

Introduction

Weather: Air Masses Interacting

Weather is created by differential heating of the Earth's surface. The sun heats the Earth at different rates, depending on the latitude and type of surface the sun's rays are hitting. The rate of heating is faster over the equatorial areas as opposed to the polar regions. Likewise, the land surfaces heat faster than lakes and seas. This differential heating creates motion at the surface and subsequently, in the lower atmosphere. This motion is wind; wind carries heat and moisture pole-ward while colder, drier air moves towards the equator. These motions, combined with the rotation of the earth, create weather.

With the use of modern computers, mathematics and physics, meteorologists are able to model the atmosphere to understand its unique motions. Forecasting has experienced vast improvements with modern technology. As technology improves, forecasts will continue to become more accurate.

Climate of Oregon

Two significant factors influence the climate of Oregon: location adjacent to the Pacific Ocean and topography. Oregon's climate can be broken into four primary sections: the Coast, the Western Valleys, the Cascades, and Eastern Oregon.

COASTAL REGION This area is heavily influenced by the ocean and wind. Temperatures are moderate, rarely dropping below freezing or rising above 100 degrees. Average maximum temperatures range from the 40s in January to the 60s in July. Average minimum temperatures range from the 30s in January to the 50s in the summer months. Occasionally temperatures reach the 80s in August, especially on the south coast, but rarely last more than a few days.

In the autumn and winter, winds are generally from the west-southwest, bringing an abundance of moisture to the region. Storms from the Pacific deposit heavy rains in the coastal mountains. The rainy season subsides in May when high pressure builds over the land, creating a north-to-northeast, or offshore wind. Offshore winds bring drier air from over the interior to the coast, creating sunny conditions. During the summer, winds frequently turn onshore and bring fog and low stratus clouds back to the coastal sections. Annual precipitation varies from near 80 inches in the south to near 95 inches in the north. As much as 150 to 200 inches falls in the coastal mountains yearly.

WESTERN VALLEYS The western valleys are separated from the ocean by the coastal mountains, diminishing the oceanic influence. The Coastal Mountains create a rain shadow effect over the western valleys. Rainfall amounts range from 20-30 inches in the southwest valleys to 35-45 inches over the Willamette Valley, and amounts are higher along the western slopes of the Cascades. Ninety percent of the rainfall in Oregon falls from mid-October to mid-May. Summer months are dominated by a dry northerly flow. Snow infrequently falls in the western valleys, and will most likely fall in the northern Willamette valley during the month of February. Average annual snowfall totals for selected sites in the Willamette Valley range from three to seven inches, although some years less than one inch may fall.

Climate of Oregon

Western Valleys (continued...)

In the Western Valleys, maximum temperatures range from the 30s and 40s in January, to the 70s and 80s in July. Minimum temperatures range from the upper 20s to lower 30s in January to the 50s in July. Occasionally cold outbreaks over eastern Oregon will flow through the Columbia River Gorge, bringing Willamette Valley low temperatures into the teens. During the summer, downslope winds off the Cascades can heat the valleys into the upper 90s to near 105. However, these conditions will not last for more than a few days.

CASCADES The Cascades Mountain Range divides the western marine climates and the continental eastern climates. Heavy precipitation occurs on the western slopes, while the eastern slopes are often dry, especially during the summer.

EASTERN OREGON Temperatures on the east side of the state cover a broader annual range. Maximum temperatures range from the 20s and 30s in January to the 80s and 90s in July. Minimum temperatures range from the teens in January to the 50s in July. Often during the winter, arctic outbreaks over the Rocky Mountains will extend to eastern Oregon, dropping temperatures as much as 30 degrees below normal. In summer, heat from the Great Basin spreads north, bringing highs from the 90s to near 110.

Eastern Oregon lies in the rain shadow of the Cascade Range. As a result, precipitation totals on the east side are much lower than those of western Oregon. Most of the precipitation arrives as snow in the winter, with rain in the lowest elevations. During the summer months, moisture associated with the monsoon season over the southwest United States can be transported to central and eastern Oregon. This moisture fuels thunderstorm activity, which is a primary source of precipitation during the summer months. Annual precipitation ranges from 10 to 20 inches, with higher totals over the mountains.

