WESTERN OREGON
UNIVERSITY

November 28, 2009

U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research
Greater Research Opportunities (GRO) Program

Dear EPA GRO Fellowship Reviewers:

This letter is written in support of Ms. Kelsii Dana as part of her application for the 2010 EPA Greater Research Opportunities (GRO) Fellowship for Undergraduate Environmental Study (Funding Opportunity Number: EPA-F2009U-GRO-Q1 Physical Sciences). Ms. Dana is currently in her second year as an Earth Science major (B.S.-level) at Western Oregon University (WOU). I am serving as her primary advisor on a research project entitled: "The Distribution and Occurrence of Nitrate in Groundwater Supplies of the Mid-Willamette Valley: Implications for Water Resource Management in the Monmouth-Independence Area, Oregon". I have known Kelsii for the past two years and she has been a student in my Earth Science courses. Based on these contacts, I feel that I am able to comment on her skills and potential as a GRO Fellow for Undergraduate Environmental Study.

Kelsii is generally an "A+" student who is a hard worker, very responsible, energetic, and pays attention to details. She ranks in the top 5% of students in her class, both in terms of potential and performance. Ms. Dana's academic proficiency and work ethic are notable compared to her peers. Her major curriculum focuses on topics including geology, Earth science, biology, environmental studies, and the allied physical sciences (math, chemistry, physics). Based on recent discussions, Kelsii plans to attend graduate school with an emphasis on applied environmental geology, and has a career goal of working as a professional geoscientist.

In terms of the GRO undergraduate fellowship opportunity, Ms. Dana approached me about her desire to apply to the program and expressed an interest in examining the effects of nitrate occurrence in groundwater of the mid-Willamette Valley, Oregon. As my area of expertise includes hydrogeology and environmental geology, I commented that there are existing nitrate-related groundwater problems in the Monmouth-Independence urban corridor, home to Western Oregon University. I also encouraged Kelsii to think about integrating that idea as part of her GRO objective. She agreed and we are moving forward with research plans as part of this application process. To better frame the project in this context, the following paragraphs provide a statement of the problem.

The Monmouth-Independence urban corridor is located in the mid-Willamette Valley, 15 miles southwest of Salem, the state capital. The greater Willamette Valley covers 12,000 sq. mi and extends northward 120 mi from Eugene to Portland, Oregon (Figure 1). This lowland is up to 40 mi wide, separating the Coast Range to the west from the Cascade Range to the east. The Willamette Basin is home to ~70% of Oregon's population, with 70% of water use derived from surface sources, and 30% from groundwater. Regional land-use is characterized by a mosaic of 8% urban, 22% agriculture and 70% forest.

In 2004, the southern Willamette Basin was formally declared a Groundwater Management Area by the Oregon Department of Environmental Quality because of anomalously high nitrate concentrations (action levels >7 mg/l). Over 80% of groundwater production in the Willamette Basin is from shallow

Division of Natural Sciences & Mathematics
345 N. Monmouth Ave. ♦ Monmouth, OR 97361 ♦ Tel: 503-838-8206 ♦ Fax: 503-838-8072 ♦ http://www.wou.edu

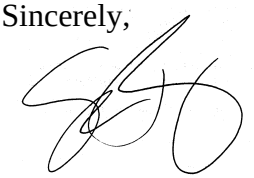
alluvial aquifers, less than 75 feet deep. The Monmouth area in particular derives 100% of its domestic water supply from this source, and is associated with known water quality problems as related to salinity (total dissolved solids) and nitrate. The former is derived from natural geochemical conditions (connate water) in the subsurface Earth materials, the latter is human-induced by agricultural practice. Local population growth (~3% from 2000-2006) and increasing development of already over-allocated water resources in the valley are exacerbating the demand for high-quality groundwater. Accordingly, land development in the Monmouth-Independence corridor is forcing the need to expand groundwater supplies by a projected 150% in the next 15 years. Local community leaders are actively weighing economic cost-benefit scenarios for public investment in expanded treatment and conveyance facilities. The City of Monmouth is particularly vulnerable in this regard and has been working on design of an updated water system since 2000, but limited availability of capital improvement funds is a persistent hindrance. Additional hydrogeologic analysis is needed to better understand the controls on distribution and occurrence of nitrate in the local aquifer system, and to communicate that information in a mode that can be effectively utilized for wise community-based decision making by lay citizens.

