JACKSON COUNTY
Health & Human Services

# Climate and Health Action Plan
## Jackson County Public Health
## Medford, Oregon
## August 2013

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This report was produced as part of the Center for Disease Control and Prevention's *Climate-Ready States & Cities Initiative* which was designed to assist 16 states and 2 cities develop ways to anticipate health effects by applying climate science, predicting health impacts, and preparing flexible programs. Oregon Health Authority administered the grant for Oregon and awarded five Local Health Jurisdictions mini-grants to develop public health climate change adaptation plans. This project ran from August 2011 through August 2013 and resulted in the creation of this Climate and Health Action Plan was primarily written by project leader, Susan Bizeau, RN from the Communicable Disease Department with assistance from Tanya Phillips of Public Health Preparedness.

## EXECUTIVE SUMMARY

Jackson County Health & Human Services (JCHHS) is ideally suited to coordinate and plan local adaptation strategies relating to the health impacts from climate change. The climate issue is a global problem, but responses may be ideally dealt with at a local level. Much of what we do as a county health department is appropriate to the monitoring, assessment, and response to the health effects from climate change. Surveillance of communicable diseases and outbreaks, public health emergency preparedness planning, and environmental health messaging and oversight are core functions of Public Health.

This plan was an outgrowth of JCHHS's role in a Center for Disease Control and Prevention (CDC) project from July 2011 to August 2013, using the Building Resilience Against Climate Effects (BRACE) framework. This project was designed to help states, cities and county health departments investigate, prepare for, and respond to the health effects that climate change may have on people.

Public Health staff and managers worked with external advisors and stakeholders to define the projected climate outlook for Jackson County Oregon at mid-century. Engaged advisors came from public and non-profit agencies, scientists, local business, and interest groups. Adaptation interventions and actions were jointly developed with input from multiple sources to insure appropriateness to the local social, economic, and political milieu.

**Key local climate variables identified:**

- Extreme Weather Events – drought, extreme heat, winter storms, and floods.
- Increased Temperature – year round increase in temperature, but with more extreme warming in the summer.
- Changes in Precipitation – more rain in late winter and spring, less snow in winter with reduced snowpack.

**What this could mean for human health in Jackson County (mid-century):**

- Decrease in air quality leading to an increase in respiratory and cardiac illness related to wildfire smoke; increase in ozone on warmer days.
- Decreased water quality and quantity. Well failure and potential contamination of groundwater supply.
- Mental health issues related to quality of life, deterioration, and economic stress particularly on local farming.
- Changes and potential increases in water, food, and vector-borne disease.

**Recommended Actions:**

1. **Collaboration and Coordination:**
   Maintain the Climate & Health Advisory Group, which is central to building local partnerships around climate change issues. Communication is essential between persons, agencies, private businesses, schools, hospitals, clinics, transportation, planners, and the community at large. It is recommended that bi-annual meetings of a standing Climate & Health Advisory Group continue the work that this project initiated. Until additional funding for implementation of the Climate and Health Action Plan is available, building alliances and partnerships will be an important, affordable interim, strategy as well as being a part of the long-term plan.

2. **Air Quality Actions:**
   Develop improved avenues and methods for educating the community about the health impacts of smoke events using the Visibility Scale (Appendix 10), air quality index monitoring from Oregon DEQ and AirNow websites, and other tools and communication methods to be determined.[1] JCHHS will continue to explore avenues of partnership with officials at local Department of Environmental Quality (DEQ), Forestry Service, Rogue Valley Transit District (RVDT), schools and Rogue Valley Council of Governments (RVCOG) to protect the public from air pollution related to weather inversions, ozone, auto emissions, and smoke.

3. **Water Actions:**
   Build connections with local water commissions, hydrologists, geologists, state experts, and internal Environmental Public Health (EPH) Division to better understand how the climate changes of drought and changing precipitation patterns may affect local groundwater, streams, and water quality and quantity over the next 35-40 years.

4. **Climate and Health Informational Website:**
   Create a local Climate and Health web page within the Jackson County web site. Include topics related to climate adaptation, mitigation strategies, as well as up to date information on how our air, water and weather are changing in our country, state and county. Include links and or "widgets" which allow for real time access to data from other web sites. Develop informational messaging, suitable for the multiple target audiences identified.

[1] http://www.deq.state.or.us/aq/burning/wildfires/visibility.htm and http://www.airnow.gov/index.cfm?action=airnow.main

## PROCESS SUMMARY

**Development of the Climate & Public Health Action Plan**

The Jackson County Public Health Climate Initiative began in August of 2011, as part of a CDC project to enhance the capability of state and local health agencies to prepare for the challenges associated with projected climate change. JCHHS worked with the Oregon Health Authority (OHA) and four Local Health Jurisdictions (LHJ) on the CDC's Climate-Ready States and Cities Initiative. [2] Participating LHJ included the counties of Multnomah, Benton, North Central (Wasco, Sherman, Gilliam), Crook and Jackson.

Although a modest amount of funds were distributed to each LHJ over 2 years, resources were maximized by working as a cohort along with guidance and support from OHA. The resulting five LHJ plans are locally driven and varied, dependent on local resources and the critical climate impacts identified by each county. The CDC's framework stressed that a core activity of this program was to engage local stakeholders to build partnerships and connect with other local initiatives.

Funding was guaranteed for the development of a strategic plan, but not for the implementation phase. Recommendations for implementation and expansion of the plan will be made based on future funding availability.

Our process utilized CDC's framework for climate change planning entitled, the BRACE framework.[3] This model consists of five sequential steps to assist LHJ in addressing climate health issues.

**BRACE:**

1. Forecast local climate impacts and assess health vulnerabilities
2. Health risk assessment – quantifying disease burden
3. Identify key interventions to respond to health impacts of climate change
4. Develop and begin implementation of climate and health action(adaptation) plan
5. Evaluation (at each step)

JCHHS plan was developed with input from a diverse group of internal public health leaders as well as public and private advisors (Appendix 1.1, 1.2, 1.3). The project leader was Susan Bizeau, RN, an experienced public health nurse with years of communicable disease and prevention experience. The project supervisor was Belle Shepherd, Jackson County Public Health Division

[2] http://www.cdc.gov/climateandhealth/climate_ready.htm

[3] http://public.health.oregon.gov/HealthyEnvironments/climatechange/Pages/BRACEFramework.aspx

Manager. Key input was received from other Public Health departments including Public Health Preparedness, EPH, Communicable Disease and the JCHHS Medical Director. Presentations were given and feedback solicited from the standing multidisciplinary: Vulnerable Populations Committee, the Public Health Advisory Board, and the Medical Advisory Board.

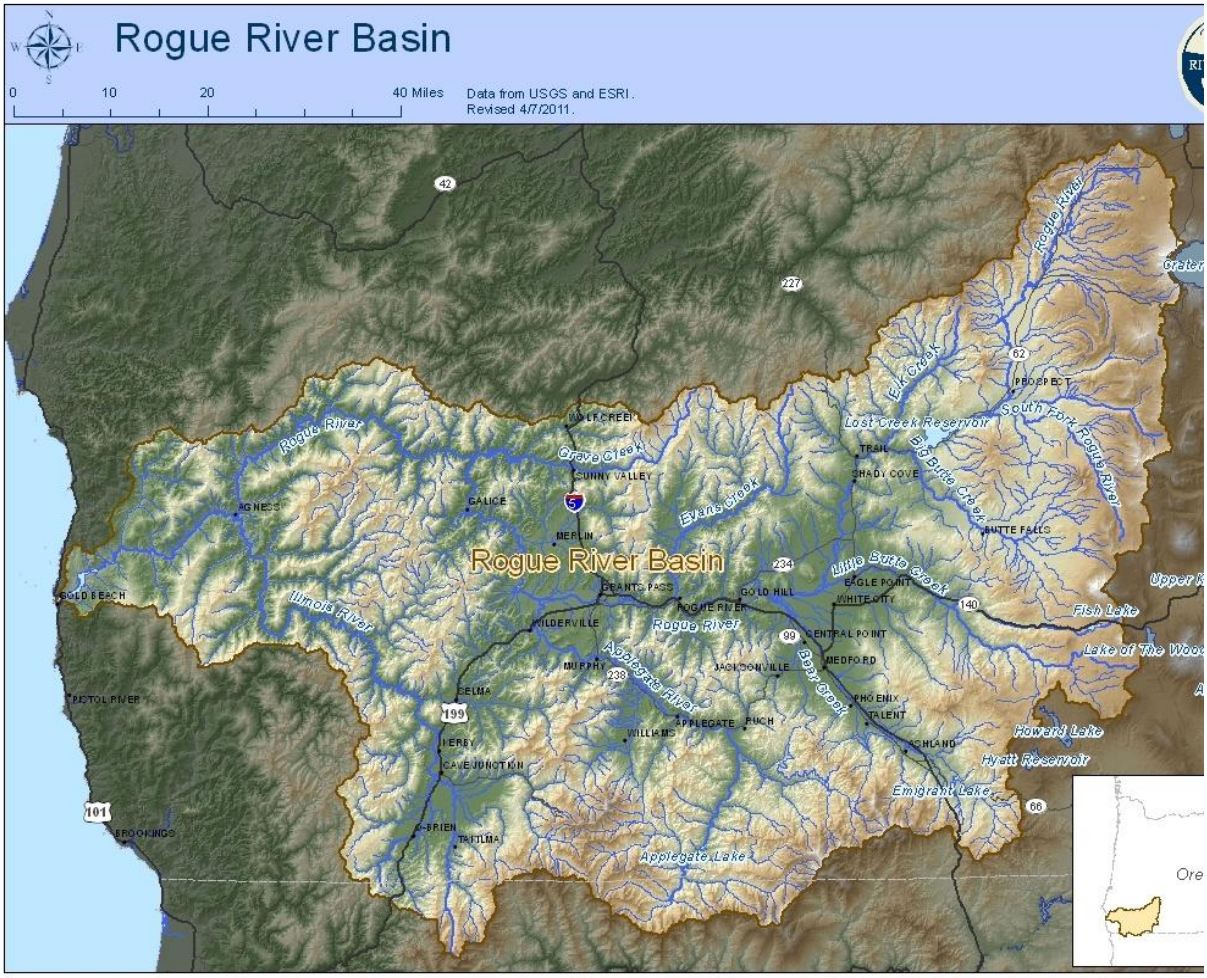
Three two-hour sessions were held with outside advisors and stakeholders. These sessions occurred in August of 2011, February of 2012, and November of 2012. Initially, we did a presentation on climate science with guest speakers from our local Geos Institute, a non-profit organization that helps communities prepare for climate change. Our second advisory group meeting in February of 2012 focused on refining our climate risks locally. Our third stakeholder session in November of 2012 focused on our primary concern, air quality. The Air Quality & Wildfire Work Group (Appendix 1.3) explored the issue of wildfire smoke in depth. Smoke from wildfires, in the summer and fall, is a great concern for many county residents, based on frequent calls to EPH and fire personnel during wildfires. In this session, representatives from multiple agencies including EPH, forestry, mass transit, Department of Environmental Quality (DEQ), National Oceans Atmospheric Administration (NOAA), Rogue Valley Transit District (RVTD), and community members met to explore wildfire smoke issues. The targeted issue was identified as the need for improved public education and service coordination around health and wildfire smoke.

The huge win from this last stakeholder session resulted in a regional planning effort. The Rogue Valley Council of Governments (RVCOG) is moving ahead with an application for a $50,000 federal grant called the Rogue Valley Clean Air Campaign. Public Health staff was invited to participate on the steering committee for this project. In addition to stakeholder sessions, multiple internal meetings, telephone calls, webinars, conferences and research occurred over a two year period.

The resulting Climate and Health Action Plan strives to provide an initial framework for approaching the issue of the health impacts of climate change in Jackson County. The approach favored building collaborative relationships at every stage of the two year initiative, with a goal of stimulating similar initiatives in the future. As planning efforts move forward, success will depend on increased collaboration and resource sharing between cities, counties, states, federal agencies, and private business. The public health perspective is a critical component for both planning and response, for mitigation and adaptation to climate change. This plan will assist Public Health staff to begin to find and develop their roles in this emerging crisis.

## BACKGROUND:

Jackson County lies within the climatic region of the Rogue Valley Basin of southwest Oregon which forms a relatively isolated enclave west of the Cascade Mountain range along the north side of the Siskiyou Mountains. The Rogue Basin comprises parts of four Oregon counties: Jackson, Josephine, Curry and Douglas and a small section of Siskiyou County in California. Jackson County is the 6th most populous county in Oregon with 203,206 residents as of the 2010 census.




