

**Alan F. Hamlet**  
Research Assistant Professor  
Department of Civil and Environmental Engineering  
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**Education:**

Ph.D. in Civil and Environmental Engineering, University of Washington, 2006  
MSE in Civil and Environmental Engineering, University of Washington, 1996  
BS in Mechanical Engineering, University of Washington, 1992  
BA in Mathematics, University of Rochester, 1981

**Research Interests:**

Integrated hydrological and water resources modeling  
Impacts of climate variability and climate change on hydrology and water resources  
Water resources planning and management  
Climate change planning and adaptation  
Sustainable water resources development and management  
Long-lead climate and streamflow forecasts and related water resources applications  
Modeling of freshwater and estuarine ecosystems  
Forest hydrology  
Paleoclimatic precipitation and streamflow reconstruction  
Climate impacts on hydropower and energy systems  
Climate services and outreach programs

**Positions Held:**

Research Assistant Professor  
Department of Civil and Environmental Engineering, University of Washington, 2007-  
present (see list of research topics under Research Scientist below)

**Research Scientist**

JISAO/CSES Climate Impacts Group, University of Washington, 1996-present  
*Research topics include: hydroclimatology of the Pacific Northwest and western U.S., impacts of climate variability and change on hydrologic and water resources systems, hydrologic modeling, water resources modeling, hydrologic forecasting based on PDO and ENSO climate forecasts with applications to water resources management, development of long range climate change scenarios for water planning, impacts of climate change on the PNW ski industry, development of long term driving data sets for hydrologic modeling studies, downscaling and bias correction of global and regional scale climate model output, bias correction schemes for hydrologic modeling studies, hydropower and electrical demand modeling, modeling studies of observed climate change in the western U.S. and effects on snowpack, runoff, evaporation, and soil moisture, studies of climate effects on flooding and extreme events, transboundary implications of climate change, and adaptation to the hydrologic impacts of climate change using optimization models. Outreach, ongoing partnerships with stakeholders, and development of pilot climate services have been an important part of my research relating to the CIG's mission statement.*

**Water Resources Engineering Consultant**

Malcolm Pirnie (1996, 1997)

*Water resources modeling and development of naturalized streamflow data sets*

Hamlet  
Vita

NW Florida Water Management District (1996-2000);  
*Water resources modeling*

Northwest Hydraulic Consultants (1999)  
*Decadal time scale streamflow forecasting*

**Teaching and Course Development:**

Variable Infiltration Capacity Macro-Scale Hydrologic Modeling Training Workshop,  
University of Washington, Nov, 2006  
(ftp://ftp.hydro.washington.edu/pub/hamleaf/VIC\_training\_nov\_2006)

Guest lecturer and hydrology and water resources syllabus development for SMA 585,  
Climate Impacts on the Pacific Northwest (N. Mantua and A. Snover instructors),  
University of Washington, 2002-2006

**Honors and Awards:**

**2001 AWRA Boggess Award, Best Paper in 2000**, Journal of the American Water  
Resources Association. (Miles, E.L., Snover, A.K., Hamlet, A., Callahan, B., and Fluharty, D., 2000:  
Pacific Northwest regional assessment: The impacts of climate variability and climate change on the water  
resources of the Columbia River Basin. *Journal of the American Water Resources Association*, 36 (2): 399-  
420)

**Best Practice Oriented Paper in 2002**, Am. Society of Civil Engineers Journal of Water  
Resources Planning and Management. (Hamlet, A.F., Huppert, D., Lettenmaier, D.P., 2002:  
Economic Value of Long-Lead Streamflow Forecasts for Columbia River Hydropower, *ASCE J. of Water  
Res. Planning and Mgmt*, 128 (2): 91-101)

**Grand Prize for Best Overall Demonstration**, 2005 Civil and Environmental  
Engineering Open House, University of Washington (Hamlet, A.F., Weather and Water: Climate  
Change and Our Watersheds)

**Outstanding Student Paper Award, 2006**, Hydrology Section of the American  
Geophysical Union (Hamlet, A.F., E. Salathe, C. Peacock et al., Wetter or drier? Estimating regional  
precipitation uncertainties in the IPCC Fourth Assessment global warming scenarios using a GCM super  
ensemble approach)

**Best Practice Oriented Paper in 2006**, Am. Society of Civil Engineers Journal of Water Resources  
Planning and Management. (Mcguire M., Wood A.W., Hamlet A.F., Lettenmaier D.P., 2006: Use of  
satellite data for streamflow and reservoir storage forecasts in the Snake River Basin, ID, *J. Water Res.  
Planning and Mgt*, ASCE, 132, 97-110)

