

# Sumas Watershed Improvement District

## Preliminary Management Plan



Version 5 (October 2017)

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### Explanatory notes

*Explanatory notes in grey boxes are intended to help readers to understand more about the content and purpose of this document.*

The purpose of this document is to assist the WID board in the process of developing their comprehensive management plan over time, beginning with this outline. This document is a preliminary management plan. Detailed content for a Comprehensive Management Plan will be developed by the WID board over time, as resources allow.

Version	Date	
Version 4a	June 2017	<ol style="list-style-type: none"><li>1. Edits were made on draft version 3, including to priority tables (Tables 1 and 2) and the agricultural actions (Table 4), following discussion at the WID board meeting of April 11, 2017.</li><li>2. Some changes to document layout and format to improve readability.</li></ol> <i>H MacKay 20170629</i>
Version 5	October 2017	<ol style="list-style-type: none"><li>1. Updates to Tables 1 and 2 after the WID board meeting in September 2017.</li><li>2. Editorial changes to improve document layout and readability.</li></ol> <i>H MacKay 20171002</i>

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## APPENDICES

### Appendix A: Executive Summary of the 2016 Agriculture-Watershed Characterization and Mapping Report for the Sumas WID

Contains maps and a summary table showing the agricultural and watershed enhancement priorities based on the January 2016 work session with Sumas WID members and on additional technical analysis by the Ag-Watershed Project team. The full WID mapping report can be downloaded from the Sumas WID website <https://www.sumaswid.com/> [Alternative download location [here](#)]

### Appendix B: Agricultural and watershed characterization tables for the Sumas WID

Contains the detailed tables listing and describing agricultural and watershed enhancement priorities as discussed at the January 2016 work session of the Sumas WID. The tables are included in the full Agriculture-Watershed Characterization Report (2016) but are presented in this appendix for easy reference.

### Appendix C: Selected Reference Maps for the Sumas WID

Contains a selection of reference maps related to the Sumas watershed and various WID priorities.

Maps in Appendix C were also included in the 2016 Agriculture-Watershed Characterization and Mapping Report, and are appended here for readers' convenience. In future technical work associated with the WID's management plan, these maps might be updated or refined to include more detail as required for baseline studies and development of an action plan.

### Appendix D: Relevant goals and policy statements for the WRIA 1 Watershed Management Project and the Whatcom County Comprehensive Plan (2016), compared to suggested priorities for the Sumas WID

### Appendix E: Sources of available data for Sumas WID (July 2016).

Reproduced from the Sumas WID mapping report.

### Appendix F: Notes from the Whatcom Watershed Improvement Districts Work Session in Lynden, March 20, 2017.

## ACRONYMS USED IN THIS DOCUMENT

AU	Assessment Unit
BMP	Best Management Practice
CDID	Consolidated Drainage Improvement District
DID	Drainage Improvement District
NRCS	Natural Resource Conservation Service
RSA	Rural Study Area
SSURGO	Soil Survey Geographic Database
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WDFW	Washington Department of Fish & Wildlife
WID	Watershed Improvement District
WRIA 1	Water Resource Inventory Area 1
WSDA	Washington State Department of Agriculture

# 1 INTRODUCTION AND OVERVIEW OF THE PLANNING PROCESS

## Explanatory notes

For this preliminary management plan, we have relied heavily on information from the recent work with the Watershed Improvement Districts to characterize and map both agricultural and watershed priorities in the six WIDs.

In this document, we have included text, maps and tables contained in the Sumas WID Agriculture-Watershed Characterization and Mapping Report (2016: the “WID mapping report”)<sup>1</sup> as reference materials. By including the actual information here where possible rather than cross-referring out to separate reports, we hope to make this document easier to use. Wherever necessary, we have noted the sources for text, maps and tables that have been copied into this document.

The focus in this preliminary plan will be on clarifying the WID’s priority issues and goals. These priorities and goals should be the basis for a more comprehensive management plan that would include actions, budgets and timelines. Where WID actions have already been initiated, these should be included in the preliminary management plan.

## 1.1 Process for developing a comprehensive management plan for the WID

We envisage three main stages in the planning process:

- First, preparing an outline for a Management Plan, that includes an overview of initial WID priorities and background information. The outline was discussed with the Sumas WID board at their regular meetings in early 2017.
- Second, preparing a Preliminary Management Plan (this document) to include agreed near-term actions to advance the WID’s priorities. The Preliminary Plan is based on available information generated in recent and current efforts, including:
  - the all-WID planning session in March 2017,
  - work sessions for the Ag-Watershed Characterization and Mapping in 2016,
  - ongoing water quality monitoring by the WID and the Conservation District, and
  - ongoing drainage management work within the WID.

Where additional baseline technical studies might be needed, the scope of work and estimated costs for these studies will be included in successive versions of the Preliminary Management Plan.

- Third, preparing a Comprehensive Management Plan over time as resources and funding are secured to undertake the necessary baseline technical studies for each component of the comprehensive plan. The comprehensive plan would also include a detailed action plan with timelines for implementation.

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<sup>1</sup> Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <[Alternate link](#) to the mapping report>

## 1.2 Purpose and content of this document

The purpose of this document is to assist the WID board in developing their comprehensive plan over time.

This document represents a Preliminary Management Plan for the Sumas Watershed Improvement District (WID). A future comprehensive management plan could follow the same format and order as this outline, but with successively more detail and technical information being added to sections of the plan over time as resources allow.

In preparing this document, we have collated recent and current information on WID management priorities and concerns from a number of sources. Where technical and background information was readily available and could be provided without additional analysis or processing, we have included it in the relevant sections and appendices of this document. Other sections in this document are limited to a description of the content that might be included in a comprehensive Management Plan but that would need additional work to prepare such content.

Section 2 contains a list of priority issues and objectives for the WID, stated as “desired outcomes”. A summary is shown in Table 1, and the process for coming up with the initial suggested list of issues is described. A more detailed list of priority issues, suggested goals against which to measure progress, and initial actions for consideration by the WID board is shown in Table 2.

Sections 3 and 4 provide a summary of available background and baseline information about the watershed and agricultural systems within the Sumas WID.

Section 5 contains supporting information on additional work and baseline studies that might be needed to prepare an action plan to achieve the WID’s priorities. Actions might include:

- actions that the WID board is already undertaking or that could be initiated in future in collaboration with farmers in the WID, without the need for extra resources or expertise;
- actions that the WID is already undertaking or could undertake in future with the assistance and collaboration of key partners such as the Conservation District and drainage districts;
- actions that will require additional technical resources and for which the WID and partners will probably need to seek grant funding.

Appendices contain additional reference information, some which is reproduced from other sources but which has been included with this document for readers’ convenience.

## 2 STRATEGIC PRIORITIES, DESIRED OUTCOMES AND GOALS

### 2.1 Process for developing the list of suggested priorities

The following process was used by the project team to develop the list of suggested priorities for discussion by the WID board.

1. We began with the set of priorities listed on the Sumas WID website<sup>2</sup> (water rights; drainage; water quality; flood management).
2. We added priorities identified in the January 2016 work session and described in the Sumas WID Agriculture-Watershed Characterization and Mapping Report<sup>3</sup> (habitats and species; water flow processes; agricultural land protection).
3. We reviewed all Sumas WID board meeting minutes back to January 2015<sup>4</sup> to collect relevant statements and decisions made by the WID board and grouped those statements or decisions against the list of priorities. We added new priorities where issues were discussed in the WID meetings and did not seem to fit readily into one or other of the already-identified priorities (outreach and education; representation; communication).
4. The list of priorities and potential actions was revised after the WID planning session held in Lynden on March 20<sup>th</sup>, 2017.
5. We built a master spreadsheet listing the main priorities that had been identified and discussed by the WID in various processes. Where the WID board had also discussed or decided on near-term actions associated with a priority, we included those in the spreadsheet. The master spreadsheet is available as an electronic document, and provides the raw material for the priorities described in this section.
6. We generated a set of suggested priorities, desired outcomes and near-term actions using draft wording drawn from previous WID documents, statements and decisions, to serve as the starting point around which the WID board could build their management plan and actions. These suggested priorities are shown in Table 1 below.
7. We compared the list of WID priorities to relevant policy statements and goals in two related planning documents, namely the Whatcom County Comprehensive Plan (2016 update)<sup>5</sup> and the WRIA 1 Watershed Management Project's statement of goals (2008).<sup>6</sup> Those two planning documents offer additional context for the Sumas WID's own priorities, and are shown alongside the suggested WID priorities in Appendix D.

### 2.2 Priorities and desired outcomes for the Sumas WID

Each agreed strategic priority should ideally have one or more desired outcomes attached to it, which would then be used to:

- establish measurable goals against which progress can be measured and reported regularly (see section 5.7 for more detail on suggested ways to measure progress), and
- identify actions, an implementation schedule, scope of work and resources needed for implementation (see Table 2).

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<sup>2</sup> See <https://www.sumaswid.com/projects>

<sup>3</sup> See Appendix A of this document (WID mapping report executive summary)

<sup>4</sup> See <https://www.sumaswid.com/minutes>

<sup>5</sup> Whatcom County Comprehensive Plan, adopted August 2016. <http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/21056>

<sup>6</sup> WRIA1 Watershed Management Project (2008). *Goals of the WMP*.

<http://wria1project.whatcomcounty.org/About-The-Project/Goals-Of-WMP/17.aspx> [accessed January 27, 2017]

#### Explanatory notes for Tables 1 and 2

The wording in Tables 1 and 2 below is based on statements drawn from WID meeting minutes, WID work session notes in the mapping report, the March 2017 WID planning session, and other WID documents.

The WID board will continue to review and update the goals and actions listed in Table 2, and will develop the detail of planned actions over time, as the board progresses towards a Comprehensive Plan for the WID.

Table 1. Sumas WID priorities and desired outcomes, based on WID statements and documents.