This region has been studied fairly extensively utilizing climate change modeling with resulting projected climate impacts at the mid and late century mark. Our project was able to define and hone specific health impacts using *Preparing for Climate Change in the Rogue River Basin of Southwest Oregon*.[4] Additional work was compiled, specifically for this project, by OHA in

[4] http://www.theresourceinnovationgroup.org/storage/ROGUE%20WS_FINAL.pdf

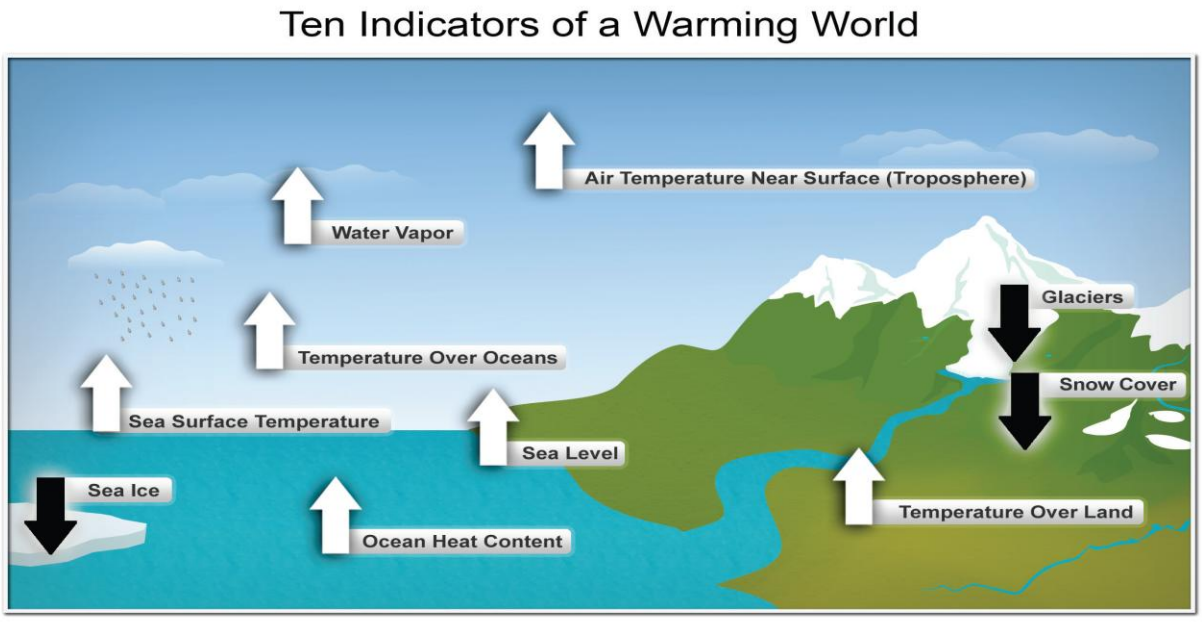
cooperation with The Resource Innovation Group[5] and Oregon Climate Change Research Institute (OCCRI) based at Oregon State University.[6] Alan Journet, retired biologist and Co-Facilitator of Southern Oregon Climate Action Now (SOCAN), did another set of calculations creating an easy to read chart, *Likely Climate Trends and Consequences for the Rogue Valley* (see Appendix 13).

Although our plan focuses on Jackson County, it is important to remember that climate models and projections do not exist along political borders, but rather geographic regions. Response to major climate trends, adaptation and mitigation efforts will be guided by government regulation, citizen input and lobbying, research institutions, nonprofits, volunteer organizations and the private business community. Funding streams will include federal, state and local revenue streams as well as private, non-profit and volunteer enterprise.

[5] http://www.theresourceinnovationgroup.org/
[6] http://occri.net/

## GLOBAL CLIMATE CHANGE DATA AND PROJECTIONS

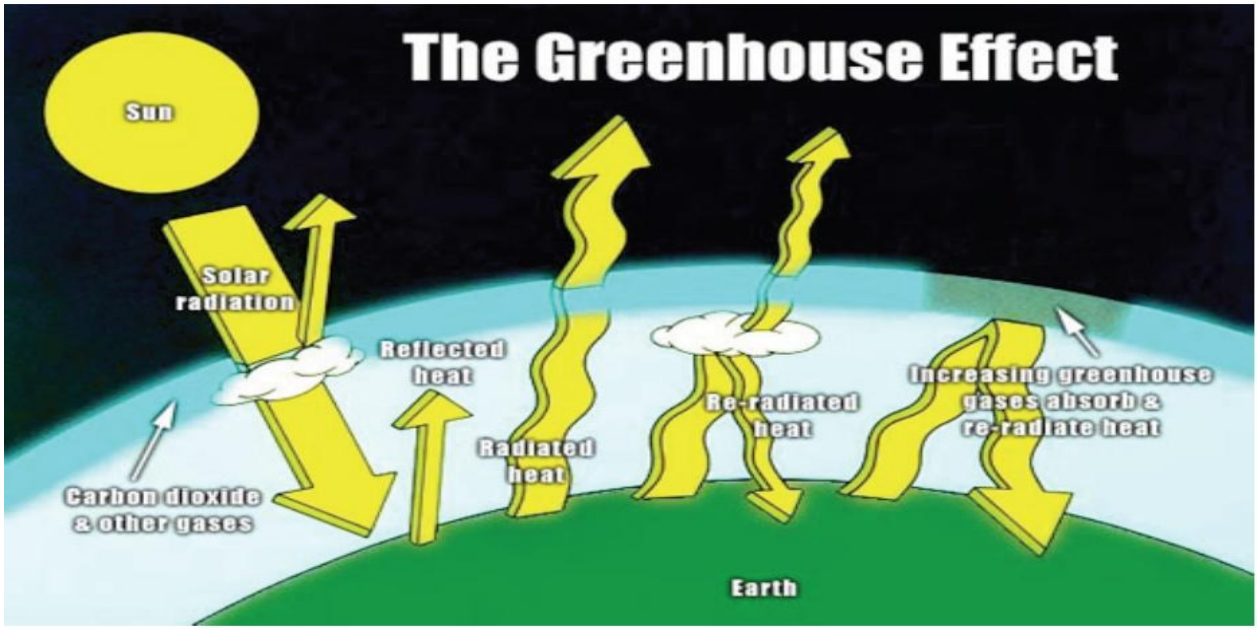
It is beyond the scope of this project to present a thorough analysis of our changing climate. But to prepare locally, we must have some rudimentary understanding of what is happening now and what science projects for the future. Terminology for these weather changes has evolved, varying from global warming to climate change to climate disruption, all of which are referring to the same thing. The National Climate Assessment (NCA) compiled the most comprehensive report to date in January of 2013 with input from scientists and engineers from around the world using satellites, weather balloons, thermometers at surface stations, and many other types of observing systems that monitor Earth's climate system. The data shows the planet is warming with rising land and sea temperatures, lengthened growing seasons in many areas, melting glaciers and arctic sea ice. Certain types of intense weather events are increasing worldwide including an increase in extremes of heat, cold, drought, and heavy precipitation. U.S. temperatures have increased by 1.5°F since 1895 with more than 80% of this increase since 1980.[7] The NCA report concludes that the evidence for a changing climate had strengthened considerably since the last National Climate Assessment (NCA) Report written in 2009. The following graphic summarizes many of the major indicators:




National Climate Assessment, Chapter 2 – Our Changing Climate (v. 11 Jan 2013)

[7] http://ncadac.globalchange.gov/ National Climate Assessment Report draft 2013- The NCADAC was established under the Department of Commerce in December 2010 and is supported through the National Oceanic and Atmospheric Administration (NOAA). A 60-person Federal Advisory Committee has overseen the development of this draft climate report. Its members are diverse in background, expertise, geography and sector of employment. A formal record of the committee can be found at the NOAA NCADAC website.

A broad scientific consensus including the NCA report, the Environmental Protection Agency (EPA)[8], National Aeronautics and Space Administration (NASA)[9], and the Intergovernmental Panel on Climate Change (IPCC)[10] indicate that strong evidence exists that these climate disruptions are caused primarily by a buildup of greenhouse gases in the earth's atmosphere. The greenhouse effect[11] occurs when certain gases: carbon dioxide (CO2), methane (CH4), Nitrous oxide (N2), and fluorinated gases build up in the atmosphere preventing the earth's heat from escaping. Heat gets trapped by the buildup of these gases, and the heat gets re-radiated back to the earth. This effect makes the planet warmer, in the same way that a greenhouse keeps the inside temperature warmer. The problems have come by the dramatic increase in this effect in the last 100 years. This increase is believed to be caused primarily by the burning of fossil fuels, clearing of forests and desertification worldwide which has dramatically increased the amount of CO2 in our atmosphere. A partial list of these scientific organizations, along with links to their published statements and a selection of related resources, can be found at the NASA Global Climate Change website.[12]




Additional graphs, charts and tables depicting a slice of the current known climate science most relevant to Jackson County can be found in the appendices.

[8] http://www.epa.gov/climatechange/
[9] http://climate.nasa.gov/
[10] http://www.ipcc.ch/
[11] http://www.epa.gov/climatechange/ghgemissions/gases.html
[12] http://climate.nasa.gov/scientific-consensus

## BRACE Steps – A Framework for Approaching the Health Impacts of Climate Change

### BRACE Step 1: Assessing Local Climate Impacts, Health Outcomes and Vulnerable Populations

JCHHS believes delivering responsible public health service requires research, monitoring and preparing for the potential and projected public health risks that have been identified by local, state, and national health agencies. The September 2009 issue of *Lancet,* published the University College London/ Lancet Commission report, *Managing the Health Effects of Climate Change*, describes a potentially disastrous effect on health across the globe. Stating it may be the biggest public health threat of the 21st century.

Climate projections for the northwest region of the U.S. are believed to have similar, but less dramatic heat and precipitation changes than other parts of the U.S. and world. Oregon has already seen low surface water supply in some areas, decreased snowpack and severe drought particularly east of the Cascades.[13] Forest fires and air pollution, from wildfire smoke, have become almost annual summer occurrence across the west including Oregon. Since much of Oregon may not be hit as hard as California and the south-western states, there has been some discussion in the media, both locally and nationally, of potential influx of climate refuges. This may need to be considered in planning for increased infrastructure, water resources as well as other social services.

**An initial survey of our regional strengths related to climate change included:**

- Geos Institute – a local non-profit, consulting firm in Ashland, OR that helps organizations and communities predict, mitigate and prepare for climate change. They participated in a regional analysis of climate change projections in the Rogue River Basin in 2008.

- Vulnerable Populations Committee – composed of a wide variety of local professionals serving low income, elderly, and disabled and otherwise at risk individuals in Jackson County.

- Medical Reserve Corps – a group of doctors, nurses and other medical professionals that were gathered in response to the H1N1 threat. This is a volunteer group that is now maintained and utilized for responding to disasters or emergencies in the county.

[13] Oregon Water Resources – Drought Watch - http://www.oregon.gov/owrd/pages/wr/drought.aspx

- Medical Advisory Group – medical professionals that meet regularly to advise the Health Director on health issues affecting Jackson County.

Our kick-off BRACE event was a presentation by Geos Institute in August of 2011 to 19 advisors, stakeholders, JCHHS staff and managers. Detailed projected climate variables for Jackson County and the Rogue River Basin (Doppelt, 2008, et al)[14] were presented and discussed:

- Temperature rise - Average annual temperature may increase by 1 to 3°F (0.5 to 1.6°C) by 2040. Potential additional increase of 4 to 8° F (2.2 to 4.4°C) by around 2080. Average summer temperatures may increase dramatically reaching 7 to 15°F (3.8 to 8.3°C) above baseline by 2080.

- Snowpack decline - by 75% from baseline by 2040s and close to 94% by end of century.

- Wildfire - longer fire season with more frequent and hotter burns, with more wildfire smoke.

- Precipitation - falling more as rain than snow and in shorter periods of time (downpours).

- Stream flow - heavier in winter and early spring, reduced in summer. Earlier snow melt impacting stream flows.

- Extreme weather events - (heat, flood, and drought) may increase in frequency and intensity.

The chart, *Likely Climate Trends and Consequences for the Rogue Valley* (Appendix 13) by Dr. Alan Journet, shows slightly different results from the same modeling data. Both sets of projections tell the same general story of a warming Oregon, particularly in the summer with less snowfall. Given the complexity of climate modeling and the potential for both positive and negative mitigating factors and adaptive strategies, the Jackson County Climate and Health Plan will focus on a shorter mid century, 35-40 years, projection rather than try to plan for a more uncertain 2080 scenario. It must be kept in mind that without mitigation, multiple scientific reports indicate that the climate trends discussed may continue and worsen significantly, perhaps sooner than expected.

[14] http://www.theresourceinnovationgroup.org/storage/ROGUE%20WS_FINAL.pdf

In order to corroborate these climate projections locally, county department managers and the project leader met with local experts and stakeholders to verify that the climate variables identified by modelling did actually appear to be local risk factors, especially to vulnerable populations. Advisors included a very wide group of experts including water commission representatives, local weather climatologists and climate scientists, planning professionals in water and air, forestry service, Public Health Preparedness, EPH, emergency management and the Vulnerable Population Committee (Appendix 1.1, 1.2, 1.3).

Stakeholders, advisors and public health staff eventually identified potential health impacts for Jackson County as potential increases in respiratory and cardiac illness from decreased air quality, well failure and water contamination, mental health issues from environmental and economic stressors, and potential increase in water, food and vector-borne diseases. The potential health impacts of climate change reflect similar health issues that Public Health already deals with on a daily basis, but the difference is that these issues are predicted to become more frequent, more intense and have greater human and environmental consequence.

Identified vulnerable populations to the projected climate changes include those with pre-existing medical conditions, the elderly, young children, low income, and the physically and mentally disabled. Geographic isolation and social vulnerability also contribute to the risk in any emergency situation.[15] Those without ready transportation cannot move quickly in an emergency and cannot easily haul water or escape flooding conditions. The U.S. Geological Survey reports that over 50% of Jackson County's population relies on groundwater wells for their drinking water which are at risk in both flooding and drought conditions. Therefore, private well users are a subset of the vulnerable population in relationship to water quality. Water threats will be discussed in more detail in following sections.

[15] Social Vulnerability to Climate Change in California July 2012 - http://www.energy.ca.gov/2012publications/CEC-500-2012-013/CEC-500-2012-013.pdf

## BRACE Step 2: Health Risk Assessment and Quantifying the Data

Estimating and quantifying the additional burden of disease due to climate change is a difficult undertaking at best and especially challenging on a county level. Dr. Paul Cieslak, Infectious Disease Specialist, heading the Acute and Communicable Disease Prevention (ACDP) section of Oregon Health Authority (OHA) writes, "Given the dynamic interplay among reservoirs, vectors, human hosts, and the environment, we can predict that communicable disease patterns will change." Disease and outbreak monitoring is essential for early detection of the health consequences of multiple complex climate disruptions. (See Reportable Diseases Appendix 5).[16]

County systems are not in place for a mortality/morbidity assessment of climate health impacts. OHA Health Security Preparedness and Response Program is working with hospitals to be able to categorize diagnosis codes from emergency room visits in such a way that tracking might be improved during a future extreme event such as a pandemic or severe heat event.