This problem provides the framework for Ms. Dana's proposed research project as part of the GRO Undergraduate Fellowship Program. The objectives of this work are to: (1) conduct a local aquifer characterization using available public records (i.e. synthesis and compilation of geologic maps, theses, drilling records, water well records, etc.), (2) determine the extents and distribution of groundwater nitrate concentrations in the Monmouth-Independence area, (3) derive conceptual water resource models and action alternatives for public supply development, and (4) cultivate a service-learning exchange between Western Oregon University and the local community, with a focus on citizen-based water resources education. In addition to addressing the municipal water supply problems stated above, value-added benefits of the study also include application of the aquifer characterization results to regional wetlands restoration efforts in the greater mid-Willamette Valley.

In sum, Kelsii is a diligent, dependable, and enthusiastic student who is consistently performing in the top 5% of her class. She is committed to working on an undergraduate research project that focuses on groundwater resources, nitrate contamination, and community-based water resource development. The proposed project is applied and directly connected to real-world environmental problem solving in the local community. This research focus combined with Ms. Dana's course curriculum in the Earth Science program at Western Oregon University, will provide an excellent training opportunity leading to advanced graduate study and STEM-related career placement in the environmental sciences.

Given her academic qualifications and stated career goals, I confidently recommend Kelsii for consideration as a top candidate in the 2010 GRO Undergraduate Fellowship Program. Please feel free to contact me directly if you have any further questions (phone: 503-838-8398, email: taylors@wou.edu). Thank you for your time and consideration. Good luck with your fellowship selection process.

Sincerely,



Steve Taylor, R.G., Ph.D.
Associate Professor of Geology
Chair, Division of Natural Sciences and Mathematics

