Guest Editorial: Aquatic Science in the Northwest

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In recent years, Northwest Science has seen a significant increase in the number of submissions representing aquatic science. Our region is punctuated by aquatic systems. The current issue in particular, presents a number of new aquatic science contributions. Accordingly, Northwest Science invited the authors of this guest editorial to address the question, why is aquatic science so important in the Northwest?

The importance of the Northwest region’s social, economic and ecological connections to water rivals that of any other area in the world. Water provides Northwest communities with critical ecosystems services including municipal water supplies, irrigation for agriculture, energy, transportation and recreation. Despite the high density of dams and multiple impaired waters, the Northwest also contains the majority of pristine waters and coastlines that remain in North America (e.g., Belote et al. 2016). Many of these pristine waters are currently protected in government-designated reserves or have been spared from human impacts due to their remoteness. Consequently, few other places offer such rich opportunities to restore or protect what has been lost elsewhere.

Despite these strong connections to water, many of its aquatic resources are in peril due to the increased demands of a growing human population, water-related challenges of climate change and aquatic invasive species. Rapid growth has not only occurred in urban locations like Seattle, WA and Anchorage, AK, but has also occurred in smaller inland cities adjacent to protected areas (Hansen et al. 2014). This rapid population growth coincides with a period punctuated by rising air temperatures, declining snowpacks, and changes in the timing and amount of water availability that interact to create stressful conditions for critical aquatic resources and provide opportunities for the establishment and spread of invasive species (Sorte et al. 2013).

Because of the growing list of individual threats to and complex interactions within aquatic ecosystems, the need for science-informed policies and practices is intensifying (Carpenter et al. 2011). Relevant, robust, unbiased science will help identify and assess current and future threats to Northwest aquatic ecosystems and lesson the uncertainties of real-world problems that aquatic resource managers face. Insights from defensible and timely scientific investigations will aid in the protection of the Northwest’s intact aquatic ecosystems and conservation of its most sensitive species. In addition, long-term science-based monitoring is increasingly important for detecting environmental and ecological change, characterizing the status and trends of natural and restored ecosystems, and assessing the efficacy of conservation and restoration actions.

Aquatic science in the Northwest has advanced our understanding of invasion pathways and threats to aquatic biodiversity posed by invasive species (Carey et al. 2011, Larson and Olden 2011, Strecker et al. 2011, Kuehne et al. 2016). In the headwater areas of the Northwest, state and federal agencies are working to protect uninvaded waters and conserve strongholds for native and endemic species (Rieman et al. 2000, Muhlfeld et al. 2014). Similarly, cataloguing the effects of anthropogenic nutrient enrichment and habitat change on aquatic ecosystems in the Northwest (Fenn et al. 2003, Sheuerell and Schindler 2004, Feely et al. 2010, Larsen et al. 2011) is clarifying how land use change, urbanization, and atmospheric deposition are altering aquatic ecosystems worldwide. Climatic change, an increasingly important determinant of aquatic ecosystem change, has been well studied in the Northwest (Mote 2006, Isaak et al. 2012, Dalton et al. 2013) and results