**Professional Memberships:**

American Geophysical Union  
American Meteorological Society  
American Water Resources Association  
American Society of Civil Engineers

**Academic Publications:**

Hamlet, A.F., 1996: Generating Basinwide Alternatives for the Apalachicola-Chattahoochee-Flint River Basin Using a Monthly-Time-Step, Hydrologic Screening Model, Masters Thesis, Department of Civil and Environmental Engineering, University of Washington, March

Hamlet, A.F., 2006: Hydrologic Implications of 20<sup>th</sup> Century Warming and Climate Variability in the Western U.S., PhD Dissertation, Department of Civil and Environmental Engineering, University of Washington, June

**Refereed Journal Articles in Review or Accepted:**

Crozier, L., R.W. Zabel, A.H. Hamlet, 2007: Does diversity enhance viability? A case study of differential survival among Chinook salmon populations confronted with climate change, *Global Change Biology* (accepted)

Hamlet, A.F., A.L. Westerling, T.P. Barnett, D.P. Lettenmaier, 2007b: Effects of Changing 20th Century Precipitation Variability on Annual Streamflow and Regional Hydropower Resources in the Western U.S., (in internal review).

Lee, S.Y., A.F. Hamlet, C.J. Fitzgerald, S.J. Burges, D.P. Lettenmaier, 2007: Optimized Flood Control in the Columbia River Basin for a Global Warming Scenario, *ASCE J. Water Resources Planning and Management* (in review).

**Refereed Journal Articles:**

Andreadis, K.M., E.A. Clark, A.W. Wood, A.F. Hamlet, and D.P. Lettenmaier, 2005: 20th Century Drought in the Conterminous United States, *J. Hydrometeor.*, 6(6): 985-1001.

Cohen, S.J., Miller, K., Hamlet, A., Avis, W., 2000: Climate Change and Resource Management in the Columbia River Basin, *Water International*, 25 (2): 253-272

Hamlet, A.F., Lettenmaier, D.P., 1999: Effects of Climate Change on Hydrology and Water Resources in the Columbia River Basin, *J. of the American Water Resources Association*, 35 (6): 1597-1623

Hamlet, A.F., Lettenmaier, D.P., 1999: Columbia River Streamflow Forecasting Based on ENSO and PDO Climate Signals, *ASCE J. of Water Res. Planning and Mgmt.*, 125 (6): 333-341

Hamlet, A.F., Lettenmaier, D.P., 2000: Long-Range Climate Forecasting and its Use for Water Management in the Pacific Northwest Region of North America, *J. Hydroinformatics*, Volume 02.3: 163-182

Hamlet, A.F., Huppert, D., Lettenmaier, D.P., 2002: Economic Value of Long-Lead Streamflow Forecasts for Columbia River Hydropower, *ASCE J. of Water Res. Planning and Mgmt.*, 128 (2): 91-101

Hamlet, A.F., Lettenmaier, D.P., 2005: Producing temporally consistent daily precipitation and temperature fields for the continental U.S., *J. of Hydrometeorology*, 6(3): 330-336

Hamlet, A.F., Mote, P.W., Clark, M.P., Lettenmaier, D.P., 2005: Effects of temperature and precipitation variability on snowpack trends in the western U.S., *J. of Climate*, 18 (21): 4545-4561

Hamlet A.F., Mote P.W., Clark M.P., Lettenmaier D.P., 2007: 20th Century Trends in Runoff, Evapotranspiration, and Soil Moisture in the Western U.S., *J. Climate*, 20 (8): 1468-1486

Hamlet A.F., Lettenmaier D.P., 2007: Effects of 20th Century Warming and Climate Variability on Flood Risk in the Western U.S., *Water Resour. Res.*, 43, W06427, doi:10.1029/2006WR005099

Leung, L.R., Hamlet, A.F., Lettenmaier, D.P., Kumar, A., 1999: Simulations of the ENSO Hydroclimate Signals in the Pacific Northwest Columbia River Basin, *BAMS*, 80 (11): 2313-2329

Miles, E.L., Snover, A.K., Hamlet, A.F., Callahan, B., and Fluharty, D., 2000: Pacific Northwest regional assessment: The impacts of climate variability and climate change on the water resources of the Columbia River Basin. *J. of the American Water Resources Association*, 36 (2): 399-420

McGuire, M., Wood, A.W., Hamlet, A.F., Lettenmaier, D.P., 2006: Use of satellite data for streamflow and reservoir storage forecasts in the Snake River Basin, ID, *ASCE J. Water Res. Planning and Mgt*, 132, 97-110.