Attachments: Figure 1 Location Map, Related Reference List

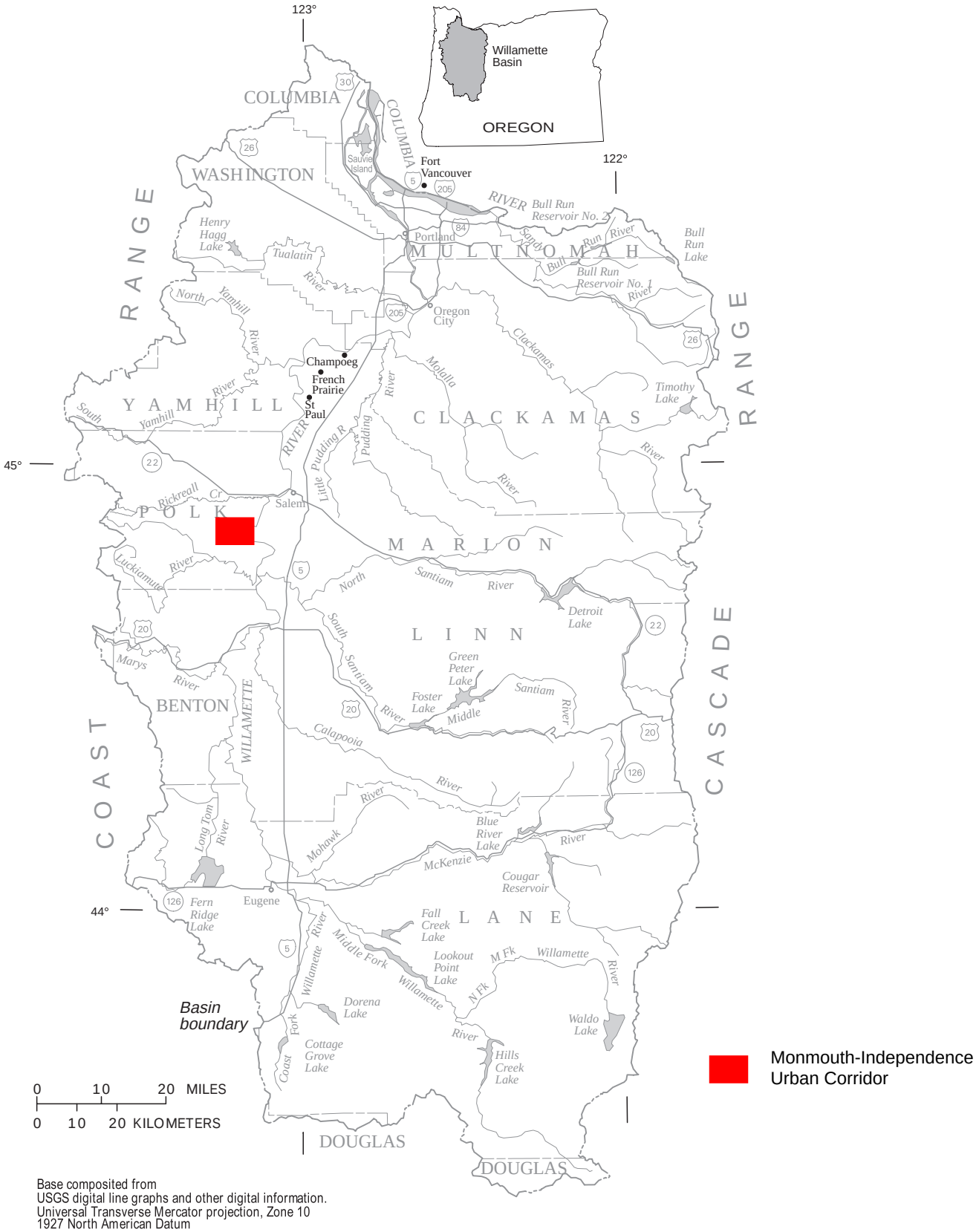


Figure 1. Location and features of the Willamette Basin, Oregon (from Urich and Wentz, 1999)

Related Reference Citations

Caldwell, R.R., 1993, Geochemistry, alluvial facies distribution, hydrogeology, and groundwater quality of the Dallas-Monmouth area, Oregon: Unpublished M.S. Thesis, Portland State University, Portland, Oregon, 198 p.

City of Monmouth, 2008, Monmouth Comprehensive Plan (Revised): Unpublished Municipal Planning Document, Monmouth, Oregon.

Eldrige, A., 2004, Southern Willamette Valley Groundwater Summary Report: Technical Document, Oregon Dept. of Environmental Quality, 26 p.

Environmental Protection Agency, 2003, Nonpoint Sources of Pollution: online resource http://www.epa.gov/owow/nps/qa.html

Gannett, Marshall, W. and Caldwell, Rodney R.; 1998; Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington; USGS Professional Paper 1424-A

Gonthier, J.B., 1983, Groundwater resources of the Dallas-Monmouth area, Polk, Benton, and Marion Counties, Oregon: State of Oregon Groundwater Report No. 28, 50 p.

Hinkle, S.R., 1997. Quality of shallow groundwater in alluvial aquifers of the Willamette Basin, Oregon 1993-1995; U.S. Geological Survey Water-Resources Investigative Report 97-4082-B.

Orzol, Leonard L.; Wozniak, Karl C.; Meissner, Tiffany R.; and Lee, Douglas B.; 2000; Groundwater and Water-Chemistry Data for the Willamette Basin, Oregon; USGS Water Resources Investigations Report 99-4036

Urich M.A., and Wentz, D.A., 1999, Environmental Setting of the Willamette Basin, Oregon: U.S. Geological Survey, Water-Resources Investigations Report 97-4082-A, 20 p.

Wentz, D.A., and McKenzie, S.W., 1991, National Water Quality Assessment Program – The Willamette River Basin, Oregon: U.S. Geological Survey, Open-File Report, 91-167.

Woodward, D.G., Garnettt, M.W., and Vaccaro, J.J., 1998, Hydrogeologic Framework of the Willamette Lowland Aqufer System, Oregon and Washington: U.S.G.S. Professional Paper 1424-B