A detailed collection of data sources related to health impacts from climate change was beyond the scope and resources of Jackson County Health Department at this time. Data necessary for a qualitative and quantitative assessment is best gathered from multiple agencies and sources and would ideally be gathered from a larger population pool, such as state or national data bases. At present, there has been no verification that local disease patterns and numbers have changed yet, due to recent climate changes. However, data related to the health risks from reduced air quality and risks to groundwater from flood and drought are available nationwide and can be extrapolated to deduce regional impacts under similar circumstances.

### Identified Local Climate Priorities

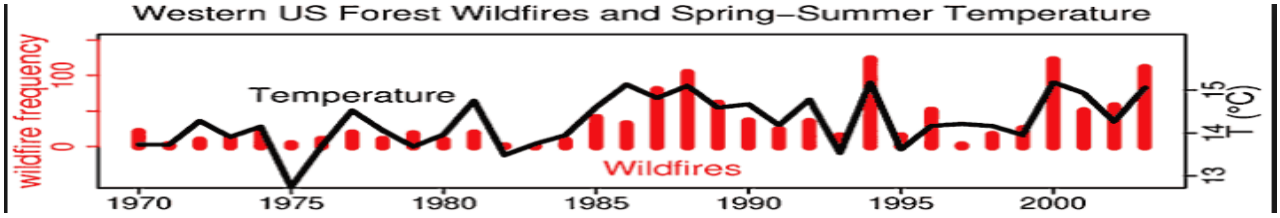
**Air quality/wildfire smoke:**

Longer fire seasons are projected in climate models due to warming temperatures, drought, infestation of bark beetles, and overgrowth due to years of fire suppression policy. A study published in *Science* in 2006 [17] showed that large wildfire activity increased suddenly and markedly in the mid-1980s, with higher large-wildfire frequency, longer wildfire durations, and wildfire seasons up to 2.5 months longer than 1970. The greatest increases occurred in mid-elevation, Northern Rockies forests, where land-use histories have relatively little effect on fire risks and were thought to be strongly associated with increased spring and summer temperatures and an earlier spring snowmelt. More frequent wildfires increase human

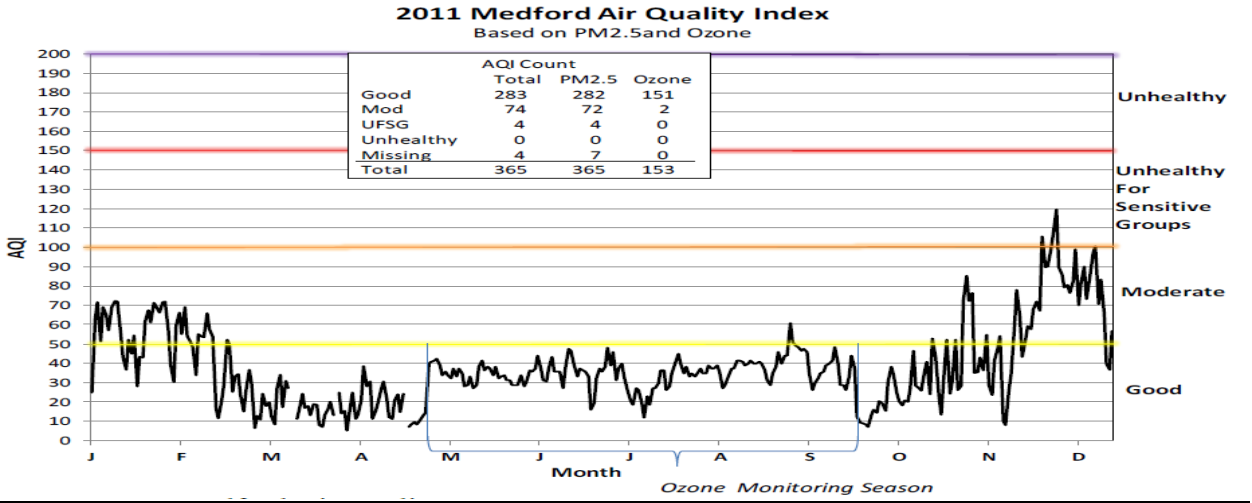
[16] CD Summary of Dec. 9, 2008 http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/CDSummaryNewsletter/Documents/2008/ohd5725.pdf

[17] http://www.sciencemag.org/content/313/5789/940.short

exposure not only to the fire, but also to smoke, ozone, and small particulate matter-PM 2.5.[18] Up to 70-95 % of wildfire smoke particles are thought to be made up of these smaller particles which can more easily penetrate the lungs causing damage and aggravating sensitive populations such as asthmatics, children, pregnant women, elderly, smokers, and those with pre-existing cardiovascular and pulmonary disease.[19] The chart below clearly demonstrates that western wildfires have increased as temperature and drought have increased. [20]




Poor air quality from wildfire smoke is often not reflected in the air quality index numbers as the monitor placement was designed to monitor automobile emissions and winter wood smoke rather than wildfire smoke (per conversation with John Becker, DEQ Regional Manager, Nov 2012 work group). In addition, wildfire smoke can change quickly with wind direction and be complicated by temperature inversions which can hold smoke on the ground for days to weeks. For example, the chart below from DEQ shows some problem air quality days in Medford related to inversions in the winter, but does not adequately capture the polluting effects of wildfire smoke that were occurring in September when smoke flooded into the valley from a 100,000 acre wildfire burn in central Oregon (DEQ News release September 2, 2011).




[18] http://www.nasa.gov/topics/earth/features/climate-fire.html
[19] http://www.deq.state.or.us/aq/burning/docs/smoke_bhope.pdf
[20] www.giss.nasa.gov and http://www.giss.nasa.gov/research/briefs/hansen_17/

In addition, it should be noted that the publicly reported air quality index (AQI) numbers are generally obtained through 24 hour averages. Yet, it is generally recognized by forest service professionals that wildfire smoke can seriously impact health at shorter one hour intervals. For instance, in Rathdrum Idaho, a coroner determined the cause of death for a woman as a "smoke inhalation triggered asthma attack" that happened during a short-term field burning smoke incident. [21]

In July and August of 2002 wildfire smoke caused a violation of the federal particulate matter standards due to smoke in Lakeview, Klamath Falls, Medford and Grants Pass. In addition, rural and smaller communities were doubtlessly affected, but lacked the monitoring equipment to document the levels of particulate matter. The 2002 wildfire season was one of the worst in Southern Oregon history, the 2002 Biscuit Fire alone burned more than 500,000 acres. According to Oregon Department of Forestry Forest Fire Summary Annual Report, nephelometer values rose to the highest hourly values DEQ had seen in 10 years, rivaling the worst years of winter-time wood smoke in the late 1980's.

The report, *Wildfire Smoke -A Guide for Public Health Officials* (rev. July 2008)[22] states that most healthy adults and children will recover quickly from wildfire smoke exposure and will not suffer long-term consequences. However, certain sensitive populations may experience more severe short-term and chronic symptoms. Much of the information about how particulate matter affects these groups has come from studies involving air pollution in cities, though a few studies examining the effects of exposure to wildfire smoke state the effects are likely to be similar (Naeher, et al. 2007). More research is needed on the short and long term effects of repeated exposure to wildfire smoke as more and more people are affected by wildfire smoke each year.

According to the OHA report, *Burden of Asthma in Oregon 2010*, approximately 10.2% of adults and 9.5% of children have asthma. In 2009, Oregon was among the top five states with the highest percentage of adults with asthma.[23] One OHA source reports that in 2007, Jackson County had pediatric asthma hospital admission rates approximately twice the state average (Appendix 6). Researcher, Rob McConnell, from USC's Keck School of Medicine states, "plans to reduce greenhouse gas emissions and combat climate change offer an opportunity to develop

[21] http://www.deq.state.or.us/aq/burning/wildfires/neap/WildfireNEAP.pdf
[22] http://www.oehha.ca.gov/air/risk_assess/wildfirev8.pdf
[23] http://public.health.oregon.gov/DiseasesConditions/ChronicDisease/Asthma/Documents/burden/or_asthma2010.pdf

'win-win' strategies that will maximize the health benefits from reduction both of greenhouse gases and of air pollution that directly harm children (from asthma)."[24]

During the 2012 Pole Creek fire in Sisters, Oregon[25] DEQ air monitoring showed small particulate matter reached hazardous levels for at least 10 days and was unhealthy for at least a month (Appendix 11). After the fire, OHA's Health Security Preparedness and Response (HSPR) team did a survey of medical visits during the time period and surprisingly found no significant increase in physician or ED visits despite anecdotal and newspaper reports of many breathing difficulties. In their post incident evaluation, OHA HSPR staff, postulated that many vulnerable individuals left the area, refilled prescriptions and did home care rather than seek direct medical care in the area. Tracking disease outcomes from environmental events requires long term studies with large sample sizes rather than drawing conclusions from individual incidents. Accurate outcome data is often not reflected in short term statistics such as ED visits. In addition, caution needs to be exercised in assessing health impacts to a one-time event when multiple similar events over time can magnify the health impact causing chronic respiratory and cardiovascular disease.

After the Pole Creek Fire of 2012, a multi-agency work group was convened to analyze and improve coordination of response when there are prolonged air quality issues due to wildfire smoke. Members of the work group included OHA, DEQ, Oregon Occupational Safety and Health (OSHA), and the Oregon and U.S. Forest Service. This group produced a report entitled *Oregon Wildfire Response Protocol for Severe Smoke Episodes*[26] intended to provide practical guidance for state, federal and county agencies in Oregon who respond to severe smoke episodes caused by large or long duration wildfires. The goal is to insure a coordinated response in order to mitigate impacts on the health of the public. The guide is posted on the Oregon DEQ website and there will be a link to it from the OHA site as well.

More research is needed to determine whether existing guidelines such as the Visibility Scale (Appendix 10) is an adequate tool for guiding the public in the health impacts and safety actions necessary when intense smoke floods an area.[27] Farrer, of OHA, and others in the work group were unable to find evidence to support the use of the Visibility Scale. Apparently, it was developed in Montana as a practical working document, but has never been validated and coordinated to match actual health outcomes.

[24] http://www.emagazine.com/earth-talk/traffic-pollution-and-asthma and http://ehp.niehs.nih.gov/wp-content/uploads/2012/09/ehp.1104785.pdf
[25] http://www.deq.state.or.us/news/prDisplay.asp?docID=3939
[26] http://www.deq.state.or.us/aq/burning/wildfires/index.htm
[27] http://www.deq.state.or.us/aq/burning/wildfires/visibility.htm

The main immediate health risk from wildfire smoke is from fine particulate matter ($PM_{2.5}$), but larger particles are more likely to contribute to the haziness that decreases visibility. Despite the lack of research parents, schools and the general public need guidelines to determine appropriate behavior when the air is very smoky. Multiple states and agencies in the western U.S. continue to use this scale in public messaging. Until more research is done, Jackson County plans to continue to use the Visibility Scale as one tool to guide the public in responding to reduced air quality from smoke. With proper training and use of the web sites such as Air Now and DEQ's Air Quality Index (AQI) site could be important tools for public education.

Finally, it is important to hone existing surveillance systems to monitor increases in disease patterns and emerging diseases with climate in mind. Ideally using multiple methods such as tracking emergency room visits, hospitalizations, physician office visits, laboratory findings, prescriptions and refills, and monitoring respiratory and cardiac diseases longitudinally. It must be kept in mind that many ill individuals do not visit health care providers due to lack of access, poor financial coverage, or social reticence leading to under reporting of much illness, particularly among men.[28] Data collection for monitoring health impacts of climate change will doubtless come from many sources and methods and agencies and is an evolving process. Thus, again, collaboration is essential.

**Water Issues**:
Jackson County has excellent sources of public drinking water at present, but issues of concern include increasing well failure, potential groundwater contamination from leaking irrigation pipes, and reliance on declining snowpack. Historically, snowpack is our water reservoir — releasing water as it melts through the summer and fall. Major drinking water sources of Ashland's Reeder Reservoir and Medford's Big Butte Springs rely on snowpack almost entirely.

Crater Lake National Park has collected data since the 1930's, showing a steady decade-by-decade decline (Appendix 4). If this trend continues, snowpack by mid-century will be only 30-40% of current levels. While the Medford Water Commission has a long term plan for water distribution, declining snowpack, precipitation changes, increased annual temperature and population migration could create a need for redistribution effecting agriculture as well as human consumption.

According to a 2012 DEQ report, the Rogue Basin's water system has 22 public water systems using surface water and 251 public water systems relying on groundwater (not all within Jackson County). All Public Water Systems require routine testing and some systems periodically exceed drinking water standards for a number of parameters including nitrates,

[28] https://www.mja.com.au/journal/2006/184/2/what-do-we-know-about-men-s-help-seeking-and-health-service-use

bacteria and turbidity.[29] There are at least 350,000 private wells in Oregon, with 3,800 new wells drilled each year. Twenty-three percent of Oregon residents are being served by wells with no regulated testing and management except at point of property transfer (Appendices 8 and 9).