	Priority issue	Desired outcome(s): suggested text for goal statements. See Table 2 for more detail on actions	Near-term priority actions
1	Water quality	<i>Agricultural activities in the Sumas WID do not cause exceedances of relevant water quality standards for surface water and groundwater bodies.</i>	<ul style="list-style-type: none"> <li>• (2017) Continue WID's ongoing water quality monitoring &amp; response program</li> <li>• (2018) Spring tour – to be a regular event</li> </ul>
2	Water quantity: water availability for agricultural use (irrigation, livestock, processing)	<i>Farmers in the Sumas WID have secure (legal) access to sufficient water for agricultural uses.</i>	
3	Agricultural protection (Protecting the agricultural industry)	<i>The Sumas WID's plans and actions contribute to the recognition, protection and strengthening of the agricultural base in the WID area.</i>	
4	Communication, outreach and education	<p><i>Internal: WID members are aware of and understand the priority issues and participate actively in WID planning and implementation of priority actions.</i></p> <p><i>External: Non-agricultural residents in the WID area, other external stakeholders and relevant bodies &amp; agencies are aware of, understand and support the Sumas WID's priority actions.</i></p>	<ul style="list-style-type: none"> <li>• (2017) Outreach and education with landowners</li> <li>• done (2017) Prepare a preliminary management plan for the Sumas WID</li> <li>• (2017-18) Review and update the Preliminary Management Plan, focusing on manageable sized sections at each board meeting.</li> </ul>
5	Agricultural field drainage	<i>Drainage infrastructure and ditches in the Sumas WID are actively and effectively maintained.</i>	<ul style="list-style-type: none"> <li>• (2017) Select and implement a ditch cleaning project</li> </ul>
6	Flood management & protection	<i>Agricultural lands in the Sumas WID are protected from flooding due to surface water runoff at critical times in the growing season.</i>	
7	Water flow processes; Habitats & species	<i>The Sumas WID's plans and actions help to protect and enhance water flow processes as well as fish and wildlife habitats in the Sumas watershed.</i>	

#### Notes on Table 1:

- *Ordering: Items numbered 1 through 4 are ordered by priority according to the results of the March 2017 WID planning session. Items (v) to (viii) are in no particular order of priority but have been addressed in minutes of the WID board meetings.*
- *Priority actions column: At the March 2017 planning session, the actions currently in the right-hand column for 2017 were the top 4 overall priorities listed for this year. The board may wish to add more near-term priority actions into this column over time, drawing from those listed in the right-hand column in Table 2. Note that some actions will need additional external resources or assistance (see section 5: discussion on preliminary scope of work for such tasks).*



Table 2. Consolidated list of Sumas WID priorities, goals and possible actions.

	Desired outcome(s): suggested text	Measurable goals	Actions
1	<i>Water quality (last reviewed &amp; updated at WID meeting September, 2017)</i>		
	<i>Agricultural activities in the Sumas WID do not cause exceedances of relevant water quality standards for surface water and groundwater bodies.</i>	<p><u>Goal statement:</u>  <i>Relevant water quality standards are met for surface and groundwater within agricultural lands</i></p> <p><u>Progress could be measured by:</u>  <i>Achievement of required water quality standards</i></p>	<p><u>Recently completed or ongoing:</u></p> <ul style="list-style-type: none"> <li>i. <i>Ongoing water quality monitoring &amp; response program, with new sites added</i></li> <li>ii. <i>Communication of water quality monitoring results to farmers (outreach lunch February 2017)</i></li> <li>iii. <i>Ongoing landowner contacts to resolve water quality concerns (as reported at regular WID meetings)</i></li> </ul> <p><u>Priority actions for management plan:</u></p> <ul style="list-style-type: none"> <li>iv. <i>Schedule a spring tour for 2018, and make this a regular event (9/2017 meeting).</i></li> <li>v. <i>Continue WID's ongoing water quality monitoring &amp; response program (noted from March 20 work session)</i></li> <li>vi. <i>Maintain watching brief on natural asbestos from Swift Creek site and collaborate as needed with Whatcom County lead (9/17 meeting)</i></li> <li>vii. <i>Encourage all agricultural landowners in the WID to implement appropriate BMPs, with assistance from the Conservation District*</i></li> <li>viii. <i>coordinate with other WIDs on funding for and implementation of DNA testing (noted from March 20 work session)*</i></li> <li>ix. <i>Coordinate with Ag Water Board and other WIDs on water quality programs and responses, including Portage Bay Partnership, implementation of best management practices (noted from March 20 work session)</i></li> </ul> <p><i>* denotes actions that may need additional resources, and more detailed scope &amp; description (see section 5)</i></p>

	Desired outcome(s): suggested text	Measurable goals	Actions
2	<i>Water quantity: Water for agricultural use including irrigation, livestock, processing. (last reviewed &amp; updated at WID meeting April 11, 2017)</i>		
	Farmers in the Sumas WID have secure (legal) access to sufficient water for agricultural uses.	<p><u>Goal statement:</u> All agricultural water use in the WID is secured through certificate, water lease or water supplier (such as water association).</p> <p><u>Progress could be measured by:</u> % of total agricultural water use in the WID that is secured through certificate, water lease or water supplier (such as water association).</p>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u></p> <ul style="list-style-type: none"> <li>i. Support &amp; coordinate with Ag Water Board for <ul style="list-style-type: none"> <li>a. actions related to water rights</li> <li>b. and for participation in the Water Supply Work Group (noted from board meeting April 11<sup>th</sup>, 2017)</li> </ul> </li> <li>ii. Hydrological analysis (surface and groundwater), including climate and evapotranspiration, to assess current water use and water availability and identify shortfalls – possibly coordinate with other WIDs on the analysis*</li> <li>iii. Pursue and test feasibility within the WID of options such as water exchange or water banking, changes in place of use, change to groundwater, aquifer recharge etc. *</li> </ul> <p>* denotes actions that may need additional resources, and more detailed scope &amp; description (see section 5 of this Preliminary Plan)</p>

	Desired outcome(s): suggested text	Measurable goals	Actions
3	<i>Agricultural protection (Protecting the agricultural industry) (Version 3 of April 2017)</i>		
	<p><i>The Sumas WID's plans and actions contribute to the recognition, protection and strengthening of agriculture in the WID area.</i></p> <p><i>(Note that WID actions could contribute to this priority issue, but there are also external factors influencing it, such as land prices, agricultural markets &amp; policies etc.)</i></p>	<p><u>Goal statement (a):</u> Important agricultural land in the WID is protected from conversion through appropriate zoning and/or voluntary agricultural conservation easements.</p> <p><u>Progress could be measured by:</u> Acres of land in the Sumas WID protected by voluntary agricultural conservation easements</p>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u> i. Consider possible outreach actions with Whatcom County Purchase of Development Rights (PDR) program</p>
		<p><u>Goal statement (b)</u> Land use conflicts with neighboring non-agricultural landowners are reduced.</p> <p><u>Progress could be measured by:</u> Number of complaints received from non-agricultural landowners by the WID or by Whatcom County.</p>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u> ii. engage and communicate with non-ag landowners in the WID area about WID priorities and programs, normal farming operations, right-to-farm etc. (include specific actions in the communication strategy)* * denotes actions that may need additional resources, and more detailed scope &amp; description (see section 5 of this Preliminary Plan)</p>
		<p><u>Goal statement(c):</u> Suggestions from WID board for goal statements that might apply here to indicate recognition, protection &amp; strengthening of agriculture?</p> <p><u>Progress could be measured by:</u> Suggestions from WID board for indicators related to ag production? An example of a measurable achievement might be the 2009 adoption of the County Council resolution on preserving 100,000 acres for the ag land base, which recognizes the value of agriculture and associated industries for the local economy.</p>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u> iii. coordinate with Whatcom Family Farmers to address legal challenges and preserve "one voice outreach" on behalf of agriculture (from March 20 work session)</p>

	Desired outcome(s): suggested text	Measurable goals	Actions
4	<i>Communication, outreach, education and reporting (Last reviewed &amp; updated at WID meeting September, 2017)</i>		
	<p><u>Internal:</u> WID members are aware of and understand the priority issues and participate actively in WID planning &amp; implementation of priority actions.</p> <p><u>External:</u> Non-agricultural residents, other stakeholders and relevant bodies &amp; agencies are aware of, understand and support the Sumas WID's priority actions.</p>	<p><u>Goal statement(s):</u> Suggestions from WID board?</p> <p><u>Progress could be measured by:</u></p> <ul style="list-style-type: none"> <li>WID landowner contacts: direct personal contacts to resolve concerns or raise awareness; information shared (e.g. newsletters, website); landowner concerns/priorities addressed; feedback received (informal or through surveys)</li> <li>External contacts: information shared (e.g. newsletters, website); feedback received (informal or through surveys); evidence of support for WID priorities (e.g. in media coverage)</li> </ul>	<p><i>Internal: The WID board will need to communicate with WID members and engage with them on agreed priority issues, and also to communicate with neighboring landowners, other stakeholders and relevant agencies.</i></p> <p><i>External: While external communication and engagement could be coordinated through the Ag Water Board and Whatcom Family Farmers, Sumas-specific information and inputs will be needed to support these efforts.</i></p> <p><u>Recently completed or ongoing:</u></p> <ol style="list-style-type: none"> <li>Meeting held with ReSources on water quality monitoring &lt;2016 - date?&gt;</li> <li>Work session in 2016 to map and characterize priorities for the WID (Mapping Report produced with the Ag-Watershed Project team)</li> <li>Ongoing landowner contacts as reported at regular WID board meetings</li> </ol> <p><u>Priority actions for management plan:</u></p> <ol style="list-style-type: none"> <li>Internal: review and update the Preliminary Management Plan, focusing on manageable sized sections at each board meeting (from 9/2017 meeting minutes).</li> <li>Internal: establish a template for tracking and regular reporting of WID progress on priority issues, based on a set of simple indicators of progress. *</li> <li>External: coordinate with other WIDs to share what farmers are doing to benefit water quality and habitat (March 20<sup>th</sup> work session notes)</li> <li>External: Coordinate with other WIDs to track legislation, rule-making, agendas and impacts on agriculture at County, State, Federal levels (March 20<sup>th</sup> work session notes; Whatcom County Agricultural Advisory Committee &amp; Whatcom County Planning Commission were mentioned)</li> </ol> <p>* denotes actions that may need additional resources, and more detailed scope &amp; description (see section 5)</p>

