

Memorandum

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To:	Ingria Jones, Washington State Department of Ecology	
From:	Bridget August, LG, LHG and John Monahan, FP-C	

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Subject: WRIA 7 Subbasin Delineations – Final Draft

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 GE0102, Task 2, WRIA 7 Subbasin Delineations.

BACKGROUND AND CONTEXT

The WRIA 7 Watershed Restoration and Enhancement Plan (WRE 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 Snohomish WRIA 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 (GUID-2094; 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 groups understand and describe location and timing of projected new consumptive water use, location and timing 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.

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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.

SUBBASIN DELINEATION METHODS

GeoEngineers worked with the WRIA 7 – Snohomish WRE Committee (Committee) and the Committee's technical workgroup to delineate subbasins for WRIA 7. The 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 (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." 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 Committee and technical workgroup held initial discussions in Spring 2019 to develop subbasin delineations. The Committee and technical workgroup discussed the pros and cons of having few subbasins versus many subbasins delineated for the WRE Plan. Specifically, members discussed reasons for dividing the WRIA into many subbasins to reflect priorities to protect streamflows where the most growth of PE wells is projected, to protect streamflows in tributaries with year-round closures, and to consider complex land use patterns, historic impacts from wells, and ecological and biological factors. Members also discussed that too many subbasins would make planning and technical work more difficult and may not result in additional ecological benefit. Ultimately, the Committee requested information about the number and spatial distribution of new domestic PE wells and decided to delay subbasin delineation until growth projections were developed.

Snohomish County developed interim growth projections using HUC-12 subwatersheds and King County developed interim growth projections using stream basins, which the technical workgroup then used to develop a subbasin delineation proposal. 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 Plan 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 stream basin boundaries in the King County portion of the watershed. GeoEngineers used existing HUC-12 shapefiles from the USGS (2016) and stream basin shapefiles from King County (2018) to develop a map and GIS shapefile for the 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.
- Stream 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, 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:** Tulalip Creek is one subbasin.
- Quilceda-Allen: Combines the Allen Creek drainage, which is part of the Snohomish River Frontal Procession Sound HUC-12 subwatershed, with the Quilceda Creek HUC-12 subwatershed.
- **Estuary/Snohomish Mainstem:** Combines the Snohomish River, Evans Creek, and French Creek.
- **Little Pilchuck:** Little Pilchuck Creek is one subbasin.
- Pilchuck: Combines Upper and Lower Pilchuck River.
- Woods: Woods Creek is one subbasin.
- **Sultan:** Combines Upper, Middle, and Lower Sultan River.
- **Lower Mid-Skykomish:** Combines Wallace River and Olney Creek.

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.

- Skykomish Mainstem: Combines Elwell Creek-Skykomish River and McCoy Creek-Skykomish River.
- Upper Skykomish: Combines the South Fork and North Fork Skykomish tributaries. 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-Harris: Combines Cherry Creek and Harris Creek.
- Snoqualmie North: Combines the northern half of the Snoqualmie mainstem drainage basin with Tuck Creek, Cathcart drainages, and Ames Lake.
- Snoqualmie South: Combines the South Fork Tolt, North Fork Tolt, and Lower Tolt stream basins with nearby stream basins Tokul Creek, Griffen Creek, and the southern half of the Snoqualmie mainstem drainage basin.
- **Patterson:** Patterson Creek is one subbasin.
- **Raging:** Raging River is one subbasin.
- **Upper Snoqualmie:** Combines the North, Middle, and South Fork Snoqualmie stream basins.

The WRIA 7 subbasin delineation combines subbasins with relatively low growth in the headwaters (Upper Snoqualmie and Upper Skykomish subbasins), and separates subbasins with relatively high growth (Tulalip, Little Pilchuck, and Quilceda/Allen). Raging River and Patterson Creek were kept separate because they have year-round closures and have important salmon habitat. Harris Creek also has a year-round closure, but was combined with Cherry Creek, since the large wetland between the two basins does not hydrologically isolate the two subbasins. The subbasin delineation splits the Snoqualmie mainstem into North and South at the Tolt River to avoid creating a large subbasin with high projected growth. Overall, the subbasin delineation aligns relatively closely with Protection Planning Units.

NEXT STEPS

The WRIA 7 WRE Committee agreed to use the proposed 16 subbasins to estimate PE well growth and consumptive use by subbasin. The Committee can revisit the subbasin delineations later in the planning process, if needed.

REFERENCES

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.

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- Snohomish County Surface Water Management, King County Snoqualmie Watershed Forum Staff, and Tulalip Tribes Natural Resources Department, 2015. *Snohomish Basin Protection Plan*. Snohomish Basin Salmon Recovery Forum, Everett, Washington.
- U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2013. Federal Standards and Procedures for the National Watershed Boundary Dataset (WBD) (4 ed.). U.S. Geological Survey Techniques and Methods 11-A3, 63 p.
- U.S. Geological Survey, 2016. USGS National Hydrography Dataset (NHD) Downloadable Data Collection -National Geospatial Data Asset (NGDA) National Hydrography Dataset (NHD): USGS - National Geospatial Technical Operations Center (NGTOC): Rolla, MO and Denver, CO. http://nhd.usgs.gov, http://viewer.nationalmap.gov/.

BA:JTM

Attachment: Figure 1. WRIA 7 – Snohomish Subbasin Delineation

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Figure 1