

Memorandum

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From:	Bridget August, LG, LHG and John Monahan, FP-C	
Date:	January 6, 2021	Hydrogeologist 2804
File:	0504-161-00	Chsed Geolog
Subject:	WRIA 7 Subbasin Delineations	Bridget A. August

INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) Committees for Water Resource Inventory Areas (WRIAs) 7, 8 and 9. This memorandum provides a summary of the deliverable for Work Assignment GEO102, Task 2, WRIA 7 Subbasin Delineations.

BACKGROUND AND CONTEXT

The Streamflow Restoration law (Revised Code of Washington [RCW] Chapter 90.94) specifies that by June 30, 2021, Ecology must establish a WRE Committee and adopt a WRE Plan in the Snohomish Watershed (WRIA 7). The Snohomish (WRIA 7) Watershed Restoration and Enhancement Plan (watershed plan) must address impacts on streamflows from consumptive use from new domestic permit-exempt wells (PE wells¹) anticipated between January 19, 2018 and January 18, 2038. Dividing the WRIA 7 into subbasins is an essential step in developing a plan that complies with the law. RCW 90.94.030(3)(b) states "The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary." The *Final Guidance for Determining Net Ecological Benefit* (Final NEB Guidance) (Ecology 2019) states that, "Planning groups must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act."

WRIA 7 includes the Snohomish River, the Snoqualmie River, the Skykomish River, and associated tributaries. It also includes streams draining directly to Puget Sound between the City of Mukilteo and the City of Everett, on the Tulalip Plateau, and in the Marysville Trough.

The methods used to delineate subbasins in WRIA 7 are summarized below.

¹ "PE wells" is used to refer to new homes associated with new permit-exempt wells and also new homes added to existing wells, including homes on group systems relying on permit-exempt wells.

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SUBBASIN DELINEATION METHODS

GeoEngineers worked with the WRIA 7 Committee to delineate subbasins for WRIA 7. The WRIA 7 Committee considered existing subwatershed units for their subbasin delineation, including hydrologic unit codes, King County drainage basins, and the Snohomish Basin Protection Plan's Protection Planning Units.

- Hydrologic unit codes (HUCs) refer to the U.S. Geological Survey (USGS) delineation of watersheds into successively smaller hydrologic units (USGS 2013). The USGS uses a nationwide system based on surface hydrologic features. This system divides the country into 21 regions (2-digit), 222 subregions (4-digit), 370 basins (6-digit), 2,270 subbasins (8-digit), ~20,000 watersheds (10-digit), and ~100,000 subwatersheds (12-digit). A hierarchical HUC consisting of 2 additional digits for each level in the hydrologic unit system is used to identify any hydrologic area. HUC-12 is at the subwatershed level (12-digit) of HUCs and there are over 60 HUC-12 subwatersheds in WRIA 7.
- King County drainage basins are similar in size to HUC-12s, but do not exactly match the HUC-12 boundaries. They are a boundary layer developed by King County using LiDAR technology to delineate drainage basins. There are 23 King County drainage basins in the King County portion of WRIA 7.
- The Snohomish Basin Protection Plan was developed "to identify protection strategies that prevent the degradation of hydrologic processes that support salmon or salmon habitat" and is intended to set a framework for "implementation and accounting of protection efforts by all Basin partners" (Snohomish Basin Salmon Recovery Forum 2015). There are 17 Protection Planning Units in WRIA 7. Protection Planning Units were determined based on critical flows for chinook and focal stream reaches, considering areas with similar hydrology and land uses.

Subbasin Selection Considerations

The WRIA 7 Committee used existing HUC-12s, King County drainage basins, and Protection Planning Units and applied the following guiding principles to develop subbasin delineations:

- Align subbasins with the Protection Planning Units as closely as possible.
- Combine HUC-12s and King County drainage basins with lower projected growth of new homes using PE wells.
- Keep distinct subbasins for HUC-12s and King County drainage basins with higher projected growth of new homes using PE wells.
- Consider important salmon habitat and potential location of offset projects and actions.
- Consider streams with known low flow issues.
- Consider streams with year-round closures².

WRIA 7 Subbasin Delineation

The WRIA 7 subbasin boundaries are based on HUC-12 subwatersheds in the Snohomish County portion of the watershed and King County drainage basin boundaries in the King County portion of the watershed.