National Weather Service Forecast Office Portland, OR

The National Weather Forecast Office (WFO) in Portland, Oregon is responsible for weather and hydrologic forecasts and warnings for northwestern Oregon and southwestern Washington. The map below shows Portland's county warning area (CWA) as well as the CWAs for other NWS offices serving Oregon. Counties and cities in Portland's CWA are listed to the right.



Oregon Counties in Portland's CWA:

Benton	Clackamas
Clatsop	Columbia
Hood River	Lane
Lincoln	Linn
Marion	Multnomah
Polk	Tillamook
Washington	Yamhill

Some Oregon Cities in the CWA:

Astoria	Corvallis
Eugene	Florence
Hood River	Lincoln City
McMinnville	Newport
Oakridge	Portland
Salem	Albany

Washington Counties in Portland's CWA:

Clark	Cowlitz
Skamania	Wahkiakum
Pacific	

Some Washington Cities in CWA:

Kelso	Stevenson
Vancouver	Mt. St. Helens
Raymond	Long Beach

GEOGRAPHY Portland's CWA is one of north-south oriented geographical features. The elevation rises from sea level at the coast to 3000 feet in the Coast Range. The Coast Range drops down again to the low elevation interior valleys. The land rises again to the high Cascades Range, whose snow-capped peaks tower over 10,000 feet above sea level. Between the Coast and Cascade Ranges lies the broad Willamette Valley which slopes from 400 feet above sea level near Eugene down to near sea level at Portland. The lowland area extends north into southwest Washington along the Columbia River Valley. The Willamette River drains most of northwestern Oregon, eventually meeting the Columbia River near Portland. Other major rivers in the CWA include: the McKenzie, the Santiam, the Tualitan, the Lewis, the Cowlitz, the Wilson, the Siletz, the Siuslaw, the Clackamas, the Toutle, and the Sandy.

National Weather Service Forecast Office Portland, OR

IMPORTANT PHONE NUMBERS:

General Office (503) 326-2340
FAX Line (503) 326-2598*
Media Line (503) 261-9248*

*These are restricted phone numbers, and not for public use.

RECORDED WEATHER INFORMATION:

Astoria (503) 861-2722 Eugene (541) 688-9041
Portland (503) 261-9246 Salem (503) 363-4131
Vancouver (360) 694-6136

OFFICE PERSONNEL:

Meteorologist-in-Charge:	Steve Todd	(503) 326-2340 ext. 222*
	e-mail:	steve.todd@noaa.gov
Warning Coordination Meteorologist:	Tyree Wilde	(503) 326-2340 ext. 223*
	e-mail:	tyree.wilde@noaa.gov
Science Operations Officer:	Bill Schneider	(503) 326-2340 ext. 224*
	e-mail:	bill.schneider@noaa.gov
Service Hydrologist:	Andy Bryant	(503) 326-2340 ext 228*
	e-mail:	andy.bryant@noaa.gov
Electronic Systems Analyst:	Bill Flieder	(503) 326-2340 ext. 260*
	e-mail:	bill.flieder@noaa.gov

Dissemination of Weather Products

Mass Media Dissemination

The NWS disseminates weather products through various means. Many media customers get NWS information via the Family of Services, NOAA Weather Wire, NOAA Weather Radio, the internet, and private vendors.

NOAA Weather Wire Service

The NOAA Weather Wire Service (NWWS) is a means for disseminating hydro-meteorological and other environmental information to the media, emergency management agencies, and other users. While most information is in plain language, a few products are in coded format.

The products are identified by an eight or nine character code. The code is in the form of cccNNNxxx. The following example breaks down the code components:

CODE FORMAT: cccNNNxxx EXAMPLE: PDXNOWPQR

where ccc = Parent Forecast Office	ccc = PDX (Portland)
NNN = Product Identifier	NNN = NOW (Short Term Forecast)
xxx = Originating Weather Office	xxx = PQR (Portland)

In the example, PDXNOWPQR is the product code for the Portland Short Term Forecast, or Nowcast.

When a product is issued by any weather office in the state, whether a warning or regularly scheduled transmission, it is sent to the forecast office main computer in Portland, by way of high-speed communications links. From there it is relayed to the NOAA Weather Wire Service via satellite communications, retaining the original eight or nine character identifier. Simultaneously, it is transmitted to the National Center for Environmental Protection (NCEP) in Camp Springs, Maryland. For subscriptions and information on the NOAA Weather Wire Service, call DynCorp at (800) 635-4679.

