precipitation.[18]	**Past:** 7% more precipitation as snow than current levels. **Current:** 43% of precipitation falling as snow. **Projections:** Significantly smaller proportion of precipitation as snow.

Drought

Average weeks per year with drought conditions present.[4]	**Past:** 26 weeks per year. **Current:** 28 weeks per year. **Projections:** Increase in drought weeks per year as short-term and long-term droughts increase in frequency.
Average drought strength* from 0 to 500. (DCSI)[4]	**Past:** Drought strength of 137. **Current:** Drought strength of 138. **Projections:** Increase in drought strength as multiple drought types occur at the same time more often, especially snow drought.

*See Appendix for an explanation of drought strenght and DCSI.

Wildfire	
Average frequency of wildfires >1 acre in area.[5]	**Past:** 3.8 wildfires >1 acre in area per year. **Current:** 3.4 wildfires >1 acre in area per year. **Projections:** Moderate to high increase in wildfire frequency as "very high" risk days increase up to 12 additional days per year.
Average area of wildfires >1 acre in area.[5]	**Past:** 161.3 acres burnt per wildfire. **Current:** 6,747.9 acres burnt per wildfire. **Projections:** Moderate increase in average size of wildfires. More high susceptibility areas where wildfires can spread easier and faster.
Large wildfire frequency.[5]	**Past:** 0.7 large wildfires per year. **Current:** 0.6 large wildfires per year. **Projections:** Largest wildfires (>12,350 acres) occuring 2 to 4 times as frequently by 2070.

Heat	
Average days per year with temperatures above 90° F.[6]	**Past:** 15.0 days above 90° F per year. **Current:** 15.8 days above 90° F per year. **Projections:** Up to 34.0 days above 90° F per year by the 2050s.

Transitional Effects	
Population growth and climate migration.[9]	**Past:** Population growth generally aligns with economic conditions, was heavily stalled by timber restrictions in 1980s. **Current:** Growing by 1% annually from 2010-2020. **Projections:** Unknown levels of growth, but limited by housing availability.
Changes in infectious disease & pest patterns.[10]	**Past:** Most diseases and pests die off in cold winter months. **Current:** Most diseases and pests die off in cold winter months. **Projections:** More diseases and pests persist and grow as winter months warm. Forest ecosystems become more vulnerable.
Changes in vegetation & agriculture patterns.[11]	**Past:** Forest ecosystems and forestry dominate the region. **Current:** Forest ecosystems and forestry dominate the region. **Projections:** Forest ecosystems will see diminshed health. Forestry will need to adopt new sustainable practices to effectively harvest over more limited supply areas.

SECTION 3: IMPACT

In Lane County, climate impacts are already present and are affecting numerous aspects of life. We must understand these impacts to build effective resilience that accomplishes the strategic goals of Lane County.

The projected changes in climates will lead to potential new vulnerabilities. Primary vulnerabilities have been identified through a series of community conversations, stakeholder meetings, and reviews of relevant literature. This section provides an overview of the various impacts for each topic area. A complete list of individual impacts that was used to develop this summary can be found in an Appendix.

IMPACT SUMMARIES

Precipitation & Snowpack
Higher risk to physical infrastructure and critical facilities as flooding becomes more frequent and/or extreme.
Higher water quality risks from shifts in water quantity, runoff patterns, and algae blooms especially in decentralized water systems such as wells.
Decreasing water available during summer months for human activities and consumption as well as natural ecosystem needs.
Poorer hillside stability and soil health leading to higher landslide risk.

Winter Storms
Health impacts to vulnerable populations that lack access to sufficiently heated shelters during storm events.
Higher risk to essential infrastructure, such as electric facilities and water lines, during storm events.
Higher connectivity risks along transportation corridors cutting off access to communities or essential services during storm events.
Higher risk to agricultural, urban, and wildland vegetation health due to shifting storm frequency, timing, and strength.

Drought
Negative impacts to water dependent industries such as farming, forestry, and recreation during drought periods.
Negative health impacts on ecosystems and reduced ability for ecosystems to recover after natural disasters due to limited water availability.
Increased stress on household or business water supply sources, especially in areas without centralized water resources.
Decreased ability to grow food and conduct other self sufficiency activities that require water at household and business scales.

Wildfire
Increased wildfire risk to homes, businesses, recreational areas, and other places of interest especially within the wildland-urban-interface.
Increased health risks, business operation restrictions, and school operation restrictions due to smoke and related air quality hazards.
Increased wildfire risk to critical infrastructure including electric facilities, drinking water supply facilities, and emergency response or operation centers.
Increased risk to natural ecosystems and wildlife from wildfire and smoke.