Groundwater wells are the primary source of drinking water for rural residents in Jackson County. The primary quality concerns for wells are nitrates and bacteria in the valley and lowlands; arsenic, salts, minerals fluoride and boron in the hills and mountain areas. Amy Patton, of Patton Environmental, in Ashland, Oregon suggests further investigation should be conducted into potential concerns associated with wide-spread vanadium in groundwater. Vanadium is considered a toxic substance, but toxic levels have been determined for air, but not water. Historically, vanadium has not been thought to be well absorbed from the gastrointestinal tract, but it has been found to have neurological and cardiovascular toxic effects on rats when given orally[30]. Future demand on groundwater from municipal systems and private drinking wells may cause water levels to drop, concentrating vanadium in some areas and releasing arsenic from rock formations.[31]

Private well failure and contamination in Jackson County is already occurring and is due to multiple causes including old wells with inadequate liners, nitrate contamination and rising groundwater in some areas. California, Colorado, Georgia, Idaho, Indiana, Oregon, Pennsylvania, Washington, and Wisconsin have been identified as having the highest nitrate concentrations in shallow groundwater in the U.S. Only Oregon has enacted legislation that requires private well testing at the point of a real estate transaction.[32] Some home owners have already had to "carry water" or have it delivered to large holding tanks for many years in some parts of rural Jackson County (per Bob Jones, Medford Water Commission).

Climate threats to water can be divided into direct and indirect. Direct threats in Jackson County include extreme weather like drought and flooding. Indirect threats include potential changes in life cycle patterns of microbes that are linked to waterborne illness enabling these microbes to thrive, persist, and act unpredictably (per Hoppe, OHA hydrologist). Changes in temperature can increase the threat from many disease organisms and their vectors, enhancing development rate and population increase. Protozoal infections such as cryptosporiodiosis, amoebiasis and giardiasis, and bacterial infections such as campylobacteriosis, Salmonellosis and, E.Coli may increase. Many of these waterborne diseases are already reportable and

[29] http://www.deq.state.or.us/wq/watershed/Docs/RogueSummary.pdf
[30] http://oehha.ca.gov/water/pals/vanadium.html
[31] "2012 Rogue Basin Groundwater Investigation – available from Amy Patton, Hydrologist, Patton Environmental (see Oregon DEQ website for future posting)
[32] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001807/

tracked by our local Communicable Disease (CD) Department, OHA's Acute and Communicable Disease Department and CDC. Changing climate patterns may make new geographic areas suitable for the mosquito-borne diseases of malaria, west nile virus and dengue fever, and tick-borne disease such as Lyme disease.

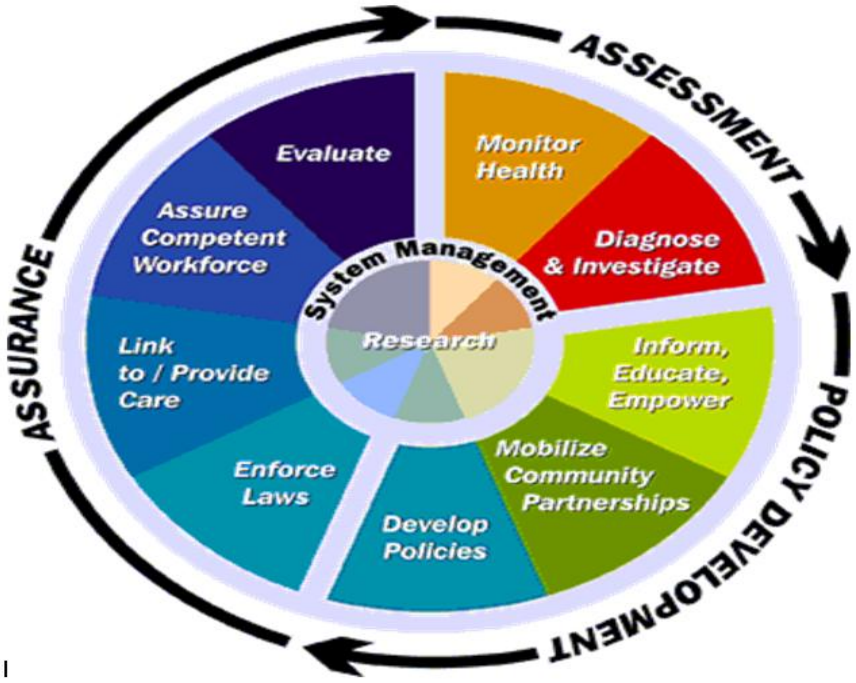
Competition for groundwater will likely get fierce in the future with drought, flooding and increased demand threatening both quality and quantity of drinking water. In addition to oversight of some small water systems, the role of LHJs could be to increase public education and advocacy for residents relying on wells regarding potential contaminants and guidance for treatment if needed.

**Extreme Weather Events**:

Jackson County's Public Health Hazard Vulnerability Assessment supports the chosen climate risks by identifying winter storms, floods, and wildfires as having a 10 on the scale of 10 or 100% likelihood of occurring (Appendix 12). Every incident is different and requires coordination between multiple agencies and personnel to make ground level, on the spot decisions which are appropriate for the particular situation. Close working relationships between OHA, Public Health Preparedness, Emergency Management, Oregon Department of Forestry, DEQ and weather specialists facilitates quick action and a coordinated service delivery during extreme weather events.

**BRACE Step 3: Key Interventions to Local Health Impacts of Climate Change**

The *10 Essential Services of Public Health* were used as a framework in analyzing and planning interventions.




1. **Monitor Health** – JCHHS works with OHA and CDC to keep abreast of trends related to disease through the state Acute and Communicable Program (ACDP) and the local Communicable Disease Department. Overall trends will probably first be recognized on a regional and national level rather than the county level, although initial outbreaks of unusual diseases may be identified at the county level first. Disease incidence data is often too few at a county level to be statistically significant, but unusual outbreaks or diseases are reported and analyzed locally by CD staff, then reported to OHA's ACDP program and eventually to CDC for national tabulation and analysis. With climate change health impacts in mind, the CD staff is strengthening our relationships with the Vector Control Program, local DEQ, Forest Service, local water commissions, weather climatologists as well as local hospitals to insure early detection of significant trends. We have begun inviting representatives from these agencies to our weekly CD Meetings. We have also taken opportunities to join other initiatives like the Vulnerable Population Committee (representing climate change) and the Rogue Valley Clean Air Initiative. It is essential that

we maintain a vigorous public health surveillance and reporting system and look for opportunities for collaboration.

2. **Diagnose & Investigate** – Jackson County currently has departments in CD and EPH with excellent technical and clinical support from OHA. We currently investigate legally reportable diseases and outbreaks (Appendix 5) and take calls from citizens and clinicians on issues of concern related to disease and prevention. EPH has a winter Wood Stove & Open Burning Program which works in conjunction with local DEQ to monitor air and prohibit burning based on reduced air quality in the winter due to air inversions. This relationship between DEQ and EPH could be expanded to assist with air quality issues, secondary to climate change effects such as wildfire smoke. EPH also has a drinking water program for small systems, outside of the larger local water districts of Medford and Ashland. EPH provides water system surveys, monitoring, and compliance activities for 221 public drinking water systems in Jackson County that provide clean water to approximately 23,000 citizens.

3. **Inform, Educate and Empower** –Jackson County Public Health Administration has demonstrated its value and support of climate change issues by fostering interest and time for Public Health staff to research and analyze the health impacts of climate change in conjunction with CDC's Climate-Ready Cities & States Initiative (2011-2013).[33] A Climate Resource Library has been started with books, DVDs and up to date climate reports. An internal web-based resource bibliography related to climate and public health has been created for future reference. The LHJ distributes a monthly *Flash Report,* which is emailed to the medical community and partners in Jackson County with topics of interest to public health locally. Climate change issues will be highlighted as appropriate including a link to our final Climate and Health Action Plan. A JCHHS Facebook page is active and is linked to current issues.

4. **Mobilize Community Partnerships –** Partner and engage with public agencies, scientists, grassroots civic groups and private business to identify common issues related to climate change in our area. A goal is to continue the Climate & Health Advisory Group (Appendix 1.1 and 1.2) meeting bi-annually to explore appropriate adaptation strategies related to the three primary local health risks of climate change: wildfire smoke, water risks and extreme weather events. A mid-term goal is to work with local agencies to develop a centralized

[33] http://www.cdc.gov/climateandhealth/climate_ready.htm

Health & Climate web page to disseminate information related to local climate change including health impacts.

5. **Develop Policies –**A long term goal is to have climate change health issues integrated in all comprehensive plans such as emergency management, public health preparedness, city/county/regional planning, forest service, education, transportation and air and water quality.

6. **Enforce laws –** Work with DEQ, wood burning stove program and forest service to give appropriate input related to health, water and air quality. Coordinate with law enforcement as appropriate to protect the health of the public (ex,-isolation and quarantine).

7. **Link to/Provide Care -** Continue to keep medical community up to date on the changing aspects of public health related to climate health issues. Specifically, continue weekly CD meetings with Division Manager, Medical Director, Public Health Preparedness Coordinator and CD nurses. In addition, continue monthly Medical Advisory Group (MAG); quarterly Public Health Advisory Board meetings; and monthly *Flash Report* to the medical community and partners in Jackson County. Identify areas where improved service is needed by working with Jackson County Vulnerable Populations Committee which meets monthly.

8. **Assure Competent Work Force –** Provide opportunities for education related to climate change and health as new information becomes available and new hires occur. Seek funding for additional training and support related to climate health issues. Identify internal team for implementation of Climate & Health Action Plan.

9. **Evaluate –** Ongoing assessment of Public Health's role and ability to assess and intervene on issues related to health and climate change. Work with other agencies to develop methods to evaluate community response to public health messaging – such as analyzing the public behavioral response to announcements regarding poor air days or flooding threat.

10. **Research -** Work with other advisors and stakeholders to develop programs for monitoring climate change impacts in Jackson County. Explore opportunities for additional grant funding or general revenue funding stream to continue and expand the Climate & Health Action Program.

## BRACE Step 4: Action Steps for Implementing JCHHS Climate and Health Action Plan

### Collaboration & Coordination

Continue the Climate & Health Advisory Group which will promote and assist the ongoing collaboration necessary to respond to the health impacts of climate change in the future. Communication is essential between persons, within and between agencies, community, private business, schools, hospitals, clinics, transportation, and planners. Public health and climate issues ideally will be represented at multiple "tables" as public and private planning occur. A core group of committed stakeholders and advisors (Appendix 1.1, 1.2, 1.3) has already been gathered, cultivated and they have committed to continue as advisors. It is recommended that bi-annual meetings of a standing Climate & Public Health Advisory Group continue the work that this project initiated. To date, this advisory group has been facilitated by the project leader for the CDC Climate-ready Cities & States Initiative grant. The appointment of an ongoing facilitator within JCHHS will be essential to keep this group active and functional after completion of the grant funding. Until additional funding for implementation of the Climate and Health Action Plan is available, finding ways to build alliances and partnerships will be an important interim strategy.

### Air Quality Actions

Develop improved avenues and methods for educating the community about the health impacts of smoke events using the Visibility Scale (Appendix 10), AQI monitoring, current websites, social media and other tools.[34] It will be important to explore continued avenues of partnership with officials at local DEQ, Oregon Department of Forestry (ODF), Rogue Valley Transit District (RVDT), and schools to protect the public from air pollution related to wildfire and wood stove smoke, auto emissions, and ozone. In coordination with other agencies, develop effective response and public messaging. Jackson County Public Health staff has already been invited to participate on the Steering Committee of Rogue Valley Council of Government's "Rogue Valley Clean Air Campaign" whose purpose is to educate the public about the Rogue Valley's air quality related to transportation. Future partnering with Rogue Valley Transit's school education program may be another avenue for teaching children and educators how to evaluate air quality and make decisions related to outside activities and sports events (use of Visibility Tool) during questionable air quality days.

[34] http://www.deq.state.or.us/aq/burning/wildfires/visibility.htm

**Water Actions**

Build improved connections with local water commissions, hydrologists, geologists and internal EPH staff to better understand how climate changes of drought, declining snowpack and changing precipitation patterns may affect groundwater, streams and water quality and quantity over the next 35-40 years. One goal is to hold a "Water Work Group" with our Advisory Group and regional and state water experts and stakeholders to further share knowledge about climate change effects on water and build collaborative relationships locally.

**Climate and Health Informational Website**

Create a local *Climate and Health* web page within Jackson County's web site. Focus could include topics related to climate adaptation, mitigation strategies, as well as up to date information on how our air, water and weather are changing in our county. Rather than using links to other sites, ease of use may favor real time widgets for immediate access to data from other web sites. Ideally, multiple data about local climate change and health could be accessed from one central web page. Important information to include could be DEQ's air quality index, maps from AirNow website, Forest Service fire advisories and local weather information. This has been done for years with success by Sacramento's Spare the Air website.[35]

The Yale School of Forestry and Environmental Studies have done extensive research on how the American public views climate change. They define "six Americas" comprising a range from range Alarmed through Concerned, Cautious, Disengaged, and Doubtful, to Dismissive. As public messaging is developed, it will be important to have an awareness of local personal attitudes and knowledge about climate change to develop appropriate messaging to our audience. [36]

[35] http://www.sparetheair.com/index.cfm
[36] http://environment.yale.edu/climate-communication/article/Climate-Beliefs-April-2013/

## CONCLUSION

A consensus of climate scientists agree that the world's climate is warming and many health professionals have said that the health impacts may be the most crucial public health challenge of the 21st century.[37] The importance of steadily moving forward on addressing the public health issues of climate change seems essential despite the lack of secure funding. While the amount of resources invested in the BRACE project has been comparatively small, future planning and implementation could easily be pushed aside in favor of day to day public health tasks. And yet, when an emergency is upon us, planning can save hours, weeks and months of time and provide for fast, effective response, often saving lives and certainly minimizing suffering.