NWWS URL: <http://www.nws.noaa.gov/nwws/>

Family of Services

At NCEP, NWS products are distributed to the Family of Services. It is from the Family of Services that the news media and private companies, who do not subscribe to the weather wire, obtain the weather products which are transmitted back to the state. With satellite communications and high speed computers, this entire process is accomplished in just a few seconds.

At the Family of Services, however, the nine character product identifying code is changed to the World Meteorological Organization (WMO) ID code. This guide refers to each product using both the "NNN" part of the nine digit NWS ID and the WMO ID code as reference. For example, the winter storm watch (PDXWSWPQR) is listed as WSW (NWS ID) followed by WWUS46 (WMO ID).

Family of Services URL: <http://www.nws.noaa.gov/datamgmt/fos/fospage.html>

Dissemination of Weather Products

NOAA Weather Radio (NWR)

The NOAA Weather Radio (NWR) is a service of the National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA) and the U. S. Department of Commerce. As the "Voice of the National Weather Service," it provides continuous weather broadcasts of the latest weather information directly from the NWS. Weather messages are repeated, generally every eight to fifteen minutes, and are routinely updated every one to three hours, or more frequently if needed. NOAA weather radio operates 24 hours daily and is tailored to the weather information needs of the people within the immediate listening area.

During severe weather, NWS forecasters can interrupt the routine weather messages and broadcast special warning messages. The forecasters can also activate specially designed warning receivers and the Emergency Alert System (EAS). Such receivers either sound an alarm to indicate that an emergency exists, or they are automatically turned on so that the warning broadcast will be heard. An alert system to selectively notify customers in specific areas and for specific types of warnings is in place, and the necessary receivers are now available.

Commercial radio and TV stations are authorized to rebroadcast any material, especially weather watches and warnings, transmitted over the weather radio. Weather watches and warnings are subject only to minimal restrictions stated in FCC Public Notice 70-1108-52876.

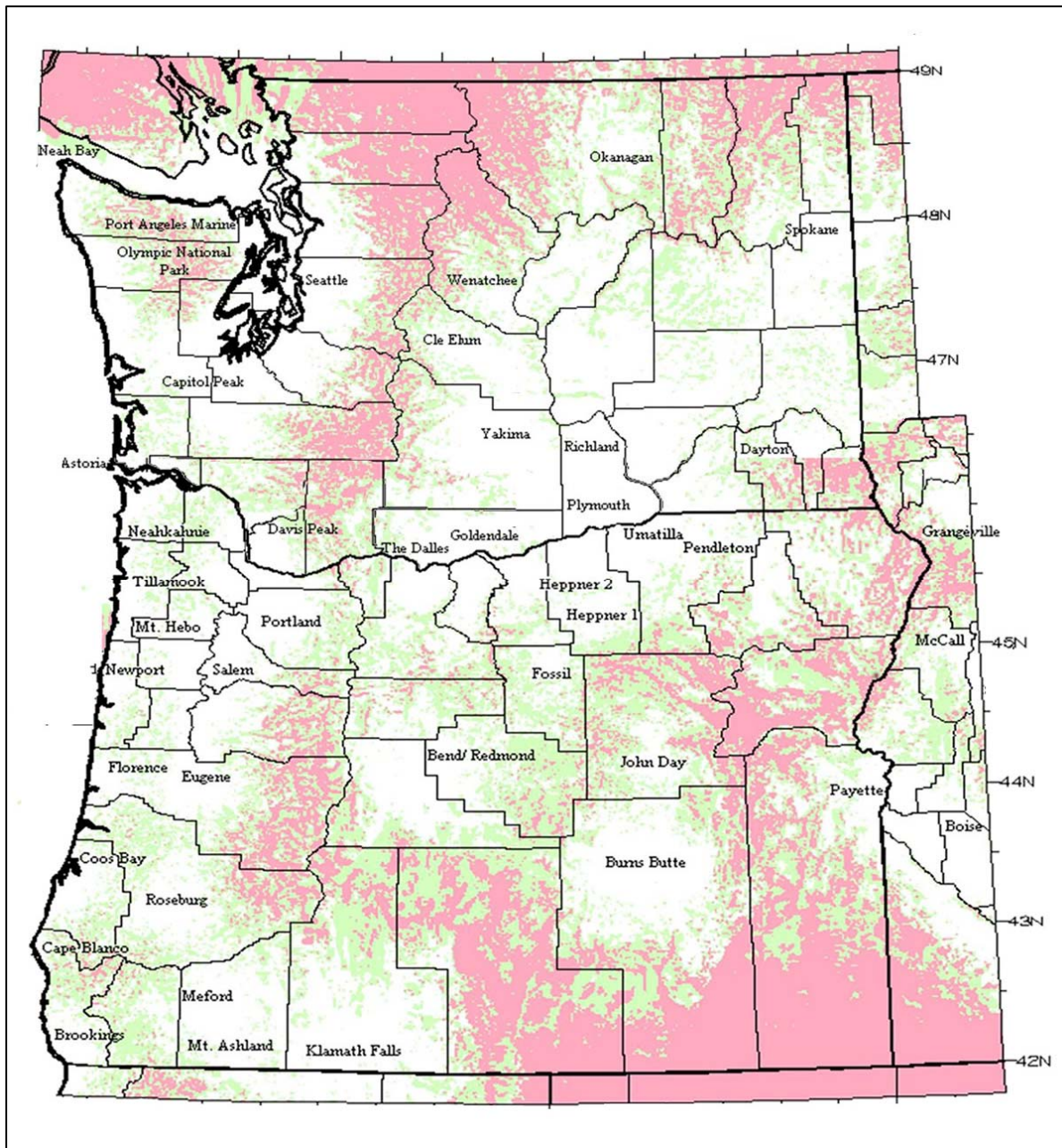
The NWR broadcasts can usually be heard as far as 40-80 miles from the antenna site. The effective range depends on many factors, particularly the height of the broadcast antenna, the local terrain, the quality of the receiver, and the type of receiving antenna.