	Desired outcome(s): suggested text	Measurable goals	Actions
5	<i>Agricultural drainage: Field drainage (Last reviewed &amp; updated at WID meeting April 11, 2017)</i>		
	Drainage infrastructure and ditches in the Sumas WID are actively and effectively maintained.	<p><u>Goal statement (a):</u> Regular, scheduled drainage maintenance in the Sumas WID area occurs under programmatic permits, in collaboration with DID#15 and CDID#31, with mitigation as required and using approved Best Management Practices.</p> <p><u>Progress could be measured by:</u> % of agricultural land requiring field drainage in the Sumas WID:</p> <ul style="list-style-type: none"> <li>that is covered by programmatic permits for drainage maintenance;</li> <li>where drainage infrastructure and ditches have been maintained and repaired as needed.</li> </ul>	<p><u>Recently completed or ongoing:</u></p> <ul style="list-style-type: none"> <li>i. Drainage work with local drainage districts #31 and #15 (from March 20<sup>th</sup> notes)</li> </ul> <p><u>Priority actions for management plan:</u></p> <ul style="list-style-type: none"> <li>ii. Review and update list of priority actions identified at the January 2016 work session (see list in Table 5 and the corresponding map in Figure 8, both in this Preliminary Plan).</li> <li>iii. Select ditch cleaning project for 2017, obtain permits and resources, implement. * (from March 20<sup>th</sup> notes)</li> <li>iv. Develop coordinated plan with the two drainage districts #31 and #15 to cover all areas of the WID needing drainage maintenance.</li> <li>v. Proactively identify locations for mitigation sites and mitigation actions that could also contribute to advancing watershed &amp; habitat priorities (see Table 5 and section 5.3, both in this Preliminary Plan). *</li> <li>vi. Obtain programmatic permits from WDFW and other permits as needed, with help from the Conservation District. *</li> </ul> <p>* denotes actions that may need additional resources &amp; more detailed scope &amp; description (see section 5 of this Preliminary Plan)</p>
		<p><u>Goal statement(b):</u> Ad hoc actions (such as beaver management or sediment removal after a storm) and/or emergency repairs to drainage infrastructure are completed in a timely manner, in collaboration with DID#15, CDID#31 and Whatcom County.</p> <p><u>Progress could be measured by:</u> Number of ad hoc emergency repairs that are completed in a year, compared to the number reported as needing attention.</p>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u></p> <ul style="list-style-type: none"> <li>vii. Document the specific procedures for responding to situations requiring ad hoc or emergency actions. Include these procedures in the management plan and in WID communications/website.</li> </ul>

	Desired outcome(s): suggested text	Measurable goals	Actions
6	<i>Agricultural drainage: Flood management &amp; protection (Version 3 of April 2017)</i>		
	<i>Agricultural lands in the Sumas WID are protected from flooding due to surface water runoff at critical times in the growing season.</i>	<u>Goal statement (a):</u> <i>Regular, scheduled maintenance is completed for flood protection infrastructure in the Sumas WID area.</i>  <u>Progress could be measured by:</u> <i>Number of projects, repairs or actions that are completed in a year, compared to the number reported as needing attention.</i>	<u>Recently completed or ongoing:</u>   <u>Priority actions for management plan:</u> <i>i. Review and update priority actions identified at the January 2016 work session (see list in Table 5 and the corresponding map in Figure 8 of this Preliminary Plan, which include several possible actions to maintain flood infrastructure in specific locations within the Sumas WID area.)</i>
		<u>Goal statement (b):</u> <i>Ad hoc or emergency repairs to flood protection infrastructure are completed in a timely manner, in collaboration with Whatcom County.</i>  <u>Progress could be measured by:</u> <i>Number of ad hoc emergency repairs that are completed in a year, compared to the number reported as needing attention.</i>	

	Desired outcome(s): suggested text	Measurable goals	Actions
7	<i>Water flow processes; Habitats &amp; species (Version 3 of April 2017)</i>		
	<p><i>The Sumas WID's plans and actions help to protect and enhance water flow processes and fish and wildlife habitats in the Sumas watershed</i></p>	<p><u>Goal statement:</u>  <i>Water flow processes (surface storage, discharge, recharge, delivery) are restored or protected as necessary in areas that are important for the watershed (see Figures 14 and 15 in the WID mapping report, included in Appendix C of this Preliminary Plan).</i></p> <p><u>Progress could be measured by:</u>  <i>Some options for measuring progress:</i></p> <ul style="list-style-type: none"> <li>- <i>Status of water flow process degradation (H, MH, M, L) in assessment units within the Sumas WID area.</i></li> <li>- <i>% effective shade cover on fish-bearing streams and ditches.</i></li> <li>- <i>Culverts &amp; fish barriers removed vs. remaining</i></li> <li>- <i>Acres of wetland or wildlife habitat restored and/or protected</i></li> </ul>	<p><u>Recently completed or ongoing:</u></p> <p><u>Priority actions for management plan:</u></p> <ol style="list-style-type: none"> <li>i. <i>Review possible actions to enhance or protect water flow processes in specific locations within the Sumas WID area,* as listed in the watershed characterization tables prepared during the WID work session in January 2016 (see Appendix B of this Preliminary Plan).</i> <ul style="list-style-type: none"> <li>- <i>Suggested actions in specific parts of the WID include, for example, enhancing surface water storage, reducing or preventing additional impervious cover, protecting and/or restoring riparian and forest cover, reducing subsurface drainage rates.</i></li> </ul> </li> <li>ii. <i>coordinate possible actions with development of programmatic drainage permits, to address mitigation requirements in drainage permits*</i></li> </ol> <p><i>* denotes actions that may need additional resources &amp; more detailed scope &amp; description (see section 5 of this Preliminary Plan)</i></p>

### 3 GENERAL OVERVIEW OF THE SUMAS WID

#### Explanatory note

The following text describing the Sumas watershed and WID area is copied from the 2016 characterization & mapping report,<sup>7</sup> with some modifications and additions. Additional sources are cited in footnotes.

The purpose of this section is to briefly inform readers about the history and characteristics of the Sumas WID area, provide summary descriptions of the sub-watersheds and agricultural activities, and introduce some of the issues that have informed the WID's stated priorities for management.

- In the comprehensive management plan, this overview section would be more detailed, with additional maps and tables providing a synthesis of readily available information on land use, cropping patterns, hydrology, water quality.
- In the comprehensive management plan, the sections on baseline conditions would be expanded, to include results of new analyses and possibly new field measurements also.

Additional background information about the Sumas WID can be found online:

- WID website <http://www.sumaswid.com/>
- Agriculture-Watershed Characterization & Mapping Report for the Sumas WID (2016) [www.sumaswid.com](http://www.sumaswid.com)
- Story map showing results of WID work sessions and the Agriculture-Watershed Characterization & Mapping work (2016) <http://arcg.is/29qspLX>
- Ag Water Board introductory story map with general information about the WIDs <http://www.agwaterboard.com/storymap>

#### 3.1 Location and hydrology

The Sumas Watershed Improvement District (see location map in Figure 1) is located in the eastern lowland area of Whatcom County, to the north and east of the main Nooksack River within Water Resource Inventory Area 1 (WRIA 1), bounded by the foothills of the North Cascades Range on the east, and the USA-Canada border to the north. The WID area covers much of the Sumas River watershed, part of which is shared with Canada. The total calculated area within the WID boundary is 23,713 acres. The area of land currently on the WID assessment roll is 18,544 acres, which includes only parcels over 5 acres in size, parcels outside urban areas and parcels enrolled in the Agricultural Open Space taxation program (see map in Figure 4).<sup>8</sup>

The WID area includes portions of significant tributaries to the Sumas River: Johnson Creek, Breckenridge Creek, Swift Creek and Dale Creek as well as a small portion of Smith Creek and the Saar drainage east of the City of Sumas. These tributaries and other drainages are included in Water Resource Inventory Area 1 (WRIA 1) and all except Smith Creek drain north to the Fraser River system.

The Sumas-Blaine aquifer (the portion of the larger Abbotsford-Sumas aquifer that lies on the US side of the Border), underlies the western portion of the Sumas watershed (see Figure 2). This aquifer is characterized by its shallow depth to water (less than 10 feet in most areas), limited thickness (mostly less than 50 feet) and high rainfall during the winter, which combine to make groundwater recharge fairly rapid but also to make the groundwater vulnerable to contamination from surface pollution.<sup>9</sup>

<sup>7</sup> See: Sumas WID mapping report (2016) Download from <http://www.sumaswid.com/>

<sup>8</sup> Henry Bierlink, Ag Water Board. March 29, 2017. The total number of acres on the assessment roll can vary somewhat over time as assessed parcels are consolidated or segregated.

<sup>9</sup> Carey B. & Cummings R. (2013). *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Washington State Department of Ecology Publication No. 12.03.026. <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> [last accessed February 5, 2017]



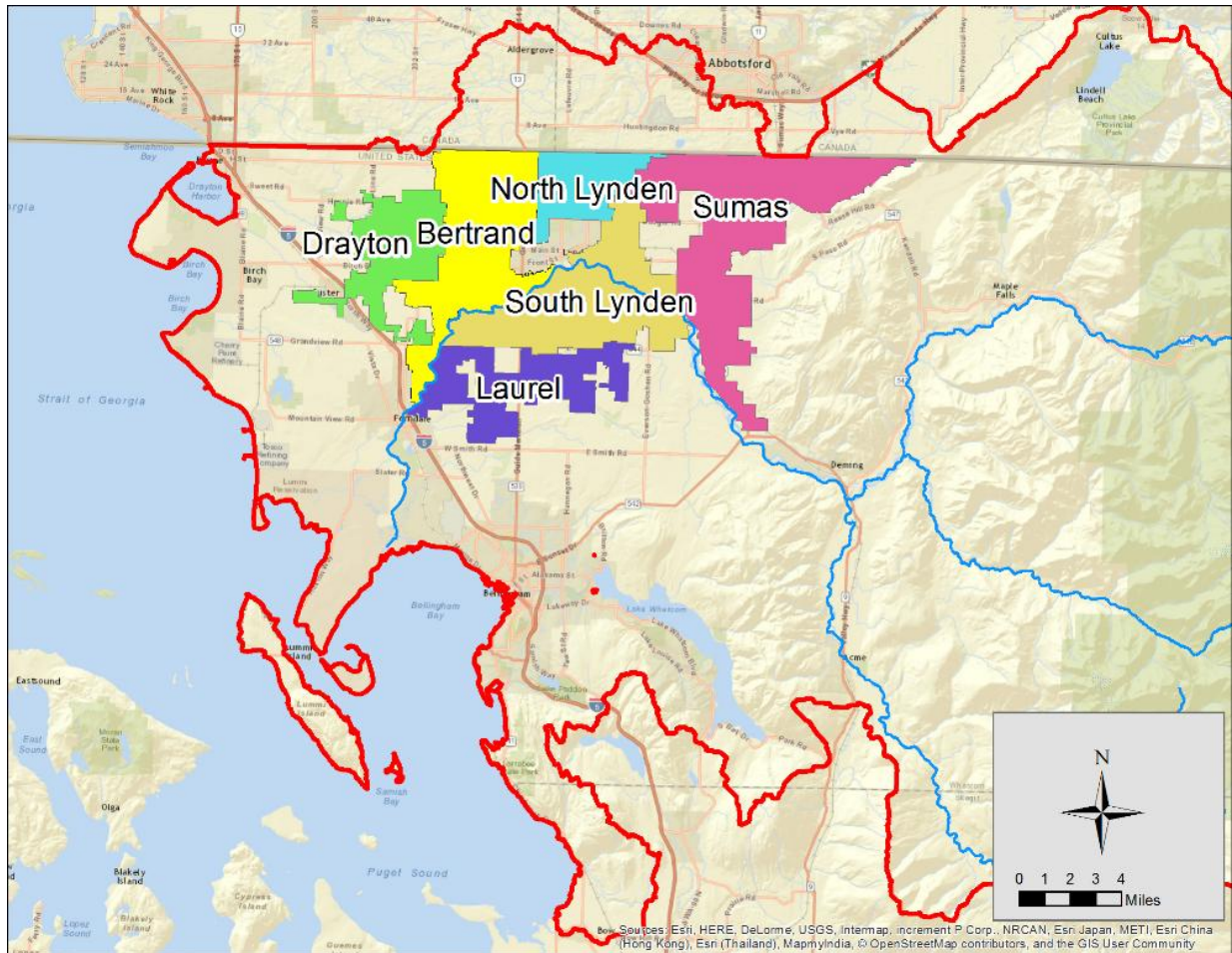


Figure 1. Map showing location of the Sumas WID, with Water Resource Inventory Area 1 outlined in red. Reproduced from the Sumas WID mapping report (2016).