A strong commitment from the health department administration and an internal core team of leaders will be necessary to move the Climate & Health Action Plan forward. Key aspects of this plan are already being implemented though the programs of Public Health Preparedness, Environmental Public Health, and Communicable Disease. In addition, input and support from the Medical Director and an ongoing Advisory Group will be important. A new June 2013 organizational chart for Jackson County Public Health indicates that the Climate Change Program has been placed under a re-organized Prevention Services Section (Appendix 14).

Future climate and health change planning must acknowledge that health impacts may not appear as a traditional acute emergency, but may be of a slightly hidden, insidious nature where the outcomes are not totally known for years, such as effects of reduced air quality or water contamination on our most vulnerable populations. No single approach or discipline can solve this multi-dimensional issue that is linked with our modern way of life. A new paradigm of system-based public health services may be essential to address this global problem on a local level. This climate and health adaptation plan is a stepping stone toward the goal of managing the health impacts of climate change in Jackson County.

[37] http://climate.nasa.gov/scientific-consensus

**LIST OF APPENDICES:**

**Appendix 1.1 Jackson County Climate Health Initiative - Internal Core Advisory Group (2011-2013)**

**Jackson County Public Health Staff:**

**Susan Bizeau RN**, BizeauSL@jacksoncounty.org, 541-774-8068, Climate Project, Communicable Disease and Immunizations

**Belle Shepherd**, ShepheBS@jacksoncounty.org, 541-774-8039, Public Health Division Manager, Co-leader Climate Change grant.

**Jim Shames, MD**, ShamesJG@jacksoncounty.org, (541) 774-7885, Health Officer, Jackson and Josephine County Public Health

**Jackson Baures**, BauresJB@jacksoncounty.org, (541) 774-7829, Environmental Public Health Division manager

**Tanya Phillips**, phillitf@jacksoncounty.org, Public Health Preparedness Coordinator.

**Stephen Mcleod**, McLeodSJ@jacksoncounty.org, 541-774-8902, Healthy Communities Coordinator

## Appendix 1.2 Jackson County Climate Health Initiative - External Stakeholders & Advisory Group (2011-2013)

**AIR** - DEQ: Wayne Kauzlarich, KAUZLARICH.Wayne@deq.state.or.us, 541-776-6010.

**BUSINESS:** Sid DeBoer, CEO, Lithia Motors, sid@lithia.com , 877-331-3084.

**COMMUNITY REPRESENTATIVE:** Gary Stevens, zeeke0943@gmail.com, 541-601-0848 ©, 541-499-6486 (landline) retired Manager JC Environmental Health Department

**COMMUNITY REPRESENTATIVE**: Alan Journet, retired professor of conservation biology and ecology, alanjournet@gmail.com, 541-301- 4107.

**COMMUNITY REPRESENTATIVE:** Pepper Trail, ornithologist and conservationist-US Fish & Wildlife Forensic Lab, ptrail@ashlandnet.net.

**EMERGENCY MANAGEMENT:** Michael Curry, Manager, CurryMC@jacksoncounty.org, 541-774-6821.

**FOREST SERVICE**: Jim McGinnis, Office of Sustainability, ecologist, jmcginnis@fs.fed.us, 541-552-1591; Rob Budge, Deputy Fire Staff Fuels-Rogue River Siskiyou National Forest; Chris Chambers, Ashland Forest Resource Specialist.

**Region 5 Healthcare Liaison, OHA:** Beth DePew, beth.depew@state.or.us, 541-471-3829.

**MEDICAL COMMUNITY:** Dr. Anne Alftine, internist, PMMC, JRHA

**NOAA (Medford National Weather Service Office):** Brett Lutz, NOAA climatologist

Brett.Lutz@noaa.gov, and Noel "Shad" Keene; 541-666-4303

**PLANNING:** Dan Moore, AICP, Rogue Valley Council of Governments, dmoore@rvcog, 541-423-1361

**ROADS AND PARKS:** Jenna Stanke, Manager, StankeJS@jacksoncounty.org, 541-774-6231

**ROGUE VALLEY TRANSIT DISTRICT:** Mike Bowman, mbowman@rvtd.org, 541-608-2420 and Paige Townsend, ptownsend@rvtd.org ,541-608-2429, Rogue Valley Transit District.

**STUDENT REPRESENTATIVE:** Eric Moenter, moenter@ohsu.edu, 916-213-3927.

**VECTOR CONTROL:** Jim Lunders, Manager, vector@jeffnet.org,541-826-2199

**VULNERABLE POPULATIONS**: Heather Freiheit, RN, Instructor OHSU, NursingFreiheiHe@sou.edu, 541-301-6733.

**WATER:** Medford Water Commission-Bob Noelle, bob.noelle@cityofmedford.or.us, 541-774-2439 and Bob Jones, bob.jones@cityofmedford.org.

**WATER**: Greg Stabach, Rogue Valley Council of Governments, gstabach@rvcog.org , 541-423-1370

## Appendix 1.3 Air Quality & Wildfire Smoke Issues Work Group - November 20, 2012

**External Stakeholders:**

**Air Quality:** DEQ: Wayne Kauzlarich, KAUZLARICH.Wayne@deq.state.or.us, 541-776-6010.

**Air Quality:** DEQ: John Becker, Manager

**COMMUNITY REPRESENTATIVE**: Gary Stevens, zeeke0943@gmail.com, 541-601-0848 ©, 541-499-6486 (landline) retired Manager JC Environmental Health Department.

**COMMUNITY REPRESENTATIVE**: Alan Journet, retired professor of conservation biology and ecology, alanjournet@gmail.com, 541-30104107.

**EMERGENCY MANAGEMENT:** Michael Curry, Manager, CurryMC@jacksoncounty.org, 541-774-6821

**FORESTRY DIVISION CHIEF – CITY OF ASHLAND/PRSCRIBED BURN INFORAMTION OFFICER:** Chris Chambers

**DEPUTY FIRE STAFF-FUELS – ROUGUE SISKIYOU FORESTS** - Rob Budge

**NOAA (Medford National Weather Service Office):** Shad Keene, NOAA climatologist

**ROGUE VALLEY TRANSIT DISTRICT:** Mike Bowman, mbowman@rvtd.org, 541-608-2420

**ROGUE VALLEY TRANSIT DISTRICT:** Paige Townsend, ptownsend@rvtd.org ,541-608-2429

**STUDENT REPRESENTATIVE:** Eric Moenter, SN, OHSU Nursing School and SOU campus

**Jackson County Internal Staff:**

**Susan Bizeau, RN**, BizeauSL@jacksoncounty.org, 541-774-8068, Climate Change Project, Communicable Disease and Immunizations.

**Belle Shepherd**, ShepheBS@jacksoncounty.org, 541-774-8039, Manager Health & Human Services, Co-leader Climate Change grant.

**Jim Shames, MD**, ShamesJG@jacksoncounty.org, (541) 774-7885, Health Officer, Jackson and Josephine County Public Health

**Jackson Baures**, BauresJB@jacksoncounty.org, (541) 774-7829, Environmental Health Manager

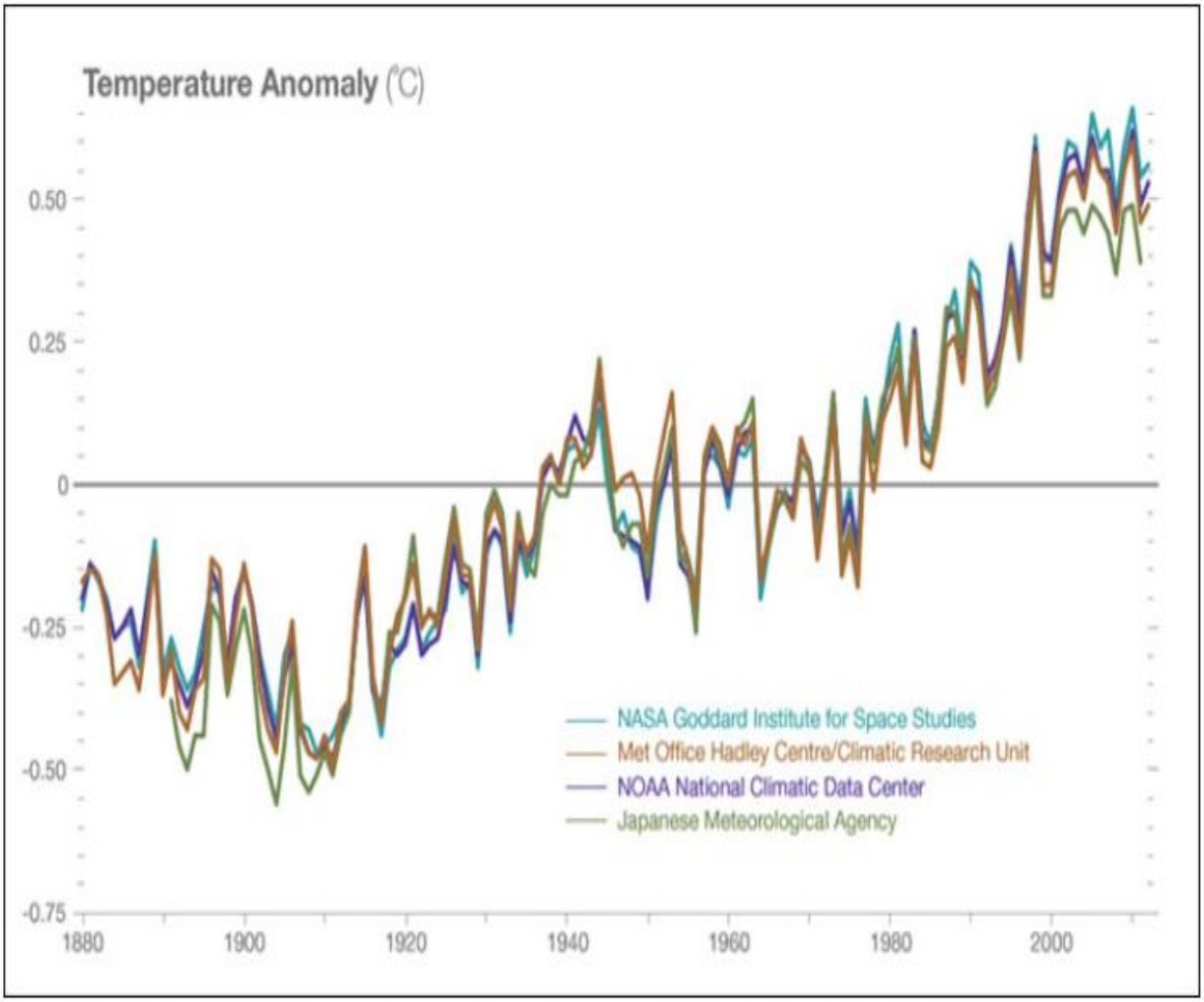
**Tanya Phillips**, phillitf@jacksoncounty.org, Public Health Preparedness Coordinator

**Stephen Mcleod**, McLeodSJ@jacksoncounty.org, 541-774-8902, Healthy Communities Coordinator

**Appendix 2** **Average Global Temperatures**

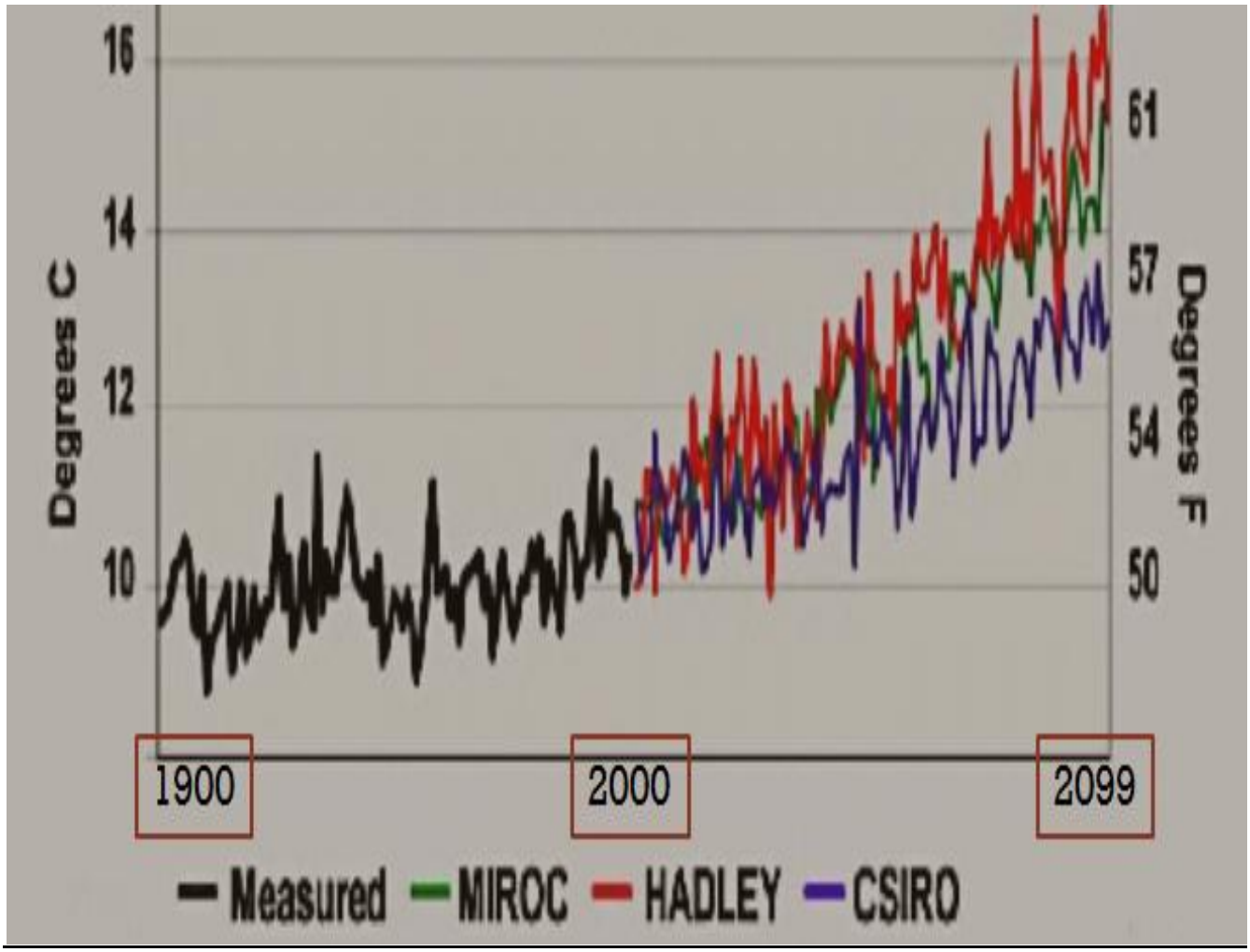
**HISTORIC TEMPERATURES WITH PROJECTIONS (The Resource Innovation Group, 2011 and http://climate.nasa.gov/scientific-consensus)**