Station	Transmitter Location	Frequency	Call Sign
Astoria	Naselle Ridge	162.400	KEC-91
	*Tillamook (Cape Meares)	162.475	WWF-95
	*Neahkanie Mountain	162.425	WWF-94
	*Mt Hebo	162.525	WNG-697
Newport	Otter Crest	162.550	KIH-33
	*Herman Peak (Florence)	162.500	WNG-674
Eugene	Blanton Heights (Eugene's south hills)	162.400	KEC-42
Salem	Prospect Hill (southwest of Salem)	162.475	WXL-96
Portland	Goat Mountain (southeast of Estacada)	162.550	KIG-98
Woodland	Davis Peak	162.525	WNG-60

Table 1 Transmitters operated by WFO Portland

Dissemination of Weather Products

Washington and Oregon NOAA Weather Radio Coverage



White areas represent strongest transmitter signal
Green areas represent weak transmitter signal
Pink areas represent no transmitter signal

National Warning System (NAWAS)

Funded by the Federal Emergency Management Administration (FEMA), the National Warning System (NAWAS) is a comprehensive party-line network of telephone circuits. NAWAS connects more than 1,500 federal and state warning points throughout the United States. Although NAWAS is a national system, the day-to-day operation is under the control of the individual states. Each state has its own plan for the use of NAWAS during weather emergencies.

NAWAS is used to warn the public, through local governments, about the potential loss of life and/or property. Such threatening situations are not limited to meteorological or hydrological events. The warning messages can include, but are not limited to: dam failures, earthquakes, volcanoes, major fires, terrorist activities, landslides, and hazardous materials releases.

When a warning is issued, the Portland NWS calls the Oregon and/or Washington Warning Point (and neighboring state warning points) to verify that warnings and watches have reached the affected counties and other officials. This insures proper dissemination of the warning.

NOAA Climate Program and Climate Information

The NOAA Climate Program consists of climate data management and information services, monthly and seasonal predictions, impact assessments, research, and monitoring.

Climate data management includes continuous quality review, computer processing, and inventory of numerous observations, including conventional surface observations, upper-air, and marine weather observations and satellite-measured parameters. The observations are converted into specialized forms of information for wide-range use.

Predictions of climatic fluctuations consist of monthly and seasonal outlooks for temperature and precipitation departures from the long-term averages.

Impact assessments quantify effects of climate fluctuations on fisheries, crop yields, energy demands, and water resources.