² The following streams have year-round closures in WAC 173-507: Griffen Creek, Harris Creek, Little Pilchuck Creek, May Creek, Patterson Creek, Quilceda Creek, Raging River, and Bodell Creek.

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GeoEngineers used existing HUC-12 shapefiles from the USGS (2016) and drainage basin shapefiles from King County (2018) to develop a map and GIS shapefile for the WRIA 7 Committee's subbasins. The following adjustments were made:

- The Allen Creek drainage was added to Quilceda HUC-12.
- The Snoqualmie mainstem King County drainage basin was split where the Tolt River enters the Snoqualmie River.
- Drainage basin boundaries were shifted to align with the boundary between WRIA 7 and WRIA 8.
- HUC-12 boundaries were extended to the Puget Sound.
- Hat Island and Jetty Island, located in Possession Sound within Snohomish County and WRIA 7, were added to the Estuary/Snohomish Mainstem subbasin.

The WRIA 7 subbasin delineations are shown on Figure 1.

WRIA 7 Subbasins

- Tulalip Creek is one subbasin (**Tulalip**).
- The Allen Creek drainage, which is part of the Snohomish River Frontal Procession Sound HUC-12 subwatershed, is combined with the Quilceda Creek HUC-12 subwatershed to create one subbasin (Quilceda-Allen).
- The Snohomish River, Evans Creek, and French Creek are combined (Estuary/Snohomish Mainstem).
- Little Pilchuck is one subbasin (Little Pilchuck).
- Upper and Lower Pilchuck River are combined (**Pilchuck**).
- Woods Creek is one subbasin (**Woods**).
- Upper, Middle, and Lower Sultan River are combined (**Sultan**).
- Wallace River and Olney Creek are combined (Lower Mid-Skykomish).
- Elwell Creek-Skykomish River and McCoy Creek-Skykomish River are combined (Skykomish Mainstem).
- The South Fork and North Fork Skykomish tributaries are combined (Upper Skykomish). This includes the following HUC-12 subwatersheds and drainage basins:
 - Foss River, Miller River, Tye River, South Fork Skykomish River, Beckler River, Rapid River, Upper Beckler River, Lower South Fork Skykomish River, Lower North Fork Skykomish River, Middle North Fork Skykomish River, and Upper North Fork Skykomish River.
- Cherry Creek and Harris Creek are combined into one subbasin (Cherry/Harris).
 - The Committee combined the Cherry and Harris Creek HUC-12 subwatersheds after considering that the hydrologic divide between Cherry Creek and Harris Creek is characterized by wetlands, rather than a distinct divide.
- The northern half of the Snoqualmie mainstem drainage basin is combined with Tuck Creek, Cathcart drainages, and Ames Lake (**Snoqualmie North**).

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- The South Fork Tolt, North Fork Tolt, and Lower Tolt drainage basins are combined with nearby drainage basins Tokul Creek, Griffen Creek, and the southern half of the Snoqualmie mainstem drainage basin (Snoqualmie South).
- Patterson Creek is one subbasin (Patterson Creek).
- The Raging River is one subbasin (**Raging River**).
- The North, Middle, and South Fork Snoqualmie drainage basins are combined (**Upper Snoqualmie**).

NEXT STEPS

The WRIA 7 Committee agreed to use the proposed 16 subbasins to estimate potential PE well growth and consumptive use by subbasin.

REFERENCES

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- Snohomish Basin Salmon Recovery Forum [Snohomish County Surface Water Management, King County Snoqualmie Watershed Forum Staff, and Tulalip Tribes Natural Resources Department], 2015. Snohomish Basin Protection Plan. <u>https://www.govlink.org/watersheds/7/pdf/SBPP/SBPP%20</u> December%202015 reduced%20size.pdf.
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 National Geospatial Data Asset (NGDA) National Hydrography Dataset (NHD): USGS National Geospatial Technical Operations Center (NGTOC): Rolla, MO and Denver, CO. <u>http://nhd.usgs.gov, http://viewer.nationalmap.gov/</u>.
- Washington State Department of Ecology (Ecology), 2019. Final Guidance for Determining Net Ecological Benefit, GUID-2094 Water Resources Program Guidance. Washington State, Department of Ecology, Publication 19-11-079, p. 131. https://fortress.wa.gov/ecy/publications/documents/1911079.pdf

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Attachment: Figure 1. WRIA 7 – Snohomish Subbasin Delineation

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