Heat
Increased health risks for employees and operation risks for employers in businesses without access to sufficient cooling infrastructure during extreme heat events.
Negative impacts to agriculture and forestry industries as crops suffer under higher average temperatures and more frequent extreme heat events.
Increased risks to electric infrastructure due to overheating and increased demand for cooling during extreme heat events.
Increased impacts on ecosystem health, wildlife, and pets during extreme heat events.

Oceanic Impacts
Increased damage to marine ecosystems, biodiversity, and food chains due to decreased aquatic environment health.
Increased risk to homes, businesses, and critical facilities of being inundated from sea level rise.
Decreased coastal watershed soil and ecosystem health due to higher rates of saltwater intrusion into soils and water tables.
Increased risk of flooding in costal watershed communities due to sea level rise and its impacts on coastal rivers and streams.

Transitional Effects
Increased strain on existing housing supply and ability to construct new housing stock.
Increased rates of physical, mental, and emotional health conditions as a result of climate change impacts.
Reduced ecosystem health and increased rates of transition to different ecosystem types due to temperature, precipitation, and other climate shifts.
Increased stress on the economic ecoystsem including stress on supply chains, operation ability for businesses, safety for employees, and other factors.

CLOSING STATEMENT

This is a living document and the first step in Lane County's climate resilience process. Recognizing that even with the best mitigation efforts in place, climate change is already here and will continue to change our shorelines, rivers, mountains, and everything in-between.

The recognition, analysis, and strategies documented in this plan show a potential path forward. Significant will be the need to be adaptable and pursue the opportunities that arise in the coming days, months, years, and decades. While Lane County will continue to push this work forward, and will continue to look to the community organizations, State, Federal, and local agencies, and individual community members to build resilience with us. Through all the changes, partnerships, and work to come, Lane County will remain the best county in which all can live, work, and play.

REFERENCES

1

City of Florence. (2022). Yearly Rainfall Report. [Data file] Retrieved from https://www.ci.florence.or.us/sites/default/files/fileattachments/public_works/page/981/2022_rainfall_report.pdf

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

National Oceanic and Atmospheric Administration (n.d.). NOWData - NOAA online weather data. Monthly climate normals, Mapleton, OR. [Data set]. Accessed April 22nd, 2022 at URL https://www.weather.gov/wrh/climate?wfo=pqr

2

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Streamflow). USGS 14307620 Siuslaw River near Mapleton, OR. Accessed April 22nd, 2022, at URL https://waterdata.usgs.gov/monitoring-location/14307620/?agency_cd=USGS#parameterCode=00060&startDT=1957-01-01&endDT=2022-01-01

3

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Western Regional Climate Center (2022). Honeyman SP, Oregon (353995). Period of record monthly climate summary, period of record: 05/21/1971 to 05/31/2016. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or3995

Western Regional Climate Center (2022). Noti 1 NW, Oregon (356173). Period of record monthly climate summary, period of record: 04/01/1964 to 04/30/1991. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or6173

4

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

National Integrated Drought Information System, National Oceanic and Atmospheric Administration. (2022). Historical data and conditions – drought since 1895. Period of Record: 1900 to 1999. Accessed May 6th, 2022 at URL https://www.drought.gov/historical-information?state=oregon&countyFips=41039&dataset=1&selectedDateUSDM=20110215&selectedDateSpi=19500701&selectedDatePaleo=1009&dateRangeSpi=1900-2000

National Drought Mitigation Center, University of Nebraska-Lincoln. (2022). U.S. drought monitor – comprehensive statistics. Period of Record: 01/04/2000 to 01/06/2020. Accessed May 6th, 2022 at URL https://droughtmonitor.unl.edu/DmData/DataDownload/ComprehensiveStatistics.aspx

5

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Oregon Department of Forestry. (December 17th, 2021). ODF FIRES [data set]. Retrieved from URL https://oregon-department-of-forestry-geo.hub.arcgis.com/datasets/geo::odf-fire-2/explore?location=43.989575%2C-123.298410%2C8.00

6

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Northwest Alliance for Computational Science and Engineering – PRISM Climate Group. (2022). Time series values for individual locations. [Data set] Accessed May 6th, 2022 at URL https://www.prism.oregonstate.edu/explorer/

7

Climate Central, (n.d.). Surging seas risk zone map. [GIS Application]. Retrieved from https://ss2.climatecentral.org/#11/43.9802/-123.8784?show=satellite&projections=0-K14_RCP85-SLR&level=4&unit=feet&pois=hide

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

SeaLevelRise, (n.d.). Sea level rise in Oregon. Retrieved from https://sealevelrise.org/states/oregon/