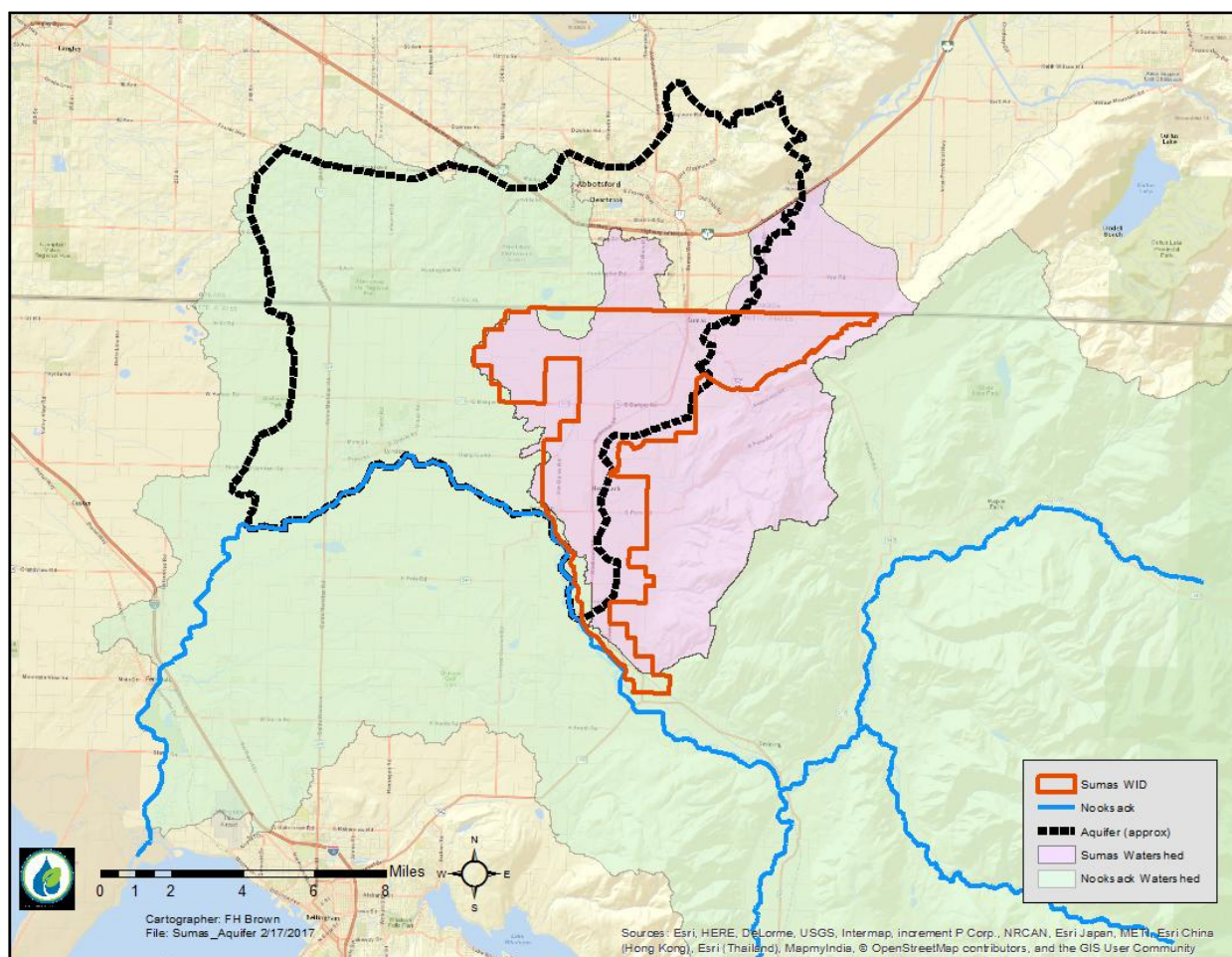


Figure 2. Map showing location of the Sumas-Abbotsford aquifer in relation to the Sumas watershed and the Nooksack River drainage.



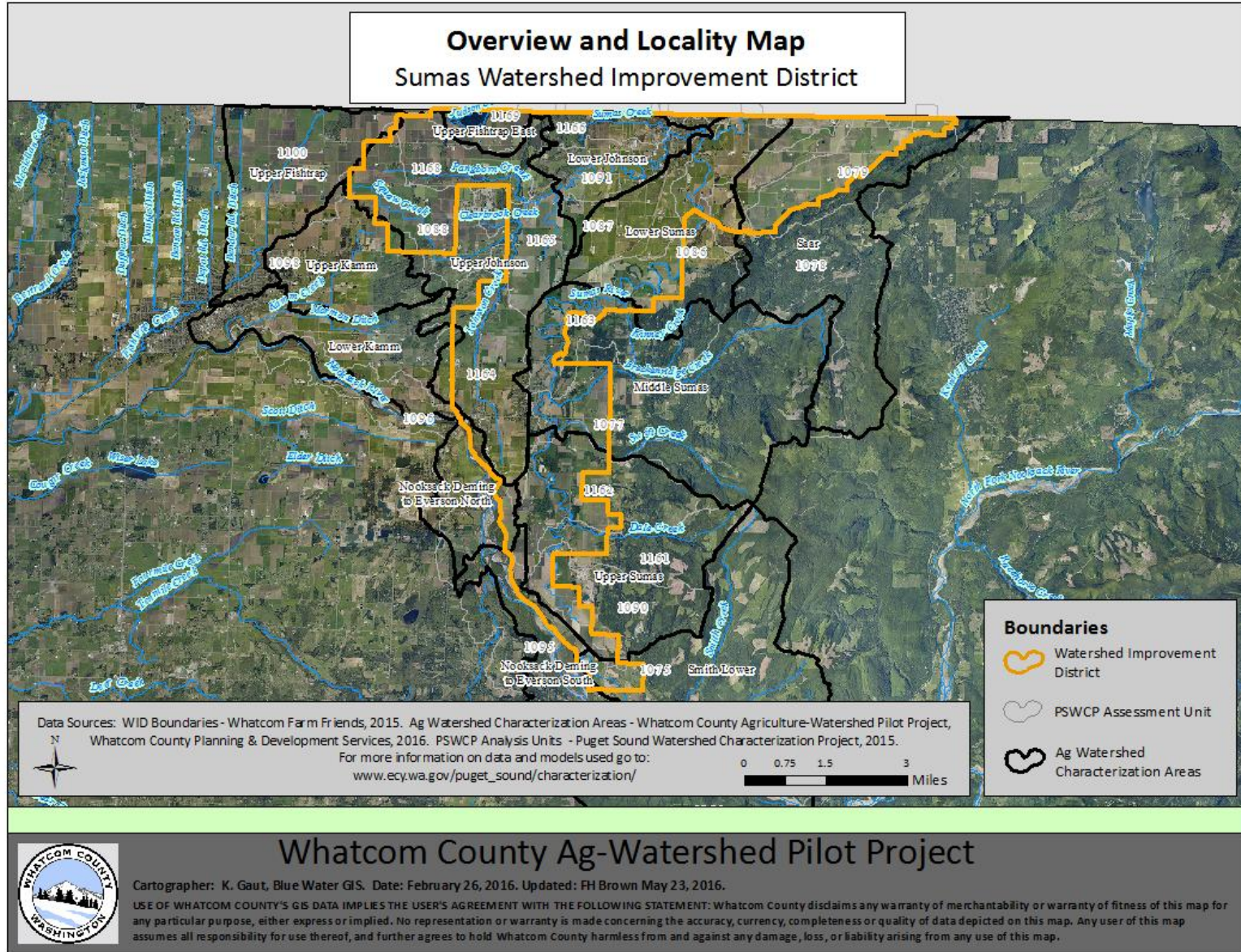
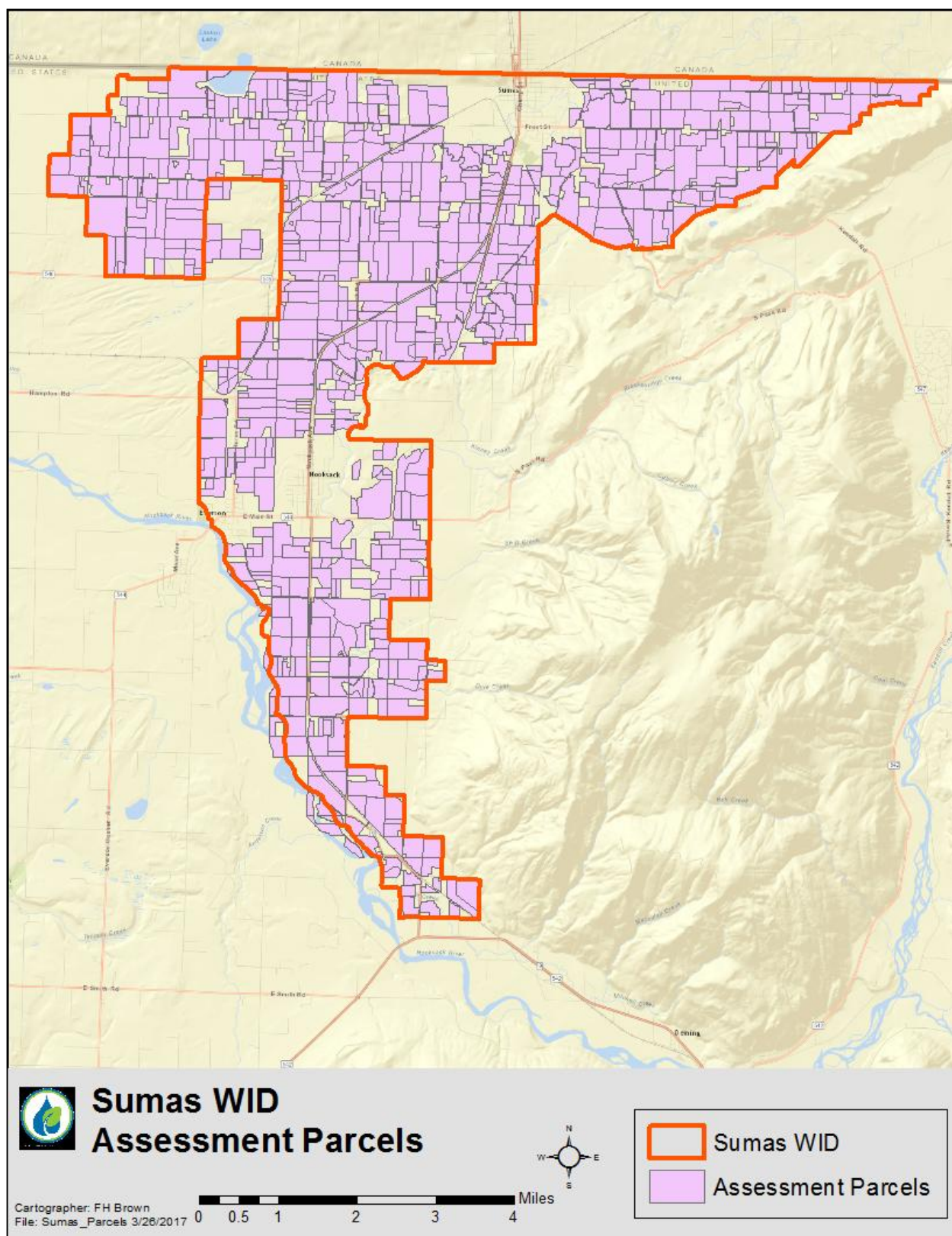