## Consensus: 97% of climate scientists agree



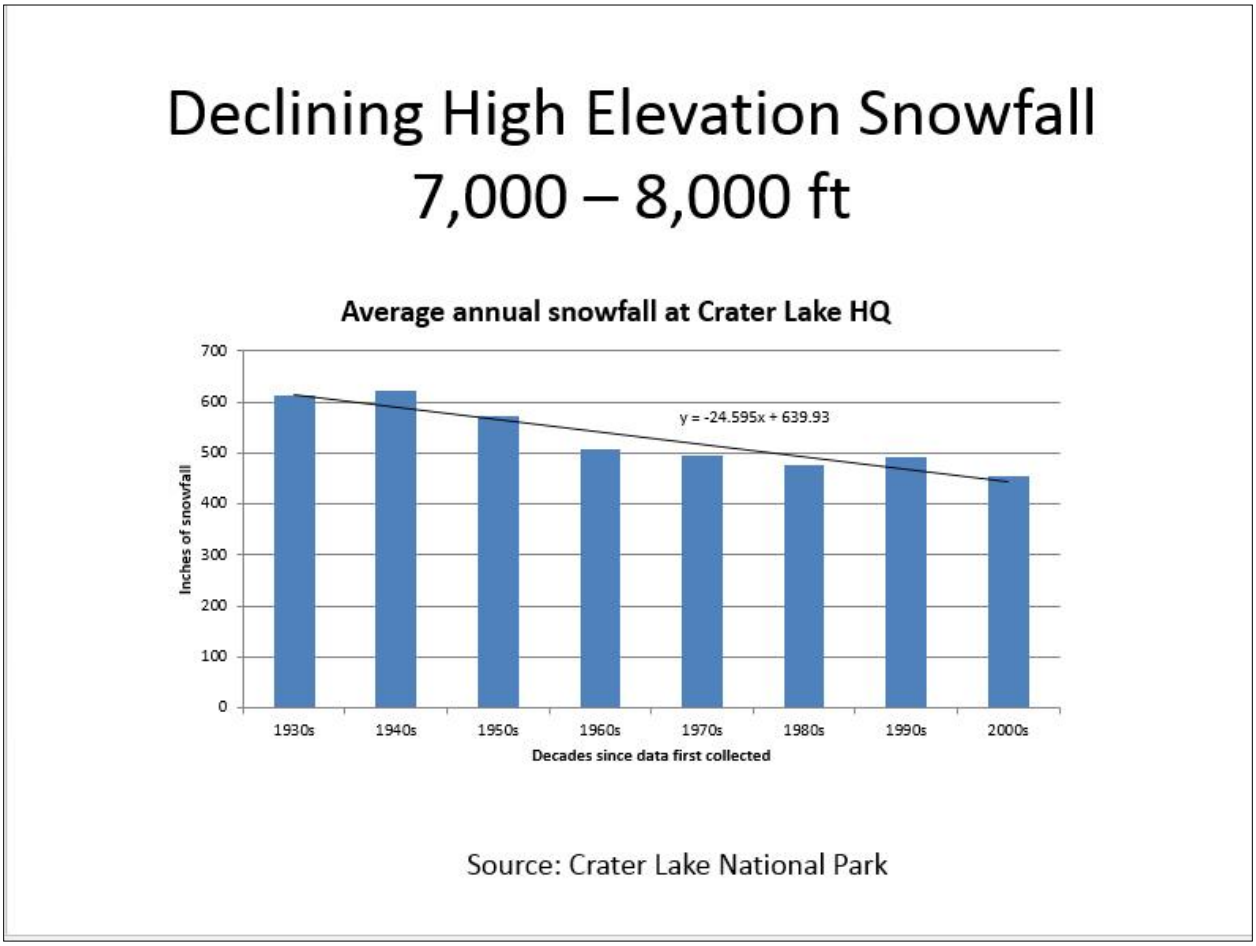

Temperature data from four international science institutions. All show rapid warming in the past few decades and that the last decade has been the warmest on record.

**Appendix 3** **Average Annual Rogue River Basin Temperatures with Projections (3 climate models)**




**Doppelt et al. 2008**

**Appendix 4** **Snowfall at Crater Lake National Park**




**Graph by Alan Journet**

**Appendix 5** **Reportable Diseases for Clinicians Oregon 2011-2013**

# OREGON PUBLIC HEALTH DIVISION REPORTING FOR CLINICIANS

By law,[1] Oregon clinicians must report diagnoses of the specified infections, diseases, and conditions listed on this poster. Both lab-confirmed and clinically suspect cases are reportable. The parallel system of lab reporting does not obviate the clinician's obligation to report. Some conditions (e.g., uncommon illness of public health significance, animal bites, HUS, PID, pesticide poisoning, disease outbreaks) are rarely, if ever, identified by labs. We depend on clinicians to report.

Reports should be made to the patient's local health department[2] and include at least the patient's name, home address, phone number, date of birth, sex, diagnosis, and date of symptom onset. Most reports should be made within one working day of the diagnosis, but there are several important exceptions — please refer to the list on this poster.

Disease reporting enables appropriate public health follow up for your patients, helps identify outbreaks, provides a better understanding of morbidity patterns, and may even save lives. Remember that HIPAA does not prohibit you from reporting protected health information to public health authorities for the purpose of preventing or controlling diseases, including public health surveillance and investigations; see 45 CFR 164.512(b)(1)(i).[3]

## CIVIL PENALTIES FOR VIOLATIONS OF OREGON REPORTING LAW

A civil penalty may be imposed against a person or entity for a violation of any provision in OAR chapter 333, division 18 or 19.[4] These regulations include the requirements to report the diseases listed on this poster, along with related data; and to cooperate with local and state public health authorities in their investigation and control of reportable diseases. Civil penalties shall be imposed as follows:

- 1st violation $100; 2nd violation $200; 3rd or subsequent violation $500;
- Each day out of compliance will be considered a new violation.

Smallpox

New reportables are highlighted.

### IMMEDIATELY

Anthrax *(Bacillus anthracis)*

Botulism *(Clostridium botulinum)*

Cholera (*Vibrio cholerae* 01, 0139, or toxigenic)

Diphtheria *(Corynebacterium diphtheriae)*

Hemorrhagic fever caused by viruses of the filovirus (e.g., Ebola, Marburg) or arenavirus (e.g., Lassa, Machupo) families

Influenza (novel)[5]

Marine intoxication (intoxication caused by marine microorganisms or their by products (e.g., paralytic shellfish poisoning, domoic acid intoxication, ciguatera, scombroid)

Measles (rubeola)

Plague *(Yersinia pestis)*

Poliomyelitis

Rabies (human)

Rubella

SARS (Severe Acute Respiratory Syndrome or SARS-coronavirus)

Smallpox (variola)

Tularemia *(Francisella tularensis)*

Yellow fever

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Outbreaks and uncommon illnesses (any known or suspected common-source outbreak; any uncommon illness of potential public health significance)

### WITHIN 24 HOURS

(including weekends and holidays)

*Haemophilus influenzae* (any isolation or identification from a normally sterile site)

*Neisseria meningitidis*

Pesticide poisoning

### WITHIN ONE WORKING DAY

Animal bites (of humans)

Arthropod vector-borne disease (babesiosis, California encephalitis, Colorado tick fever, dengue, Eastern equine encephalitis, ehrlichiosis, Kyasanur Forest disease, St. Louis encephalitis, West Nile fever, Western equine encephalitis, etc.)

Brucellosis *(Brucella)*

Campylobacteriosis *(Campylobacter)*

Chancroid *(Haemophilus ducreyi)*

Chlamydiosis *(Chlamydia trachomatis;* lymphogranuloma venereum)

Creutzfeldt-Jakob disease (CJD) and other transmissible spongiform encephalopathies

Cryptococcosis *(Cryptococcus)*

Cryptosporidiosis *(Cryptosporidium)*

Cyclosporosis *(Cyclospora cayetanensis)*

*Enterobacteriaceae* family isolates found to be non-susceptible to any carbapenem antibiotic

*Escherichia coli* (Shiga-toxigenic, including *E. coli* 0157 and other serogroups)

Giardiasis *(Giardia)*

Gonococcal infections *(Neisseria gonorrhoeae)*

Hantavirus

Hemolytic uremic syndrome

Hepatitis A

Hepatitis B (acute or chronic infection)

Hepatitis C (acute or chronic infection)

Hepatitis D (delta)

Hepatitis E

HIV infection (does not apply to anonymous testing) and AIDS

Influenza (laboratory-confirmed) death of a person <18 years of age

Lead poisoning [6]

Legionellosis *(Legionella)*

Leptospirosis *(Leptospira)*

Listeriosis *(Listeria monocytogenes)*

Lyme disease *(Borrelia burgdorferi)*

Malaria *(Plasmodium)*

Mumps

Pelvic inflammatory disease (PID, acute, non-gonococcal)

Pertussis *(Bordetella pertussis)*

Psittacosis *(Chlamydophila psittaci)*

Q fever *(Coxiella burnetii)*

Relapsing fever *(Borrelia)*

*Rickettsia* (all species: Rocky Mountain spotted fever, typhus, others)

Salmonellosis (*Salmonella*, including typhoid)

Shigellosis *(Shigella)*

Syphilis *(Treponema pallidum)*

*Taenia* infection (including cysticercosis and tapeworm infections)

Tetanus *(Clostridium tetani)*

Trichinosis *(Trichinella)*

Tuberculosis *(Mycobacterium tuberculosis* and *M. bovis)*

Vibriosis (other than cholera)

Yersiniosis (other than plague)

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**FOOTNOTES**

1. ORS 409.050, 433.004; OAR 333-018-0000 to OAR 333-018-0015 (http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_333/333_018.html)
2. http://www.healthoregon.org/lhd
3. http://edocket.access.gpo.gov/cfr_2004/octqtr/pdf/45cfr164.512.pdf
4. http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_333/333_026.html
5. Influenza A virus that cannot be subtyped by commercially distributed assays
6. "Lead poisoning" means a blood lead level of ≥10 µg/dl.

OHA 8577 (Rev. 11/2011)

Oregon Health Authority
PUBLIC HEALTH DIVISION
Office of Disease Prevention and Epidemiology
971-673-1111 (phone)
971-673-1100 (fax)
www.healthoregon.org/acd

**Appendix 6** **Selected Asthma Data for Oregon & Jackson County**

# Pediatric Asthma Admission Rate, 2007

Data notes
Rates for counties with less than 30 cases are not displayed.

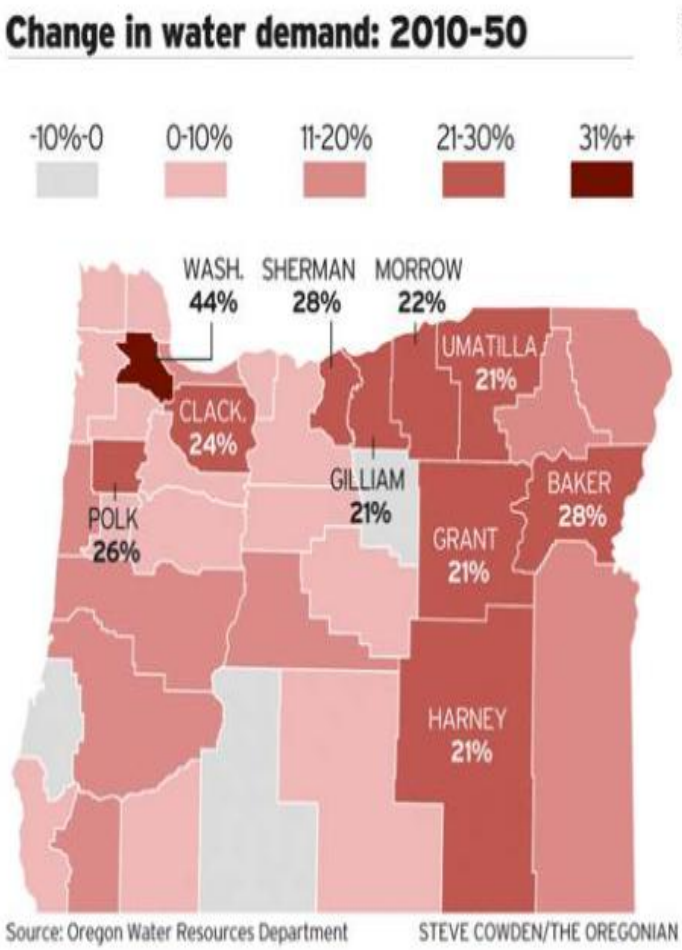
Pediatric asthma is the most common chronic disease in children. Hospital admission rates can be lowered with appropriate diagnosis, adherence to treatment guidelines, physician-patient relationship, management of asthma symptoms with medications, appropriate prophylactic maintenance therapy, and adequate follow-up care.