Research focuses on dynamic modeling, simulation, and diagnosis of global climate, the ocean climate, and the earth radiation budget as derived from satellite data.

NOAA Climate Program and Climate Information

Each weather service office in the state can answer general climate requests concerning their area of responsibility. However, extensive research efforts and/or climate data requests outside the state are referred to the National Climatic Data Center (NCDC) in Asheville, North Carolina, the Western Regional Climate Center (WRCC) in Reno, Nevada or the Oregon State Climatologist in Corvallis, Oregon. The hours of operation and phone numbers are below:

National Climatic Data Center (NCDC)
Phone number: (828) 271-4800
Fax requests: (828) 271-4876

5:00 am - 1:30 pm PST (Mon-Fri)
Internet: <http://www.ncdc.noaa.gov>

Western Regional Climate Center (WRCC)
Phone number: (775) 674-7010
Fax requests: (775) 674-7016

8:00 am - 4:00 pm PST (Mon-Fri)
Internet: <http://wrcc.sage.dri.edu/>

Oregon State Climate Service
George Taylor
OSU, Corvallis, OR
Phone number: (541) 737-5705

8:00 am - 4:00 pm PST (Mon-Fri)
Internet: <http://ocs.orst.edu/>

Emergency Managers Weather Information Network (EMWIN)

The Emergency Managers Weather Information Network (EMWIN) is a low cost method for receiving NWS information. The data is received free of charge using a small dish satellite receiving system that is purchased by the user. The satellite dish is connected to a home or office personal computer. The data is accessed and displayed using Windows based point and click software. The latest weather and flood warnings, watches, forecasts, statements, observations and other data are automatically stored, along with weather graphics like the radar summary and satellite imagery. The data are available nationwide directly from satellites and the system can be purchased by anyone. For more information, access the EMWIN home page at the address shown below or contact the NWS in Portland.

EMWIN URL: <http://iwin.nws.noaa.gov/emwin/index.htm>

Emergency Alert System (EAS)

The Emergency Alert System (EAS) is a national system developed by the Federal Communications Commission (FCC), allowing the NWS and others access to commercial radio and television stations for announcing emergency messages to the public. The NWS in Portland has direct access to this system. Specific Area Message Encoders (SAME) have been installed on the current NOAA Weather Radio system, and they enable transmitted tones to directly trigger radio and television station EAS equipment. It is important for emergency managers to develop local EAS plans that ensure that radio and television stations within their county monitor NWR or the AP wire, in the event that a severe weather warning is issued and tones are sent to trigger the EAS system. With hardware and procedures in place, weather related and other EAS broadcasts will reach the public in a timely manner. The NWS uses EAS to warn the public of major life threatening, short-fused, and/or severe weather events.

Internet Access

A wealth of weather data is available on the internet. Current weather observations, forecasts, maps, satellite, and radar imagery are stored on computers at universities, government agencies, and private companies, and are accessible to anyone via the Internet.

Internet Addresses:

- 1) WFO Portland Home Page
<http://weather.gov/portland/>
- 2) NWS Headquarters
<http://weather.gov/>
- 3) Western Region Headquarters
<http://www.wrh.noaa.gov/>
- 4) Tsunami Warning Center
<http://wcatwc.arh.noaa.gov/>
- 5) National Digital Forecast Database (NDFD)
<http://weather.gov/ndfd>
- 6) Private Weather Companies
<http://www.nws.noaa.gov/im/more.htm>

Media and EM Communications to the NWS

A dedicated line has been established to allow immediate two way communications between the NWS in Portland and the media or emergency managers. These lines should be used when it is critical to relay severe weather information to the NWS or to obtain additional information on weather warnings or severe weather events. The media phone number is for media use only and the emergency manager phone number is for emergency managers only.

Media Phone Line.....503-261-9248

Emergency Management Phone Line.....503-326-2356

Private Meteorological Information Firms

For a listing of commercial meteorological vendors, access the following page on the Internet:

<http://www.nws.noaa.gov/im/more.htm>

or call NWS Headquarters Industrial Meteorology Office at 301-713-0258.

Private Meteorological Information Consultants

For a listing of private meteorological consultants, access one of the following internet pages:

<http://www.nws.noaa.gov/im/>

or

<http://www.ametsoc.org/memb/ccm/ccmhome.html#Consulting>