Figure 3. Sumas WID overview map. Reproduced from the Sumas WID mapping report (2016).





### 3.2 Historic conditions in the Sumas watershed

#### Explanatory note

Understanding the historic conditions in the watershed helps us to understand how the watershed system has changed over time. This informs the discussion about what actions are needed for both agriculture and watersheds, which actions are practical and feasible in the landscape given the topography, soils and hydrology, and where specific actions would be most effective in achieving both agricultural and watershed priorities.

Before European settlement, there were major Nooksack Indian Tribe settlements concentrated near the present cities of Lynden and Everson, and at the Forks of the Nooksack River. The Tribe's territory included the major part of the Nooksack lowland. Many well-defined trails northward facilitated their trade with the Sumas, Chilliwack, and Matsqua bands of British Columbia, as well as The Hudson's Bay Company at Fort Langley. The Nooksacks also conducted more limited trade with tribes to the south and west, the Semiahmoo, Lummi, and Skagit.<sup>10</sup> The map shown in Figure 5 was prepared in 1858 and shows local topography and wildlife "of special interest" to the tribes in the area at the time.<sup>11</sup>

In addition to relying on salmon, gathered fruits and vegetables, shellfish, and wild game for food, the Nooksack people utilized prairie land to cultivate "Indian carrots", a prized food item,<sup>12</sup> and also to harvest fern roots and camas bulbs. These prairies were located between Lynden and Everson, around Clearbrook, and near Goshen.<sup>13</sup> The potato, which was introduced to the Tribe by the Hudson's Bay Company sometime after the establishment of Fort Langley in 1828, was cultivated, traded, and spread by the Nooksacks to other groups in Puget Sound.<sup>14</sup>

The area near modern Sumas was part of a huge wetland complex between Fishtrap Creek and the Fraser River and Native Americans used the extensive waterways to travel.<sup>15</sup> The areas around Pangborn and Bone Creeks in the lower Johnson watershed, the area near the intersection of Van Buren and E. Badger roads, and the area near the current border station were all wetland. A map from 1907 shows the E. Badger road ended at the High School as the area to the north was wetland.<sup>16</sup> The area was too wet for

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<sup>10</sup> Jeffcott, P.R. 1949. *Nooksack Tales and Trails*. (Ferndale: Sedro-Woolley Courier Times), cited in Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>11</sup> Wells, Oliver (1858). Map of Indian Territory 1858 showing tribal areas, topography, village sites, Indian trails, historic sites and wildlife of special interest to Natives. PR Jeffcott Map#1-15, PR Jeffcott Papers, Center for Pacific Northwest Studies, Western Libraries Heritage Resources, Western Washington University, Bellingham.

<sup>12</sup> Smith, M.W. 1950 "The Nooksack, Chilliwack, and Middle Fraser," *Pacific Northwest Quarterly* 41 (1950):330-41, cited in Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>13</sup> Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>14</sup> Edson, The Fourth Corner and Smith, M.W. 1950 "The Nooksack, Chilliwack, and Middle Fraser," *Pacific Northwest Quarterly* 41 (1950):330-41, cited in Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>15</sup> Luginbill, T. 2017 [personal communication February 21, 2017].

<sup>16</sup> Perry, R. 2017 [personal communication February 14, 2017]

trees to grow<sup>17</sup> and in fact the name “Sumas,” which comes from the Cowichan tribe who also lived in the area, means “land without trees.”<sup>18</sup>

The upper Sumas watershed was heavily forested;<sup>19</sup> near Everson and Nooksack, there were dense stands of cedar and fir, the wood from which supported lumber and shingle mills in the late 1800s and early 1900s.<sup>20</sup> Marion West, in her book *Clearbrook, A Memoir of Place*, describes Clearbrook as a one-time “sawmill town” and reports that her grandfather cleared the land of “the giant trees leaving only a small woods along the creek” in 1904.<sup>21</sup>

In addition to the forest and wetland, prairies were also an important landscape feature. William Smith described parts of the Whatcom Trail, which extended from Bellingham Bay through Everson and then north to British Columbia, in a letter published in the *Northern Light* of July 2, 1858 as follows: “The first water and grasses are on Six Mile Prairie. Five miles on, water. Two small streams between that and Lummy [Nooksack] River. Prairie for 18 miles to the base of mountain, with plenty of water.”<sup>22</sup>

European settlers began to clear and drain the land for agriculture in the mid to late 1800s.<sup>23</sup> By 1880 agricultural settlements were distributed throughout the Whatcom County region with a relatively large number of settlers in Ferndale, Lynden, and Everson.<sup>24</sup> The first agricultural efforts were simple subsistence farming, but by 1885 the settlers began large scale clearing of the land to support market agriculture.

Sumas had a township form of governance beginning in 1912 which was mostly focused on maintaining roads and drainage.<sup>25</sup> Chinese laborers dug out Squaw Creek to provide drainage. In the Sumas area, the predominantly peat soils were best for growing grass and silage, and farmers focused on raising dairy cows.<sup>26</sup> Early settlers cut grass from wetland areas that dried up in the summer.<sup>27</sup> The acidic soils ate away at the cement tiles used in the earliest attempts to drain the land. Farmers subsequently switched to clay tiles and local clay mines were created to meet the demand.<sup>28</sup>

In the higher elevation areas of the watershed and areas that were originally forested, the soils supported a broad diversity of crops more like agricultural endeavors elsewhere in the County.<sup>29</sup> In Whatcom County as a whole, 52 different varieties of crop are known to have been grown between 1900 and World War II

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<sup>17</sup> Perry, R. 2017 [personal communication February 14, 2017]

<sup>18</sup> Dougherty, P. 2009. *Sumas – Thumbnail History*. HistoryLink.org. <http://www.historylink.org/File/9204>

<sup>19</sup> Luginbill, T. 2017 [personal communication February 21, 2017].

<sup>20</sup> Moles, K. 2014. *Everson – Thumbnail History*. HistoryLink.org <http://www.historylink.org/File/10775>

<sup>21</sup> West, M. 2005. *Clearbrook, a Memoir of Place*. Seattle: Western Home Publishing

<sup>22</sup> Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>23</sup> Luginbill, T. 2017 [personal communication February 21, 2017] and Perry, R. 2017 [personal communication February 14, 2017]

<sup>24</sup> Tremaine, D.G. 1975. *Indian & Pioneer Settlement of the Nooksack Lowland, Washington to 1890. Occasional Paper #4*. Center for Pacific Northwest Studies, Western Washington State College.

<sup>25</sup> Perry, R. 2017 [personal communication February 14, 2017]

<sup>26</sup> Luginbill, T. 2017 [personal communication February 21, 2017].

<sup>27</sup> Perry, R. 2017 [personal communication February 14, 2017].

<sup>28</sup> Perry, R. 2017 [personal communication February 14, 2017]

<sup>29</sup> Luginbill, T. 2017 [personal communication February 21, 2017].

including hops, flax, bulb flowers, strawberries, blueberries, beets (the primary source of sugar at the time), cabbage, and potatoes. Poultry and dairy cows were also extensively raised.<sup>30</sup> In 1905, C.S. Kale helped to found the Nooksack Valley Fruit Association (renamed the C.S. Kale Canning Company in 1909) in Everson. The company shipped prunes, apples, pears, cherries, berries, and beans throughout the region and as far as the East Coast and the United Kingdom. The front page of the *Everson Valley Home* featured a photo of a Kale Cannery Produce shipment that filled 21 train cars and was valued at \$65,000.<sup>31</sup>

Additional historical information and weather records for the Clearbrook area can be accessed on the website run by local farmer and WID board member Mr. Roderic Perry.<sup>32</sup>