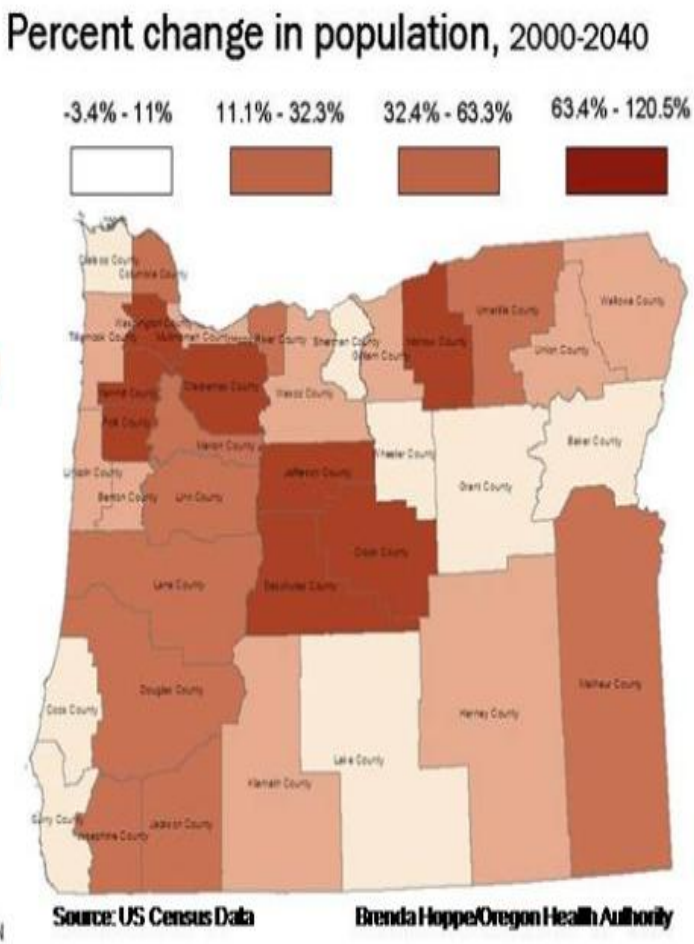
Source: Office for Oregon Health Policy and Research

| County or Region | Rate per 100,000 Population (ages 2-17) |
|---|---|
| Jackson | 79.5 |
| Lane | 51.8 |
| Multnomah | 42.2 |
| Washington | 34.3 |
| Region 4 | 87.1 |
| Oregon | 41.3 |

This site is a project of the Office for Oregon Health Policy and Research, an official State of Oregon agency.

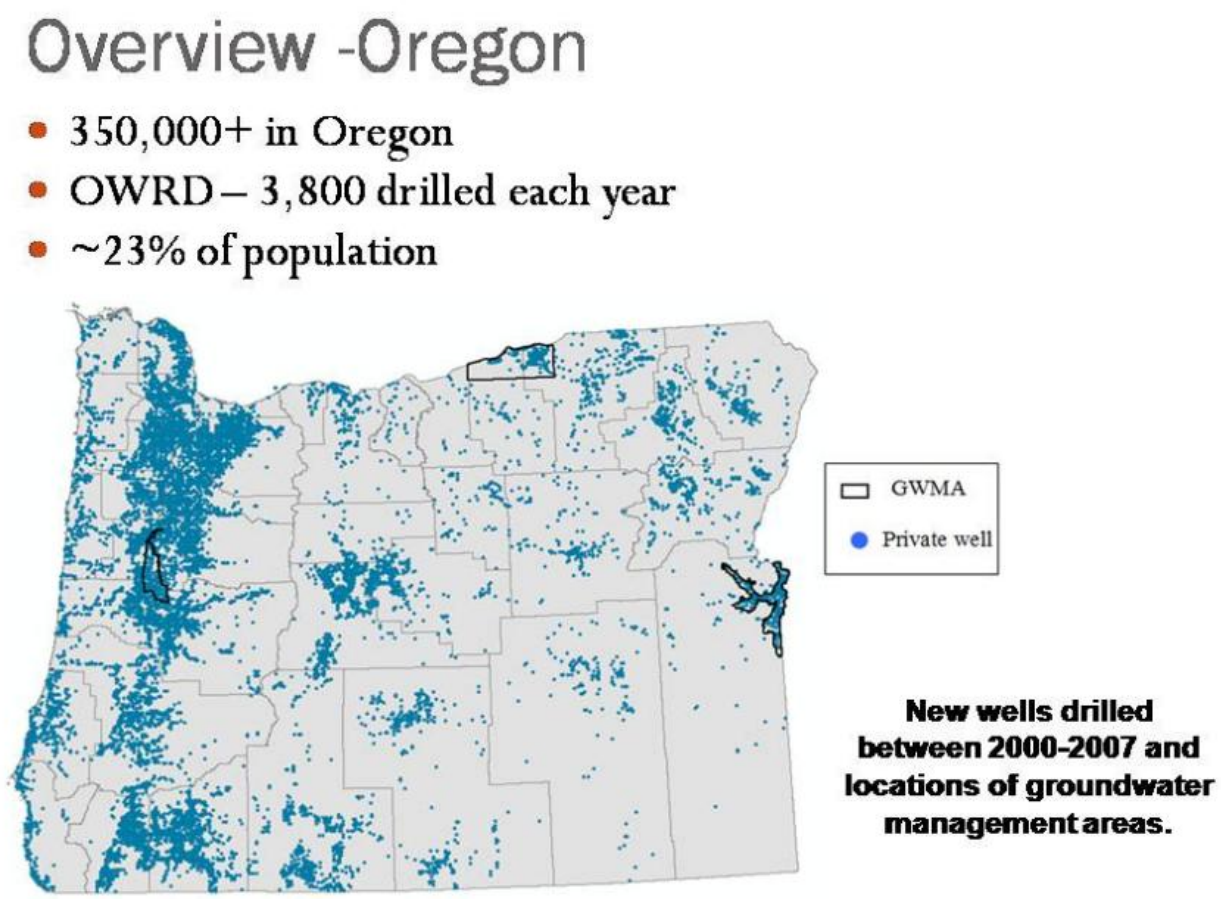
**Appendix 7** **Projected Water Demand and Increases in Oregon**



**Appendix 8**

**New Well Drilled in Oregon Between 2000-2007**




**New wells drilled between 2000-2007 and locations of groundwater management areas.**

**Appendix 9**

## Groundwater Study Results 1971-2011

| | USGS 1971-2 Study | USGS 1972 Study | 1992 DEQ Study | 1994 DEQ Study | 1994 DEQ Study | 2011 DEQ Study | 2011 DEQ Study | 2011 DEQ Study |
|---|---|---|---|---|---|---|---|---|
| | Jackson County | Josephine County | Jackson County | Jackson County | Josephine County | Jackson County | Josephine County | Combined |
| Number of Wells Tested | 92 | 14 | 27 | 20 | 20 | 26 | 16 | 52 |
| | | | | | | | | |
| Nitrate >3 ppm | 24% | 10% | 7% | 70% | 25% | 47% | 6% | 25% |
| Nitrate>10 ppm | 14% | 0% | 0% | 15% | 10% | 8% | 0% | 6% |
| Max Nitrate (ppm) | 41 | 4.2 | 6.7 | 12 | 14 | 19.3 | 4.27 | 19.3 |
| | Lithia Wtr. = 26 | 10 wells tested | | | | | | Lithia Wtr. =ND* |
| | 76 wells tested | | | | | | | |
| | | | | | | | | |
| Arsenic detection | N/A | 0% | 7% | 5% | 5% | 44% | 6% | 17% |
| Max Arsenic (ppb) | | ND | 26 | 16 | 12 | 22.1 | 18.1 | 22.1 |
| | 0 wells tested | 4 wells tested | | | | | | |
| | | | | | | | | |
| Fluoride >2 ppm | 9% | 0% | 4% | 0% | | 2% | 0% | 2% |
| Fluoride >4 ppm | 7% | 0% | 4% | 0% | | 2% | 0% | 2% |
| Fluoride detection | 97% | 7% | 37% | 70% | N/A | 78% | 50% | 71% |
| Max Fluoride (ppm) | 12 | 0.5 | 11 | 0.7 | | 3.31 | 0.77 | 3.3 |
| | 92 wells tested | 11 wells tested | | | | | | |
| | | | | | | | | |
| Boron >2ppm | 16% | 29% | 15% | 0% | 0% | 5% | 0% | 4% |
| Boron detection | 93% | 100% | 96% | 75% | 40% | 69% | 50% | 63% |
| Max Boron (ppm) | 20 | 4.3 | 14 | 0.99 | 0.32 | 6.64 | 0.305 | 6.64 |
| | Lithia Wtr=74 | 7 wells tested | | | | | | Lithia Wtr. = 87.6* |
| | 89 wells tested | | | | | | | |
| | | | | | | | | |
| Vanadium detection | N/A | N/A | 0% | 0% | 0% | 50% | 50% | 50% |
| Max Vanadium (ppb) | | | <30 | <30 | <30 | 33.7 | 29.6 | 33.7 |
| | | | | | | | | |
| Pesticides | N/A | N/A | 0% | 10% | 0% | N/A | N/A | N/A |
| VOCs | N/A | N/A | 4% | 10% | 20% | N/A | N/A | N/A |
| N/A = Not tested | | | | | | | | |
| ND = Not Detected | | | | | | | | |
| *From City of Ashland Testing, February 2011 – Non-Potable Water | | | | | | | | |

## Appendix 10 Air Quality & Wildfire Smoke

### Using visibility to estimate health effects

DEQ monitors air pollution throughout the state to ensure that air quality standards are being met. Because wildfires often occur in remote areas, and the smoke impacts are transitory, monitoring wildfire smoke levels is often difficult. Given the highly visible nature of wildfire smoke, it is possible to make visual estimates of smoke levels. Generally the worse the visibility, the worse the smoke. The table below shows this relationship and how to estimate potential health effects.

| Visibility range | Health category | Health effects | Cautionary statements |
|---|---|---|---|
| 15 miles and up | Good | None | None |
| 8 to 14 miles | Moderate | Possibility of aggravation of heart or lung disease among persons with cardiopulmonary disease and the elderly. | None |
| 3 to 7 miles | Unhealthy for sensitive groups | Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly. | People with respiratory or heart disease, the elderly and children should limit prolonged exertion. |
| 1½ to 2½ miles | Unhealthy | Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population. | People with respiratory or heart disease, the elderly and children should avoid prolonged exertion; everyone else should limit prolonged exertion. |
| 1 mile | Very unhealthy | Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in general population. | People with respiratory or heart disease, the elderly and children should avoid any outdoor activity; everyone else should avoid prolonged exertion. |
| Less than ½ mile | Hazardous | Serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; serious risk of respiratory effects in general population. | Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors. |

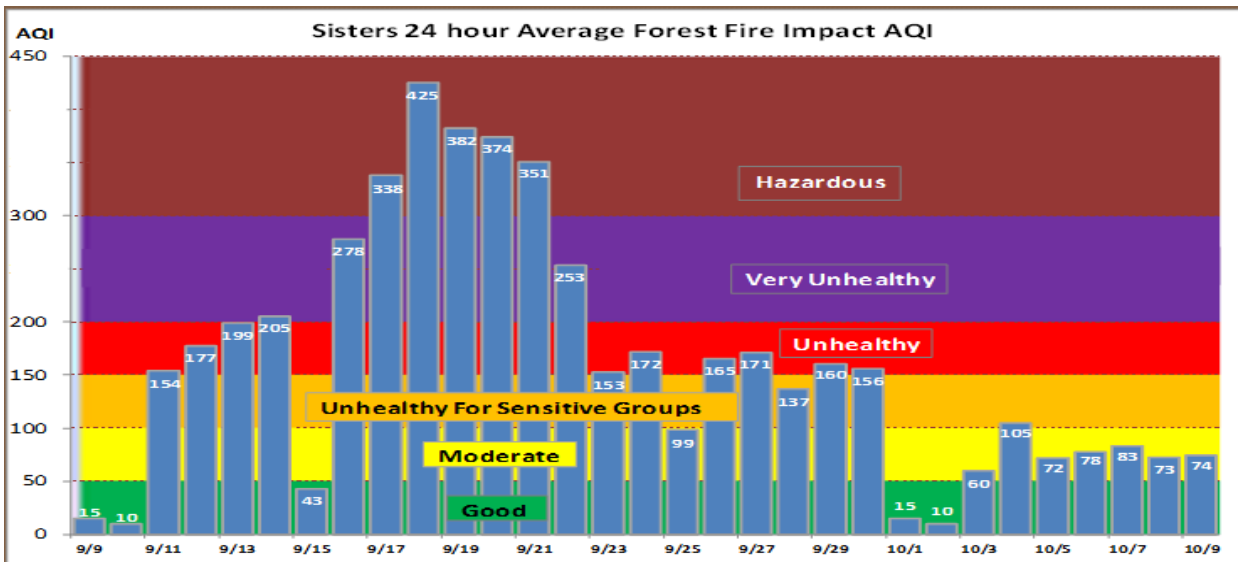
Source: Guideline For Reporting of Daily Air Quality – Air Quality Index (AQI), EPA-454/R-99-010, July 1999, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards.