8

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Oregon Department of Fish and Wildlife. (2016). Climate change and Oregon's nearshore open water habitat, Oregon Nearshore Strategy. Retrieved from https://www.dfw.state.or.us/conservationstrategy/docs/climate_change/Open_Water_Fact_Sheet.pdf

Stein, T. (2021). Low-oxygen waters off Washington, Oregon coasts risk becoming large 'dead zones'. National Oceanic and Atmospheric Administration Research News. Retrieved from https://research.noaa.gov/article/ArtMID/587/ArticleID/2779/Low-oxygen-waters-off-Washington-Oregon-coasts-risk-becoming-large-%E2%80%9Cdead-zones%E2%80%9D

9

Dalton, M., and E. Fleishman, editors. 2021. Fifth Oregon Climate Assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://blogs.oregonstate.edu/occri/oregon-climate-assessments/

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Irfan, U. (2022). Why we still don't know yet how bad climate migration will get. Vox. Retrieved from https://www.vox.com/2022/3/16/22960468/ipcc-climate-change-migration-migrant-refugee

Oregon Housing and Community Services. (2022). ReOregon Action Plan. Retrieved from https://www.oregon.gov/ohcs/housing-assistance/disaster-recovery/Pages/action-plan.aspx

Thorsby, D. (2021). The best places to live in the U.S. if you're concerned about climate change. USNews. Retrived from https://realestate.usnews.com/real-estate/slideshows/the-best-places-to-live-in-the-us-if-youre-concerned-about-climate-change

World Population Review. (n.d.). Lane County, Oregon population. [Data set] Retrieved from https://worldpopulationreview.com/us-counties/or/lane-county-population

10

ArborPro Tree Experts. (2015). Climate change aids mountain pine beetle outbreak in Oregon. ArborPro, Inc. Retrieved from https://www.arborpronw.com/climate-change-aids-mountain-pine-beetle-outbreak-in-oregon/?cn-reloaded=1

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

11

Dalton, M., and E. Fleishman, editors. 2021. Fifth Oregon Climate Assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://blogs.oregonstate.edu/occri/oregon-climate-assessments/

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Waldroupe, A. (2021). Hotter, drier, and less predicatable: How Oregon farmers are adapting to climate change. Oregon Humanities. Retrieved from https://www.oregonhumanities.org/rll/magazine/beyond-fallwinter-2021/hotter-drier-and-less-predictable/

Weiskittel, A., Crookston, N., & Rehfeldt, G. (2012). Projected future suitable habitat and productivity of douglas-fir in western North America. Schweiz Z Forstwes. 163(3): 70-78. Retrieved from https://www.fs.fed.us/rm/pubs_other/rmrs_2012_weiskittel_a001.pdf

12

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Rockey, C., National Oceanic and Atmospheric Association (2018). Local climate data for Eugene. [Data file]. Retrieved from https://www.wrh.noaa.gov/pqr/eugclimate/index.php

13

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Annual statistics). USGS 14153500 Coast Fork Willamette R BLW Cottage Grove Dam, OR. Accessed April 22nd, 2022, at URL https://waterdata.usgs.gov/nwis/annual?referred_module=sw&site_no=14153500&por_14153500_113703=546423,00060,113703,1939,2022&year_type=C&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Current/historical observations). USGS 14153500 Coast Fork Willamette R BLW Cottage Grove Dam, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/or/nwis/uv?cb_00060=on&format=gif_stats&site_no=14153500&period=&begin_date=1988-01-01&end_date=2021-12-31

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Current/historical observations). USGS 14164900 McKenzie River ABV Hayden Br, at Springfield, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/usa/nwis/uv/?cb_00060=on&format=gif_default&site_no=14164900&period=&begin_date=2007-03-22&end_date=2021-12-31

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Current/historical observations). USGS 14166500 Long Tom River near Noti, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/uv?cb_00060=on&cb_00065=on&format=gif_default&site_no=14166500&period=&begin_date=1987-10-01&end_date=2020-12-31

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Peak streamflow for the nation). USGS 14164900 McKenzie River ABV Hayden Br, at Springfield, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/peak?site_no=14164900&agency_cd=USGS&format=html

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Surface-water monthly statistics for the nation). USGS 14153500 Coast Fork Willamette R BLW Cottage Grove Dam, OR. Accessed April 22nd, 2022, at URL https://waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=14153500&por_14153500_113703=546423,00060,113703,1939-01,2021-10&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Surface-water monthly statistics of the nation). USGS 14164900 McKenzie River ABV Hayden Br, at Springfield, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=14164900&por_14164900_113836=546482,00060,113836,2007-03,2021-10&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Surface-water monthly statistics for the nation). USGS 14166500 Long Tom River near Noti, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=14166500&por_14166500_113843=546486,00060,113843,1935-10,2021-03&start_dt=1936-01&end_dt=2020-12&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