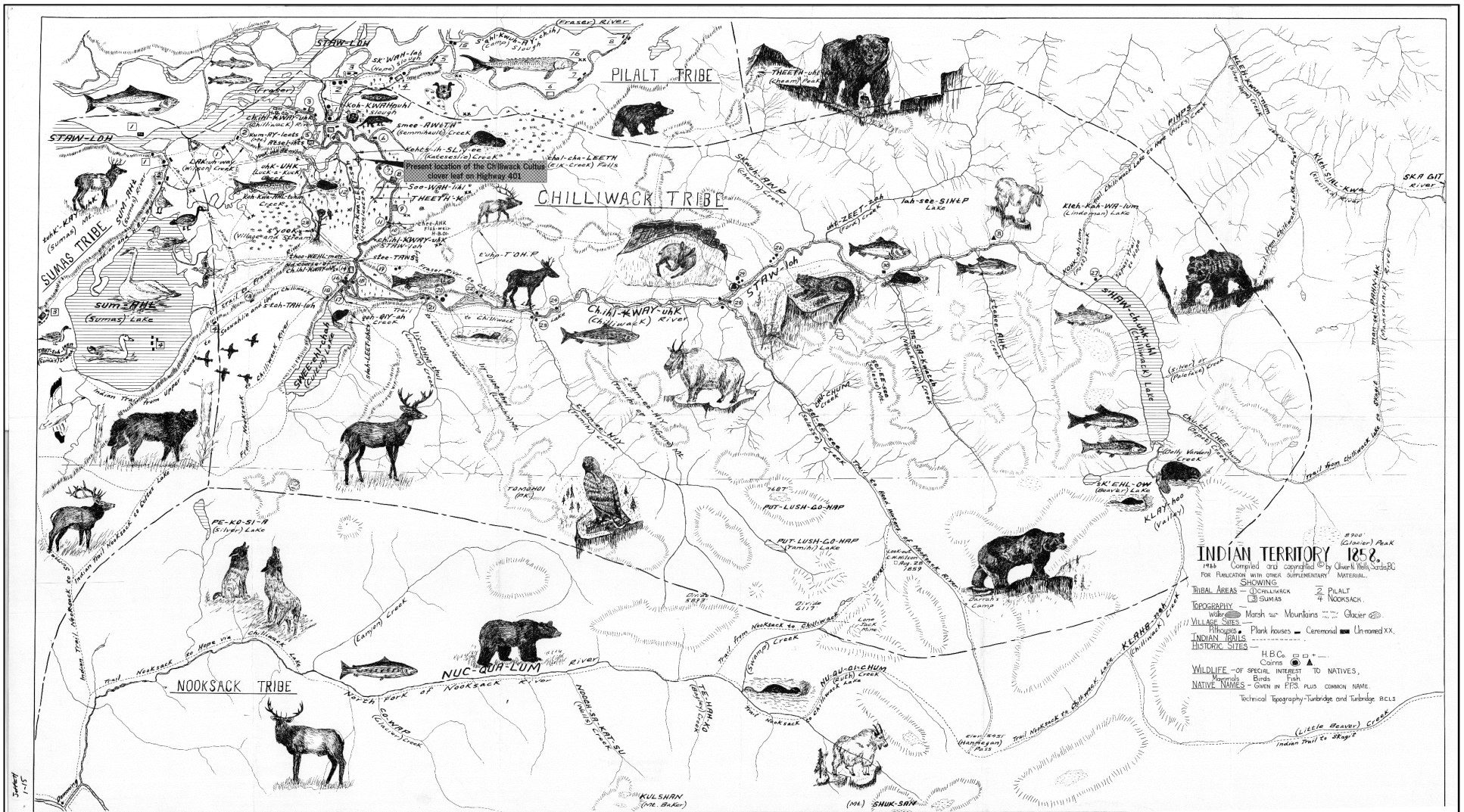
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<sup>30</sup> Luginbill, T. 2017 [personal communication February 21, 2017].

<sup>31</sup> Moles, K. 2014. *Everson – Thumbnail History*. HistoryLink.org [webpage] <http://www.historylink.org/File/10775>

<sup>32</sup> See <http://rodericperry.weebly.com/>





P. R. Jeffcott Map #1-15  
 Center for Pacific Northwest Studies  
 Western Libraries Heritage Resources  
 Western Washington University

Figure 5. Map of Indian Territory in 1858, including the Nooksack, Chilliwack, Sumas and Pilalt areas. From the PR Jeffcott Papers, provided by the Center for Pacific Northwest Studies, Western Libraries Heritage Resources, Western Washington University.



### 3.3 Soils and land use

Based on the soil capability, a significant proportion of the Sumas WID area has been classified by the USDA Natural Resources Conservation Service as “Prime farmland” or “Prime if managed”,<sup>33</sup> with much of the area being “Prime if drained” (see Table 3). The map in Figure 6 shows prime soils on those parcels that are included in the Sumas WID assessment roll as at March 2017. A map of all prime soils within the Sumas WID is included in Appendix C of this document.

Land use in the WID and surrounding area is predominantly agricultural. Much of the land within the WID area is designated as Agriculture District of Whatcom County (AG zoning).<sup>34</sup> Predominant crops are berries, dairy corn and dairy hay, with smaller acreages of pasture, vegetables and other crops.<sup>35</sup> Maps of agricultural land use inventory and important agricultural land in the Sumas WID are included in Appendix C.

Table 3. Prime soils within the Sumas WID area. Data from SSURGO, NRCS (2015).

Prime Farmland Category	Description	Acres within Sumas WID boundary (for any land cover type)	Acres included Sumas WID assessment roll (March 2017) <sup>36</sup>	% of total acres on the assessment roll
0	Not prime farmland	503	383	2%
1	All areas are prime farmland	8,573	6670	36%
2	Prime if drained	13,497	10,772	58%
4	Prime if irrigated	173	145	1%
7	Prime if irrigated and either protected from flooding or not frequently flooded during the growing season	68	94	1%
30	Farmland of Statewide Importance <sup>37</sup>	899	604	3%
	<i>Acres in WID assessment roll</i>		<i>18,669</i>	<i>100%</i>
	<i>Total area within WID boundary</i>	<i>23,713</i>		

<sup>33</sup> See definitions in the National Soil Survey Handbook: [NSSH Part 622](#)

<sup>34</sup> Whatcom County Title 20 zoning maps <http://www.whatcomcounty.us/822/Zoning-Maps> [last accessed January 31, 2017]

<sup>35</sup> The story map for the Ag Water Board contains maps and graphs of crop acreages in each WID. See <http://www.agwaterboard.com/storymap>

<sup>36</sup> Assessment roll data provided by Henry Bierlink on March 13<sup>th</sup> 2017. Total area included in the Sumas WID assessment roll as at March 2017 is 18,544 acres (Henry Bierlink, March 29, 2017). The slight difference in total acres assessed is due to changes to the assessment roll as assessed parcels are consolidated or segregated.

<sup>37</sup> Farmland of Statewide Importance is important for the production of food, feed, fiber, forage, and oilseed crops. These lands include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmland if conditions are favorable.

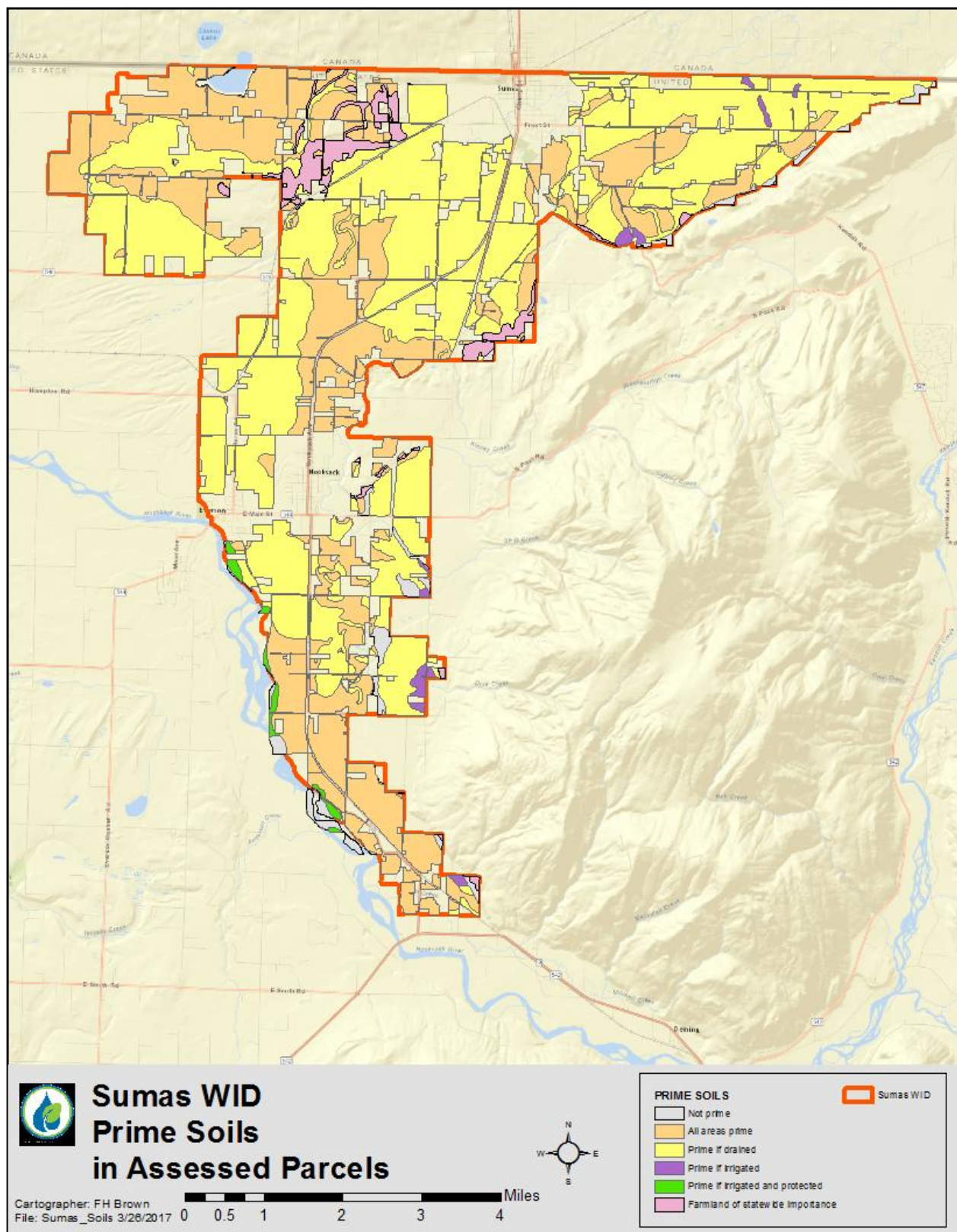


Figure 6. Map showing prime soils in parcels on the Sumas WID assessment roll. Soil data from SSURGO (NRCS). Parcel data from Ag Water Board.

### 3.4 Water quantity, water use and water availability

The location of existing groundwater and surface water rights within the Sumas WID is shown in the water rights map in Appendix C.<sup>38</sup> Many new applications and change applications are also on record for the Sumas WID area and are shown in this map.

The *2010 State of the Watershed Report*<sup>39</sup> indicates that a little under 10,000 acres are irrigated in the Sumas River watershed, and describes metered and modeled water use in the Sumas River watershed. There are seven group A water systems and five group B water systems in the Sumas River watershed (this does not include the Nooksack mainstem (Deming to Everson) or Smith watersheds). Metered water use makes up a small percentage of the overall use in the watershed, approximately 10% in Saar, middle and lower Sumas and Johnson Creek watersheds; less than 10% in the Nooksack (Deming to Everson watershed), and none in the Smith Creek watershed.