The procedure for making this observation is:

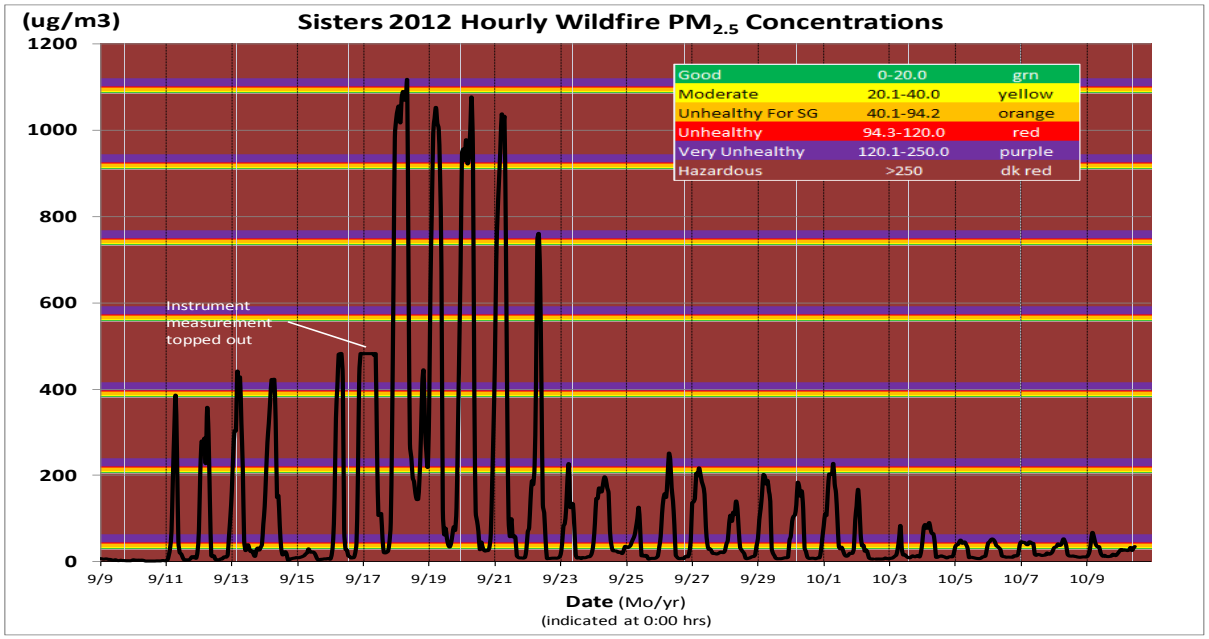
1. Face away from the sun
2. Determine the limit of your visual range by looking for targets at known distances (miles).
3. Visual range is that point at which even high contrast objects totally disappear.
4. Use the values above to determine the local forest fire smoke category.

**http://www.deq.state.or.us/aq/burning/wildfires/visibility.htm**

**Appendix 11** **Pole Creek Fire – Sisters, Oregon Sept. 2012 (Oregon DEQ data)**




Sisters' 24 average AQI- tied to the National Air Quality Standards (NAAQS) which is based on the 24 hour average. Note, the Sisters data is from the Nephelometer and is informational only. If it were Federal Reference data it would be flagged as execptional event.




Hourly AQI data- Not comparable to the NAAQS since the NAAQS is based on 24 hour averages. This AQI data is informative because it shows hourly fluctuations, but it is not as concrete as 24 hr AQI which is based on the NAAQS.

## Appendix 12 Jackson County Public Health Hazard Risk Assessment

| Enterprise-wide | | Worksheet B: Public Health Consequences | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HAZARD RISK ASSESSMENT MODEL | | HEALTH AND SAFETY | | | | | | | | | RESPONSE CAPACITY | | | | PUBLIC HEALTH INFRASTRUCTURE | | Public Health Consequence | Public Health Risk |
| Revised: Nov 2011 | | Potential injuries and deaths | | | | | | | | | Ability to respond | | | | Service Interruption | | Overall Impact (Average) | Probability x Consequences |
| Hazards | Probability of Occurrence | Fatalities | Outpatient Injuries | Respiratory Illness | Chronic Disease | Communicable Disease | Mental Health | Vulnerable Populations | Food Security | Water Security | Hospital Beds | Primary Care Providers | Pharmacies | Ambulance | Staffing | Interagency Partners | 1-Lowest 5-Highest | 1-Lowest 50-Highest |
| Natural Hazards – Earthquake - Cascadia (3-5min) | 6 | 2 | 5 | 3 | 4 | 2 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3.69 | 22.15 |
| Natural Hazards – Flood - Riverine | 10 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2.31 | 23.08 |
| Natural Hazards – Wildfire (WUI) | 10 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 1.85 | 18.46 |
| Natural Hazards – Winter Storm | 10 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 1.92 | 19.23 |
| Technological – Hazmat Release - Transportation | 10 | 2 | 2 | 2 | 2 | 0 | 1 | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 1.92 | 19.23 |
| Technological – Hazmat Release - Fixed Facility | 10 | 2 | 2 | 2 | 2 | 0 | 1 | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 1.92 | 19.23 |
| Human – Public Health Emergency | 8 | 4 | 5 | 4 | 5 | 4 | 2 | 5 | 3 | 1 | 5 | 4 | 3 | 4 | 4 | 1 | 3.46 | 27.69 |

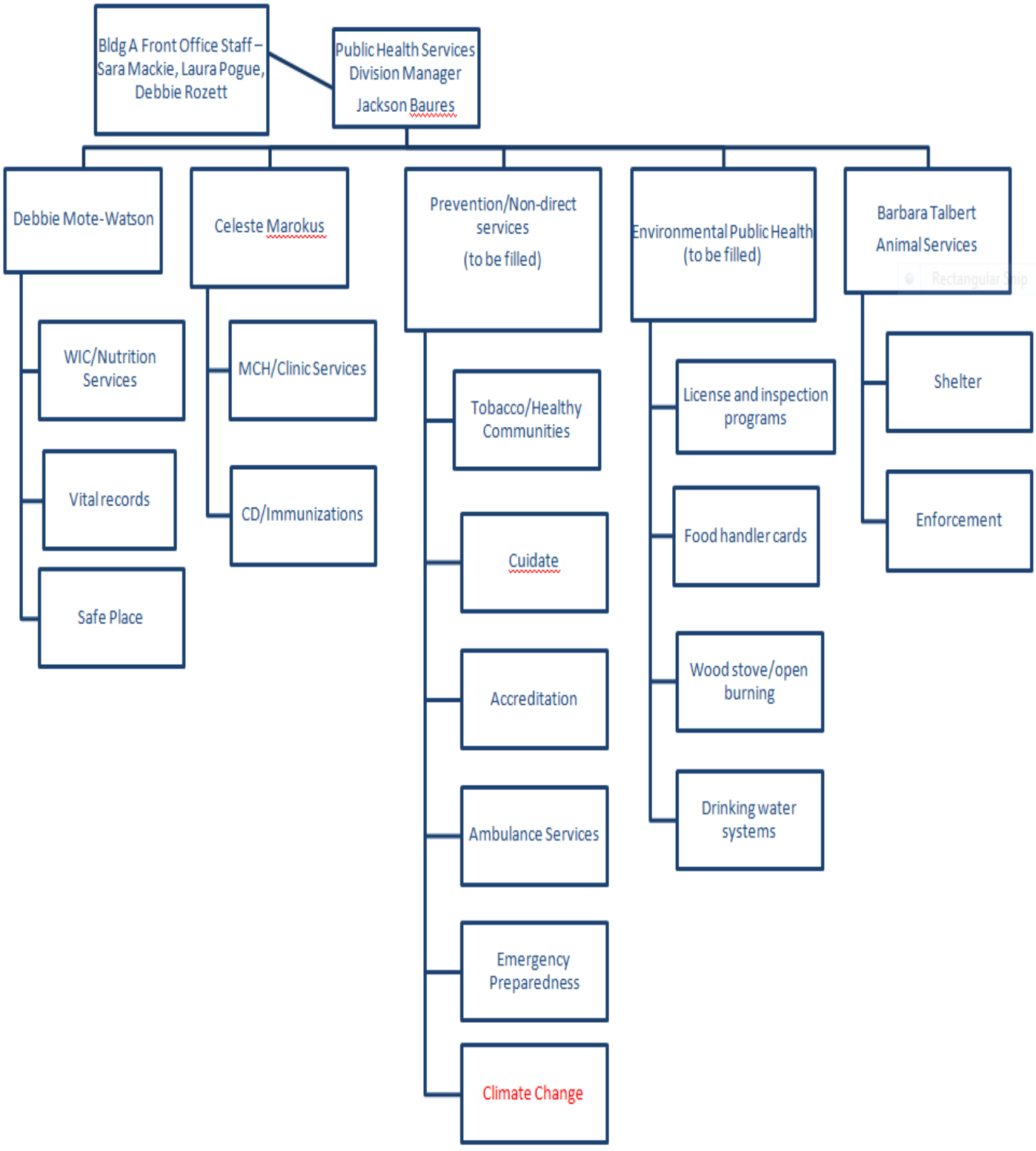
## Appendix 13 Likely Climate Trends and Consequences for the Rogue Valley

| | | | | |
|---|---|---|---|---|
| **TEMPERATURE**[1] |  | **Summer = June to Aug; Winter = Dec to Feb** | ***Projections for 2035 - 2045*** | ***Projections for 2075-2085*** |
| | | Average Annual Increase | 1.5 to 4$^0$F | 4.3 to 8.2$^0$F |
| | | Average Summer Increase | 1 to 6$^0$F | 5.6 to 11.8$^0$F |
| | | August Increase | 1 to 7.5$^0$F | 6.7 to 16.8$^0$F |
| | | Average Winter Increase | 1 to 3.5$^0$F | 3.4 to 6.3$^0$F |
| **PRECIPITATION**[1] |  | **Summer = June to Aug; Winter = Dec to Feb** | ***Projections for 2035 - 2045*** | ***Projections for 2075-2085*** |
| | | Average annual change | -4.46 to +0.04 inches | -5.56 to +11.81 inches |
| | | Average summer change | -0.65 to -0.34 inches | -0.75 to -0.12 inches |
| | | Average winter change | +0.33 to +1.83 inches | -0.40 to + 5.67 inches |
| **SNOWFALL**[2] |  | Rising temperatures will likely cause precipitation to fall as rain at lower elevations rather than as snow on peaks so average January snowpack will decrease; by 2035 – 2045 snowpack may be reduced 60 – 65% and by 2075 – 2085 as much as 90%. This will likely reduce run-off during late summer / fall and substantially reduce available irrigation and drinking water. | | |
| **SEVERE WEATHER**[2] |  | Weather variability is likely to increase as both wet and dry cycles are likely to increase in length and severity. Many more days are likely to exceed 90$^0$F and 100$^0$F while more heavy rainfall days are likely. More precipitation falling as rain at low elevations rather than snow at high elevations is likely to increased flash flood frequency in Winter and Spring. | | |
| **WILDFIRES**[2] |  | Longer droughts and higher temperatures with more intense heat waves will likely increase substantially the amount of (vegetation) forest lost to wildfire. | | |
| **VEGETATION**[2] |  | With warming and drying, climatic conditions will likely become more appropriate for deciduous forest communities such as oaks and other hardwoods while conditions for higher elevation spruce/fir/hemlock communities will be severely compromised and those for Douglas fir will likely be reduced in area. Grassland and scrubland conditions are likely to expand as forest conditions diminish. | | |
| **NATIVE AQUATIC SYSTEMS**[2] |  | With increases in storms and fires, enhanced soil erosion will likely cause greater stream sediment and mineral build-up.<br>Increased summer air temperatures will elevate water temperatures reducing critical dissolved oxygen concentrations and potentially enhancing bacterial and disease conditions.<br>Reduced snowpack and earlier snowmelt will likely modify current stream flow patterns. With warmer water temperatures earlier aquatic insect emergence is probable, compromising historic food availability pulses for migratory fish.<br>Reduction in conditions for many native fish species may be accompanied by range expansion of non-native species. | | |
| **NATIVE TERRESTRIAL SYSTEMS**[2] |  | Probable increase in wildfires and lengthened fire seasons may induce dramatic shifts in vegetation communities towards more fire-adapted associations. Both invasive and non-native species abundances may be enhanced as natives are reduced.<br>Particularly at risk are mature forests and the wildlife species they support as well as amphibians which will have limited dispersal capacity conditions become dryer. Disruption of synchronicity is likely between insect development and nesting / hatching particularly of migrant bird species. Bark beetle conditions will be enhanced, increasing the threat to native forests. | | |

[1] Compiled by Alan Journet, Ph.D., K. A. CONJOUR Consulting, 2011. (http://kaconjour.com/Consulting/KAConJour_Consulting.htm), using data provided by the Geos Institute (Ashland, OR) obtained from the MAPSS team of the USFS Pacific Northwest Research Station (Corvallis, OR) based on three General Circulation Models (HADLEY, MIROC, and CSIRO). Future conditions are compared to the historical (1961-1990) average.

[2] Largely Doppelt, B., Hamilton, R., Deacon Williams, C., Koopman, M., 2008. *Preparing for Climate Change in the Rogue River Basin of Southwest Oregon;* Prepared by: The Climate Leadership Initiative, The National Center for Conservation Science and Policy (now Geos Institute), and MAPSS Team at the USDA Forest Service Pacific Northwest Research Station. http://www.geosinstitute.org/images/stories/pdfs/Publications/ClimateWise/ROGUEWORKSHOP_FINALsinglewebsite.pdf

**<u>Appendix 14</u> JACKSON COUNTY PUBLIC HEALTH DIVISION -ORGANIZATION CHART JUNE 2012**



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