Summary Table
Historical and Projected Climate Change for the Lower Coquille Watershed

From the following three reports (see below for full citations and URLs):
- *Climate Change and the Lower Coquille Watershed* (Oregon Climate Change Research Institute);
- *Coquille River Basin Stream Temperature Assessment* (U.S. Fish and Wildlife Service); and
- *Potential Climate-Induced Runoff Changes and Associated Uncertainty in Four Pacific Northwest Estuaries* (U.S. Geological Survey)

Key climate-related threats to the Lower Coquille Watershed include rising air temperatures, drier summers, ocean acidification, sea level rise, wave and storm increases, changes to salinity levels and rising sea surface temperatures. It is not possible to give a single definitive answer as to what to expect for future climate for the lower Coquille watershed. A more defensible approach is to present the range of possible future outcomes based on ensembles of projections (when available). The temperature and precipitation projections below are based in part on original research done for this report by the Oregon Climate Change Research Institute, while the other results are based on a survey of the best available science. All projections are based on scenarios and conditions that might reasonably be assumed to occur in the time period specified.

Climate-Related Parameter	Historical Change and Projections
Temperature (Sharp 2012)	Historical: There has been a warming trend of 0.1°C (0.2°F) per decade (1903-2010 period at North Bend weather station). While this warming trend has varied by season, all seasons show a warming trend. Projections: 2040s: Increase in the annual mean air temperature of 1.3°C (2.3°F), range 0.7-1.9°C (1.3-3.4°F). 2060s: Increase in the annual mean air temperature of 1.8°C (3.2°F), range 1.2-2.6°C (2.1-4.7°F). For both decades, the summer months have the largest projected temperature increase, as well as the largest projected range.
Precipitation (Sharp 2012)	Historical: There is no statistically significant trend in precipitation (1903-2010 at North Bend weather station). However, average yearly precipitation has decreased more than 15 percent (and more so in the summer and fall) over the last 30 years of that period. Projections: 2040s and 2060s: Inconclusive; little or no change outside the historical range of variability. The data suggest drier summers, but are inconclusive as to whether total annual precipitation will increase or decrease. Data suggests an increase in winter extreme precipitation events.
Ocean Acidification (Sharp 2012)	Historical: Over the past 250 years, there has been about a 16 percent decrease in aragonite and calcite saturation state in the Pacific Ocean due to ocean acidification processes (calcifiers, such as shellfish and some plankton, depend on calcite and aragonite for shell building). Recently-published results of oceanographic surveys in the Pacific Ocean show accelerating ocean acidification trends over the past 14-year period (average 0.34 percent per year decrease in aragonite and calcite saturation state of surface seawater). Projections: pH will continue to drop (i.e. increased acidification). Annual mean pH by 2050 projected to drop to 7.82 +/-0.04 (10 km nearshore, A2 emissions), compared to a pre-industrial value of 8.03 +/-0.03.

Local Relative Sea Level Rise (Sharp 2012)	Historical: Globally, sea level has risen approx. 22 cm (8.7 inches) since 1870. In the Coquille River estuary, the land is rising due to local geologic forces, and thus the area has not experienced significant sea level rise since 1870, when tidal records begin. Projections: The range of sea level rise in the region from northern California to the Puget Sound (due to many localized factors) is -3.5 inches to +22.7 inches by 2030; and -2.1 inches to +48.1 inches by 2050 compared to 2008. For Coos Bay, average sea level rise is projected to increase +9 cm (+3.5 inches) by 2030; and +24 cm (+9.4 inches) by 2050 relative to 2008. Projections for the Coquille River estuary would be lower due to the area's current upward vertical land movement.
Hydrology/ Stream Flow (Steele et al. 2012)	Historical: No historic record. Projections: Higher mean flow in the fall likely, with the possibility of lower mean flow in the late summer. Probable increase in high flow events (top 5 percent). (Projections are for 2041-2065 compared to 1971-1995). (Steele et al. 2012)
Stream Temperature (Mayer 2012)	Historical: Stream temperature data are mostly available for sites at and upstream of the mouths of the three major tributaries (North Folk, Middle Fork and South Fork). The 7-day average summer maxima range from 22˚C (71.6°F) to 24.6˚C (76.3°F) (the temperature criterion is 16˚C [60.8°F]). Daily average temperature for the lower main stem Coquille (only four days of data from Sept 11-14, 2007) was 19.9˚C (67.8°F) at river mile (RM) 30 and 20.2˚C (68.4°F) at RM 23 (the temperature criterion is 20˚C [68.0°F]). Projections: Stream temperatures at the mouths of all three tributaries are estimated to increase about 0.7°C (1.3° F) by the 2040s and 0.9°C (1.6°F) by the 2060s given the projections in air temperature increases for the area.
Upwelling (Sharp 2012)	Historical and Projections: Inconclusive. Some data suggests increased upwelling.
Waves/ Storms (Sharp 2012)	Historical and Projections: Suggestion of increased waves/storms. Data suggest more frequent wind and wave related flood events, with some west coast locations experiencing 100 year events every 5 years.
Sea Surface Temperatures (Sharp 2012)	Historical: The global mean sea surface temperature has increased by approximately +0. 6°C (+1.1°F) since 1950 Projections: Increase on the order of 1.0°C (1.8°F) by mid-century (A1B emissions scenario).

Citations

Mayer, T. 2012. Coquille River Basin Stream Temperature Assessment. U.S. Fish and Wildlife Service. 13p. Available at: http://ecoadapt.org/data/documents/CoquilleRiverTemperatureAssessment_Dec2012.pdf

Sharp, D. 2012. Climate change and the lower Coquille watershed. Oregon Climate Change Research Institute. 33 p. Available at: http://ecoadapt.org/data/documents/CoquilleClimate_02nov2012_FINAL.pdf

Steel, M.O., H. Chang, D.A. Reusser, C.A. Brown and I.-W. Jung. 2012. Potential Climate-Induced Runoff Changes and Associated Uncertainty in Four Pacific Northwest Estuaries. U.S. Geological Survey. Open-File Report 2012-1274, 63p. Available at: http://pubs.usgs.gov/of/2012/1274/