The remaining non-metered water use is estimated from modeled data. Modeled uses include residential, commercial, and agricultural uses. The majority of modeled use is attributed to agriculture and accounts for approximately 75% to 90% of overall use in all but the Swift Creek area. Swift Creek is the only sub-watershed described separately in the report. Here modeled agricultural use is smaller at about 70% and the remainder of use is attributed to residential. In the Johnson Creek, Sumas River, and Nooksack Deming to Everson watersheds residential use accounts for a very small percentage (approximately 10%) and in the Saar Creek watershed no modeled water use is attributed to residential. A very small amount of commercial water use, approximately 5% is modeled in Smith Creek watershed only.

Within the Sumas WID, 87 new applications for water rights have been filed, which indicates a significant demand for water rights. Johnson Creek, Saar Creek, and the Sumas River are closed year-round to further appropriations unless mitigated. Smith Creek is closed to new withdrawals from May 1 to October 31 each year.<sup>40</sup> Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flows levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.<sup>41</sup> Some Group A public water suppliers do not have adequate water rights in proper locations to meet projected future demand.<sup>42</sup>

### 3.5 Water quality

Surface water quality impairments have been reported, related to high levels of fecal coliform bacteria, low dissolved oxygen, temperature, bio-assessment impairments, or a combination of these. Naturally occurring asbestos is present in Swift Creek sediments, which are being washed down into watercourses

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<sup>38</sup> See Appendix B for the reference map on agricultural water rights points of diversion in the Sumas WID. That map is reproduced from the Sumas WID mapping report (2016).

<sup>39</sup> Peterson, B., Gill, P. and J. Fleishmann. 2011. *State of the Watershed Report*. WRIA 1 Watershed Joint Board and Whatcom County. [online] <http://wria1project.whatcomcounty.org/> [last accessed February 8, 2017]

<sup>40</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability, Publication 11-11-006* <https://fortress.wa.gov/ecy/publications/documents/1111006.pdf> [last accessed February 7, 2017]

<sup>41</sup> *WAC 173-501* (1985). Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

<sup>42</sup> Whatcom County Coordinated Water System Plan (2016) <http://www.whatcomcounty.us/DocumentCenter/View/24143> [last accessed January 31, 2017]

in the area as a result of a previous natural landslide.<sup>43</sup> A number of groundwater wells in the Sumas-Blaine aquifer, which underlays much of the Sumas WID, have shown elevated concentrations of nitrates over the past 30 years, largely as a result of historical intensive agriculture practices.<sup>44</sup> Iron (of natural origin in the surrounding soils) is found in many areas of the Sumas-Blaine aquifer, including in most wells in the Sumas Valley.<sup>45</sup>

A map of listed water quality impairments and graphs of the results of routine water quality monitoring are included in Appendix C of this document.

### 3.6 Fish and wildlife

The Sumas River watershed and the Nooksack mainstem (Deming to Everson) and Smith Creek watersheds contains critical habitat for bald eagle, band-tailed pigeon, great blue heron, trumpeter swans, and waterfowl. The north-western area of the upper Johnson watershed, adjacent to the Kamm Creek drainage, contains designated Sandhill crane habitat, based on a single sighting in 1994. Wetland habitat occurs throughout the area. The Johnson Creek watershed also contains the rare plant soft-leaved willow.<sup>46</sup> Char, Chinook, chum, coho, cutthroat, pink, sockeye, steelhead are present. Coho spawning is documented in upper Johnson, Breckenridge Creek, the upper Sumas, and Saar Creek. Fall Chinook and winter steelhead spawning occurs in the Nooksack Deming to Everson area.<sup>47</sup> Participants in the Sumas WID mapping work session also reported observing salmon spawning in tributaries to Johnson Creek.<sup>48,49</sup>

Maps of priority habitats and species, fish occurrence and fish barriers are included in Appendix C of this document.

For more information on local wildlife in the late 20th century, see the sections describing the Nooksack River Corridor: Johnson Creek and Sumas River, contained in the 1994 report on significant wildlife areas in Whatcom County.<sup>50</sup>

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<sup>43</sup> For more information on Swift Creek Sediment Management Action Plan, see Whatcom County Public Works (River & Flood): <http://www.co.whatcom.wa.us/513/Swift-Creek> [last accessed February 5, 2017]

<sup>44</sup> Carey B. & Cummings R. (2013). *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Washington State Department of Ecology Publication No. 12.03.026. <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> [last accessed February 5, 2017]

<sup>45</sup> Cox, S. E., and Kahle, S. C. (1999). Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada; Water-Resources Investigations Report 98-4195. USGS. <<http://pubs.usgs.gov/wri/1998/4195/report.pdf>> [last accessed February 8, 2017].

<sup>46</sup> See Appendix B of this document: Watershed characterization tables from the Sumas WID mapping report (ibid.)

<sup>47</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed February 7, 2017]

<sup>48</sup> Video of salmon spawning in Pangborn/Cummings Creek can be found at <https://www.youtube.com/watch?v=umbOHHZ6MK0>. Provided by R. Perry, April 2016.

<sup>49</sup> Participant comment from Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <http://www.sumaswid.com/>

<sup>50</sup> Eissinger, A. M. (1994). *Significant Wildlife Areas, Whatcom County Washington*. Bellingham, WA: Whatcom County Planning & Development Services. <https://wa-whatcomcounty.civicplus.com/DocumentCenter/View/24178> [Last accessed March 12, 2017]



## 4 DESCRIPTION OF BASELINE CONDITIONS FOR SUB-WATERSHEDS IN THE SUMAS WID

### Explanatory note

This section provides a summary description of baseline conditions in the Sumas WID.

The purpose of describing baseline conditions and quantifying them where possible is to support the design of targeted actions to achieve agreed WID priorities, and to be able to measure and report progress towards achieving the WID priorities over time.

- In the preliminary management plan, this summary information would be expanded using available data where possible, and the gaps in knowledge would be defined in order to determine the scope of any new or additional work needed.
- In the comprehensive management plan, this summary information would be expanded to provide more detailed information which would also include the results of new analyses and field measurements where needed.

Note that Appendix E of this document (reproduced from the Sumas WID mapping report) lists a wide range of sources of data that would be potentially useful as baseline or background information for developing a comprehensive plan.

### 4.1 Johnson Creek

Water quality: Upper Johnson Creek generally enjoys adequate water quality for agricultural purposes but nitrate in groundwater is of concern for drinking water quality.<sup>51</sup> However, nitrate concentrations in groundwater are reported to have decreased somewhat over the years due to corrective actions.<sup>52</sup> Johnson Creek is listed in category 4a<sup>53</sup> for bacteria and dissolved oxygen; streams in the lower part of the watershed contain higher sediment levels after rain events.<sup>54</sup> There are no noted surface water concerns for the small upper Fishtrap East sub-basin, located on the US-Canada border to the west of the lower Johnson watershed.

Water quantity: Johnson Creek is closed year-round to further appropriations unless mitigated. More than 25 new water right applications have been filed in this area; the majority of these applications are located in the upper Johnson area (see water rights map in Appendix C). Some Group A public water suppliers do not have adequate water rights in proper locations to meet projected future demand.<sup>55</sup>

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<sup>51</sup> See Appendix B of this document, which contains a copy of the tables of agricultural enhancement priorities that are included in the Sumas WID mapping report.

<sup>52</sup> Noted by participants at the WID mapping work session in January 2016. The most recent Dept. of Ecology report on nitrate concentrations in groundwater in this area is still in peer review and has not been released yet (pers. comm. Barb Carey, Department of Ecology, January 2017)

<sup>53</sup> Definition of Category 4a: "Has a TMDL: water bodies that have an approved TMDL in place and are actively being implemented." WA Department of Ecology, 2015. *Water Quality Assessment Categories*.

<http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>54</sup> See Table 3B (Agricultural enhancement priorities) in the WID mapping report: Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services.

<http://www.sumaswid.com/>

<sup>55</sup> This includes the Nooksack water department, Hampton water association and Everson water association. See: Whatcom County Coordinated Water System Plan (2016)

<http://www.whatcomcounty.us/DocumentCenter/View/24143> [last accessed January 31, 2017]

Land use and soils: The majority of soils in this part of the WID are classified as Prime, with most being Prime if drained. Most agricultural land in the upper Johnson Creek is actively drained and is included within CDID#31. Almost all of the land in this part of the WID is zoned AG, which indicates that it is important agricultural land. There is a Rural Study Area (RSA) in the Upper Johnson Creek watershed, adjacent to the WID's western boundary, which indicates some potential pressure for conversion of land out of agriculture.<sup>56</sup>

Habitats and species: This area contains critical habitat for band-tailed pigeon, great blue heron, waterfowl, trumpeter swans, as well as critical wetland habitat and the rare soft-leaved willow plant.<sup>57</sup> The north-western area of the upper Johnson watershed, adjacent to the Kamm Creek drainage, contains designated Sandhill crane habitat, based on a single sighting in 1994. Coho and cutthroat are present in the upper Johnson and coho spawning is documented.<sup>58</sup> Salmon spawning occurs in tributaries to Johnson Creek: Pangborn<sup>59</sup> (formerly called Cummings Creek), Clearbrook, and Squaw Creeks.<sup>60</sup> In the lower Johnson area, Chinook, chum, coho, cutthroat, sockeye and steelhead are present.<sup>61</sup>

Water flow processes: The upper Johnson Creek watershed area is of moderate-high importance for water flow processes, particularly recharge and delivery processes. The lower Johnson Creek area is one of the areas of highest importance for water flow processes in the whole Sumas watershed, particularly for recharge and delivery. Overall, however, water flow processes in Johnson Creek are highly degraded due to historic land use trends including increases in impervious surface areas, decrease in forest and riparian cover, and drainage of agricultural land.<sup>62</sup>

## 4.2 Sumas River

This area Includes tributary watersheds of Kinney Creek, Breckenridge Creek, Swift Creek, and Dale Creek and also a small portion of the Smith Creek watershed that is within the WID area.

Water quality: For agricultural purposes, the water quality within most of the Sumas River watershed is adequate. However, there are several water quality impairments in the watershed: Swift Creek in the middle Sumas area has high levels of naturally occurring asbestos in the sediments;<sup>63</sup> sections of the Lower Sumas River are in category 5<sup>64</sup> for dissolved oxygen, and category 4a for dissolved oxygen and bacteria;

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<sup>56</sup> Rural study areas are areas with significant prime soils and farming operations within R10A or R5A zoning designations. Whatcom County (2013). *Excerpt from the 2012 Agricultural Advisory Committee Analysis and update of the 2007 Whatcom County Rural Land Study*.

<http://www.co.whatcom.wa.us/DocumentCenter/View/4488>

<sup>57</sup> See Appendix B (Tables 5A and 5B in the WID mapping report)

<sup>58</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>59</sup> Video of salmon spawning in Pangborn/Cummings Creek can be found at <https://www.youtube.com/watch?v=umbOHHz6MK0>. Provided by R. Perry, April 2016.