Mote, P.W., E.A. Parson, A.F. Hamlet, K.G. Ideker, W.S. Keeton, D. P., Lettenmaier, N.J. Mantua, E.L. Miles, D.W. Peterson, D.L. Peterson, R., Slaughter, and A.K. Snover, 2003: Preparing for climatic change: the water, salmon, and forests of the Pacific Northwest, *Climatic Change*, 61: 45-88

Mote P.W., Hamlet A.F., Clark M.P., Lettenmaier D.P., 2005: Declining mountain snowpack in western North America, *BAMS*, 86 (1): 39-49

Mote, P.W., A.F. Hamlet, E.P. Salathe, 2007: Has spring snowpack declined in the Washington Cascades?, *Hydrology and Earth System Sciences Discussions*, 4, 2073-2110, SRef-ID: 1812-2116/hessd/2007-4-2073

Nijssen, B., O'Donnell G.M, Hamlet, A.F., Lettenmaier, D.P., 2001: Hydrologic Sensitivity of Global Rivers to Climate Change, *Climatic Change*, 50: 143-145

Payne, J.T., A.W. Wood, A.F. Hamlet, R.N. Palmer, and D.P. Lettenmaier, 2004: Mitigating the effects of climate change on the water resources of the Columbia River basin, *Climatic Change*, 62 (1-3): 233-256

Snover, A.K., Hamlet, A.F., Lettenmaier, D.P., 2003: Climate Change Scenarios for Water Planning Studies, *BAMS*, 84 (11): 1513-151

Voisin, N., A. F. Hamlet, L. P. Graham, D. W. Pierce, T. P. Barnett, and D. P. Lettenmaier, 2006: The role of climate forecasts in western U.S. power planning, *Journal of Applied Meteorology* 45(5), 653-673.

**Books:**

Gamble, J.L., John Furlow, Amy K. Snover, Alan F. Hamlet, Barbara J. Morehouse, Holly Hartmann, and Thomas Pagano, 2002: Assessing the Impact of Climate Variability and Change on Regional Water Resources: The Implications for Stakeholders, in *Water: Science, Policy, and Management*, R. Lawford et al., editors, AGU Press Monograph

Hamlet, A.F., P.W. Mote, A.K. Snover, and E.L. Miles, Chapter 4, Climate, Water Cycles, and Water Resources Management in the Pacific Northwest, *Rhythms of Change: An Integrated Assessment of Climate Impacts on the Pacific Northwest*, E.L. Miles and A.K. Snover, editors, (in review).

Hamlet, A.F., 2003: The Role of Transboundary Agreements in the Columbia River Basin: An Integrated Assessment in the Context of Historic Development, Climate, and Evolving Water Policy, *Climate and Water: Transboundary Challenges in the Americas*, Eds. H. Diaz and B. Morehouse, Kluwer Press, Dordrecht/Boston/London

Lettenmaier, D.P., Hamlet, A.F., 2003: Chapter 7, Improving Water Resources System Performance Through Long-Range Climate Forecasts: the Pacific Northwest Experience, *Water and Climate in the Western United States*, William M. Lewis Jr., editor, University Press of Colorado, Boulder

**Other Publications:**

Cohen S., R. de Loe, A. F. Hamlet, R. Herrington, L. Mortsch, D. Shrubsole, 2003, Chapter 15 -Integrated and Cumulative Threats to Water Availability, in *Threats to Fresh Water Availability in Canada*, Environment Canada, [<http://www.nwri.ca/threats2full/intro-e.html>]

Hamlet, A.F., 2001, Effects of climate change on water resources in the Pacific Northwest: Impacts and policy implications. Preparatory White Paper for Climate and Water Policy Meeting, Skamania, Washington, July 16-17, 2001. (Available at: <http://www.cses.washington.edu/db/pdf/hamleteffectsofcc36.pdf>)

Hamlet, A.F., 2001, Preparing for climate change in the Pacific Northwest: A discussion of water resources adaptation pathways. Preparatory White Paper for Climate and Water Policy Meeting, Skamania, Washington, July 16-17, 2001.