14

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Western Regional Climate Center (2022). Cottage Grove 1 NNE, Oregon (351897). Period of record monthly climate summary, period of record: 08/01/1916 to 06/06/2016. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or1897

Western Regional Climate Center (2022). Eugene, Oregon (352706). Period of record monthly climate summary, period of record: 12/01/1892 to 06/30/1945. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or2706

Western Regional Climate Center (2022). Eugene Mahlon Sweet AP, Oregon (352709). Period of record monthly climate summary, period of record: 06/01/1938 to 06/09/2016. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or2709

15

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Western Regional Climate Center (2022). McKenzie BRG RS, Oregon. Period of record monthly climate summary: 02/01/1902 to 04/30/2016. Accessed April 22nd, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or5362

Western Regional Climate Center (2022). Oakridge fishe hatchery, Oregon. Period of record monthly climate summary: 03/04/1914 to 05/31/2016. Accessed April 22nd, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or6213

16

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Monthly statistics). USGS 14144800 Middle Fork Willamette River nr Oakridge, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=14144800&por_14144800_113613=546393,00060,113613,1958-10,1997-09&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Monthly statistics). USGS 14159000 McKenzie R at McKenzie Bridge, Oreg. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=14159000&por_14159000_113745=546450,00060,113745,1910-08,1994-09&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Peak streamflow). USGS 14144800 Middle Fork Willamette River nr Oakridge, OR. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/peak?site_no=14144800&agency_cd=USGS&format=html

U.S. Geological Survey, 2022, National Water Information System data available on the World Wide Web (USGS Water Data for the Nation – Peak streamflow). USGS 14159000 McKenzie R at Mckenzie Bridge, Oreg. Accessed April 22nd, 2022, at URL https://nwis.waterdata.usgs.gov/nwis/peak?site_no=14159000&agency_cd=USGS&format=html

17

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

U.S. Department of Agriculture, 2022, Natural Resources Conservation Service: National Water and Climate Center. Holland Meadows (520) Oregon SNOTEL Site. Accessed April 22nd, 2022 at URL https://wcc.sc.egov.usda.gov/reportGenerator/view/customChartReport/monthly/start_of_period/529:OR:SNTL%7Cid=%22%22%7Cname/POR_BEGIN,POR_END:M%7C1,M%7C2,M%7C3,M%7C4,M%7C5,M%7C6/WTEQ::collectionDate,SNWD::value,WTEQ::value?fitToScreen=false&useLogScale=false

U.S. Department of Agriculture, 2022, Natural Resources Conservation Service: National Water and Climate Center. McKenzie (619) Oregon SNOTEL Site. Accessed April 22nd, 2022 at URL https://wcc.sc.egov.usda.gov/reportGenerator/view/customChartReport/monthly/start_of_period/619:OR:SNTL%7Cid=%22%22%7Cname/POR_BEGIN,POR_END:M%7C1,M%7C2,M%7C3,M%7C4,M%7C5,M%7C6/WTEQ::collectionDate,SNWD::value,WTEQ::value?fitToScreen=false&useLogScale=false

Western Regional Climate Center (2022). Oakridge fishe hatchery, Oregon. Total of Snowfall (inches) period of record: 03/04/1914 to 04/30/2016. Accessed April 22nd, 2022 at URL https://wrcc.dri.edu/WRCCWrappers.py?sodxtrmts+356213+por+por+snow+none+msum+5+07+F

Western Regional Climate Center (2022). McKenzie BRG RS, Oregon. Total of Snowfall (inches) period of record: 03/04/1914 to 07/14/2022. Accessed April 22nd, 2022 at URL https://wrcc.dri.edu/WRCCWrappers.py?sodxtrmts+355362+por+por+snow+none+msum+5+07+F

18

Dalton, M., Fleishman, E., Bachelet, D., editors, 2022. Future Climate Projections: Lane County, Oregon. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://dlcd.app.box.com/s/gy76zpjwudqt8s0qh60q2vyl81n1wesw

Western Regional Climate Center (2022). McKenzie BRG, Oregon (355357). Period of record monthly climate summary, period of record: 11/02/1954 to 09/16/1970. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or5357

Western Regional Climate Center (2022). Oakridge fishe hatchery, Oregon (356213). Period of record monthly climate summary, period of record: 1914 to 2012. Accessed May 4th, 2022 at URL https://wrcc.dri.edu/cgi-bin/cliGCStT.pl?or6213