(Available at: <http://www.cses.washington.edu/db/pdf/hamletprepforcc37.pdf>)

Lee, S. Y., A. F. Hamlet, C. J. Fitzgerald, S. J. Burges, and D. P. Lettenmaier, 2006: Optimized flood control in the Columbia River Basin for a global warming scenario. In D. Zimelman and W.C. Loehlein (eds.), *Operating Reservoirs in Changing Conditions*, ASCE conference proceedings, Sacramento, CA, August 14-16, 2006, Reston, Virginia: American Society of Civil Engineers

Lettenmaier, D.P., Wood E.F., Zion, M., Wood A.W., Hamlet, A.F., Palmer, R.N., 1996, Water Management Implications of Global Warming, 6: The Appalachian-Chattahoochee-Flint River Basin, Report to the Interstate Commission on the Potomac River Basin and the Institute for Water Resources, April

Mote, P., D. Canning, D. Fluharty, R. Francis, J. Franklin, A. Hamlet, M. Hershman, M. Holmberg, K. Gray-Ideker, W.S. Keeton, D. Lettenmaier, R. Leung, N Mantua, E. Miles, B. Noble, H. Parandvash, D.W. Peterson, A. Snover, and S. Willard, 1999: Impacts of Climate Variability and Change, Pacific Northwest. National Atmospheric and Oceanic Administration, Office of Global Programs, and JISAO/SMA Climate Impacts Group, Seattle, WA. 110 pp.

Mote, P. W., A. F. Hamlet, and D. P. Lettenmaier. 2005: Variability and trends in mountain snowpacks in western North America. In K. Elder, B. McGurk, and J. Lea (eds.), *Proceedings of the Western Snow Conference, April 19-22, 2004, Richmond, British Columbia*, pp. 15-22, Soda Springs, CA: Western Snow Conference.

Parson, E. A., P. W. Mote, A. F. Hamlet, N. J. Mantua, A. K. Snover, W. S. Keeton, E. L. Miles, D. J. Canning, and K. N. Ideker. 2000. Potential consequences of climate variations and change for the Pacific Northwest. Chapter 9 in National Assessment of the Potential Consequences of Climate Variations and Change (Washington D.C.: USGCRP).

Snover, A. K., E. L. Miles, and A. F. Hamlet. 2003. Learning from and adapting to climate variability in the Pacific Northwest. In Background Papers in Preparation for the "Insights and Tools for Adaptation: Learning from Climate Variability" Workshop, November 18-20, 2003, Washington, D.C., pp. 167-179, Washington, D.C.: NOAA Office of Global Programs.

Snover, A. K., P. W. Mote, L. C. Whitely Binder, A. F. Hamlet, and N. J. Mantua, 2005: *Uncertain Future: Climate Change and Its Effects on Puget Sound*. Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington.

VanRheenen, N. T., R.N. Palmer, A. F. Hamlet, and D. P. Lettenmaier. 2003. Climate change, fish, agriculture, and power: Impacts and implications for future Snake River water resources management. In Bizier, P. and P. De Barry (eds.), World Water and Environmental Resources Congress 2003 and Related Symposia: Proceedings of the

Congress, June 23-26, 2003, Philadelphia, Pennsylvania, Reston, Virginia: American Society of Civil Engineers.

**Conference, Workshop, Meeting, and Class Presentations:**

I currently give about 30 presentations a year at conferences, workshops, seminars, and professional meetings. Many of these presentations are directly related to the Climate Impacts Group's extensive outreach and education activities here in the Pacific Northwest. A full listing of presentations and posters from 2002 to present is available at: <http://www.hydro.washington.edu/Lettenmaier/Presentations.html>

**Consulting and Professional Practice:**

Construction of a water management model and inflow data set for the Norfolk, VA Water Supply System, Malcolm Pirnie, Newport News, VA, 1996-1997

Development and testing of a daily time step version of the Apalachicola-Chattahoochee-Flint shared vision water management model, Northwest Florida Water Management District, 1996-2000

Ultra long-term forecasts of inflows to the Nechakco Reservoir, Northwest Hydraulic Consultants, Seattle, WA, 1999

Effects of Climate Change Scenarios on Ski Conditions at Snoqualmie Pass, Stevens Pass, Mission Ridge, and Schweitzer Mountain Ski Areas, Study for Harbor Properties, Seattle, WA, 2000

Sensitivity of Washington Water Resources Inventory Areas to Regional Warming, Resource Innovation Group, Eugene, OR, 2006

Sensitivity of Pacific Northwest Watersheds to Regional Warming, Resource Innovation Group, Eugene, OR, 2007