<sup>60</sup> Sumas WID mapping report. Participant comment.

<sup>61</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>62</sup> See Appendix B (Tables 5A and 5B in the WID mapping report)

<sup>63</sup> Whatcom County Public Works (River & Flood) <http://www.whatcomcounty.us/513/Swift-Creek>

<sup>64</sup> Definition of Category 5: "Polluted waters that require a TMDL (total maximum daily load) or other WQI (water quality Improvement) project: the list of impaired water bodies traditionally known as the 303(d) list. Starting with

a section of middle Sumas River is in category 5 for bacteria and another section of the middle Sumas is in category 5 for bioassessment. A section of the upper Sumas is in category 5 for bioassessment, and Hoff Creek is in category 5 for temperature. There are no water quality impairments listed in upper Smith Creek, but lower Smith Creek within the Sumas WID area is in category 5 for dissolved oxygen and category 4a for bacteria.<sup>65</sup>

**Water quantity:** The Sumas River watershed is closed year-round to further appropriations unless mitigated.<sup>66</sup> Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flows levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.<sup>67</sup> Some Group A public water suppliers do not have adequate water rights in proper locations to meet projected future demand.<sup>68</sup> Smith Creek is closed to new withdrawals from May 1 to October 31 each year,<sup>69</sup> but no new applications for water rights have been filed in the Smith Creek sub-basin.

**Land use and soils:** Most of the soils in the Lower Sumas area are prime if drained (Prime 2). Much of the land in this area is zoned AG, indicating important agricultural land. In the middle and upper Sumas watersheds within the WID boundaries, almost all of the soils are prime or prime if drained, and almost all of the land is zoned AG. There are Rural Study Areas in the Lower Sumas area just outside the WID boundary and in the upper Sumas watershed within the WID boundary. In the portion of the Smith Creek watershed that is within the WID boundary, soils are mostly prime and the area is zoned AG or is within a Rural Study Area.<sup>70</sup>

**Habitats and species:** Wetland habitat occurs in locations throughout the Sumas River watershed including the Smith Creek Watershed. The lower and middle Sumas River watersheds contain habitat for Chinook, chum, coho, cutthroat and steelhead. Sockeye can also be found in the lower Sumas River. Coho spawning has been documented in Breckenridge Creek and the upper Sumas River. Critical habitat for great blue heron is found in the middle and upper Sumas watersheds. The middle Sumas River watersheds also contain critical habitat for bald eagle (in the more southeastern section) and band tailed pigeon (in the more northwestern section).<sup>71</sup>

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the 2008 Water Quality Assessment, Washington's 303(d) list of polluted waters were placed under Category 5 in the approved assessment. Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan." WA Department of Ecology, 2015. *Water Quality Assessment Categories*.

<http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>65</sup> Water quality as noted in Tables 5E through 5J of the WID mapping report (Appendix B of this Preliminary Plan). Data source: Department of Ecology, 2012. *Water Quality Assessment for Washington*. <

<http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>66</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability, Publication 11-11-006*

<https://fortress.wa.gov/ecy/publications/documents/1111006.pdf> [last accessed February 7, 2017]

<sup>67</sup> WAC 173-501 (1985). Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

<sup>68</sup> This includes the Nooksack Water Department and the Hampton Water Association. See: Whatcom County Coordinated Water System Plan (2016) <http://www.whatcomcounty.us/DocumentCenter/View/24143> [last accessed January 31, 2017]

<sup>69</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability, Publication 11-11-006*

<https://fortress.wa.gov/ecy/publications/documents/1111006.pdf> [last accessed February 7, 2017]

<sup>70</sup> See Appendix C of this Preliminary Plan (Figure 17 in the WID mapping report)

<sup>71</sup> See Appendix B of this Plan: Habitats & species as noted in Tables 5E through 5J of the WID mapping report.

Data sources: Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services; WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last February 7, 2016]

Water flow processes:<sup>72</sup> The lower Sumas River watershed is an area of highest importance for water flow processes but overall, the water flow processes in this area are moderately-high to highly degraded, particularly storage and delivery processes. The middle Sumas River and Kinney Creek watershed is an area of moderate-high importance overall for water flow processes and the degradation of these processes is rated moderately-high. Also in the middle Sumas area, the Breckenridge and Swift watersheds have lower importance for water flow processes and those processes are moderately degraded.

The upper Sumas River watersheds (excluding the Dale Creek area) are areas of moderate-high importance overall for water flow processes and the degradation of these processes is rated moderate-high. The Dale Creek watershed within the upper Sumas watershed is an area of highest importance for water flow processes and these processes are only moderately degraded. Much of the headwater area is forested.

In the Smith Creek watershed, overall water flow processes are of moderate importance and are moderately degraded. Much of the area is forested, with agriculture being confined to the lower reaches where the land is flatter.

#### 4.3 Saar Creek

Water quality: The groundwater here contains high levels of iron, of natural origin.<sup>73</sup> Otherwise, there are no surface water quality impairments listed for the Saar Creek watershed.

Water quantity: Saar Creek is closed year-round to further appropriations unless mitigated.<sup>74</sup> Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flows levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.<sup>75</sup> A number of new applications for water rights have been filed in the Saar Creek watershed.

Land use and soils: Almost all of the soils within the WID boundaries in this area are prime or prime if drained. Most of the agricultural land in the portion of the Saar Creek watershed that is within the WID area is actively drained and is included within DID#15. Almost all of the land within the WID area is zoned as AG, indicating important agricultural land.

Habitats and species: The Saar Creek watershed contains critical habitat for bald eagle, trumpeter swan, and also wetland habitat. Chinook, chum, coho, cutthroat, pink, sockeye, and steelhead are present and coho spawning has been documented in Saar Creek.<sup>76</sup>

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<sup>72</sup> See Appendix A of this Plan (summary maps from the WID mapping report) and Appendix B of this Plan (Tables 5E through 5J in the WID mapping report)

<sup>73</sup> Cox, S. E., and Kahle, S. C., 1999. Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada; Water-Resources Investigations Report 98-4195. USGS. <<http://pubs.usgs.gov/wri/1998/4195/report.pdf>> [last accessed February 8, 2018].

<sup>74</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability, Publication 11-11-006* <https://fortress.wa.gov/ecy/publications/documents/1111006.pdf> [last accessed February 7, 2017]

<sup>75</sup> WAC 173-501 (1985). Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

<sup>76</sup> See Appendix B of this Plan: Habitats & species as noted in Tables 5E through 5J of the WID mapping report. Data sources: Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by



Water flow processes: This is an area of lower to moderate importance overall for water flow processes relative to other sub-basins in the Sumas River watershed. However, a number of springs and streams enter the lowland area from the foothills above and contribute to streamflow in Saar Creek and smaller tributaries. Overall water flow processes are moderately degraded.

#### 4.4 Nooksack main channel (Deming to Everson)

Water quality: The groundwater here is within the Sumas-Blaine aquifer which is known to have widespread nitrate contamination. The Nooksack River mainstem is in category 5 for pH and temperature in this area<sup>77</sup> and lower Smith Creek is in category 5 for dissolved oxygen, and 4a for bacteria.<sup>78</sup>

Water quantity: The mainstem is not closed to new withdrawals but is subject to year-round instream minimum flows. The minimum flows are not met an average of 100 days per year between late spring and early fall.<sup>79</sup> A number of applications for new water rights have been filed in this area.

Land use and soils: Within the WID in the Nooksack main channel area (Deming to Everson) all of the soils are prime and most land is zoned AG, indicating important agricultural land.

Habitat: This area contains wetland habitat. The area from Nugent's Corner to Everson also contains the rare plant soft-leaved willow.<sup>80</sup> Char, Chinook, chum, coho, cutthroat and steelhead are present here. Spawning of Fall Chinook and winter steelhead and rearing of odd-year pink salmon are known to occur here.<sup>81</sup> The area is important for salmonids moving upstream to spawning grounds in the Nooksack River tributaries.

Water flow processes: The area of the Nooksack main channel from Nugent's Corner to Deming is one of the areas of highest importance for water flow processes, and is particularly important for salmonids moving upstream to spawning grounds in the Nooksack River tributaries. Overall water flow processes show moderate-high level of degradation, and there are water quality problems (dissolved oxygen, bacteria and fine sediments) in the lower reaches of the tributaries where the most intensive agricultural activity is located. The area of the Nooksack main channel from Nugent's Corner to Everson is an area of moderate-high importance overall for water flow processes, but water flow processes are highly degraded.

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Sarah Watts, Whatcom County Planning & Development Services; WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed February 7, 2017]

<sup>77</sup> Ecology, 2012. *Water Quality Assessment for Washington* <<http://www.ecy.wa.gov/programs/Wq/303d/index.html>>

<sup>78</sup> Ecology, 2012. *ibid.*

<sup>79</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability, Publication 11-11-006* <<https://fortress.wa.gov/ecy/publications/documents/1111006.pdf>> [last accessed February 7, 2017]

<sup>80</sup> WA Department of Natural Resources (2015). *Washington Natural Heritage Program*. <<http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html>>

<sup>81</sup> See Appendix B of this Plan: Habitats & species as noted in Tables 5E through 5J of the WID mapping report. Data sources: Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services; WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed February 7, 2017]

## 5 SUPPORTING INFORMATION FOR PLANNING OF SPECIFIC ACTIONS

### Explanatory notes

In the management plan, this section would contain as much detail as possible on priority actions agreed by the WID, including a description and rationale for each task, a planned schedule, and indication of who would assist in implementation. Some priority actions might require additional resources, more detailed baseline studies or collection of new data: descriptions of these actions would be supported by a scope of work and estimated budget.

Maintenance of agricultural drainage and management of water quality are two areas where the WID has been particularly active and already has a number of actions planned or ongoing. In cases where there might be little or no available information on how the WID proposes to address an issue and implement priority actions related to that issue, we have made some notes about how actions might be identified and prioritized during further development of the WID's management plan.

This section will be updated after discussion with the WID board. Currently, the suggested list of sub-sections to be included is:

- Hydrology and water availability; water use and water rights
- Water quality (surface and groundwater)
- Agricultural field drainage
- Flooding and stormwater management
- Agricultural protection (protection of the agricultural industry)
- Water flow processes; fish and wildlife
- Communication, outreach, education and reporting

As the management plan is developed in more detail, it is likely that different actions will be prioritized in different parts of the WID area, depending on farmers' needs and availability of resources.

## 5.1 Hydrology and water availability; water use and water rights

### 5.1.1 Desired outcomes, goals and possible actions

In subsequent versions of the management plan, this section would include:

- a review of what information is readily available to determine
  - water availability for current and future agricultural water needs (both surface and groundwater),
  - climate (focus on precipitation and temperature) and potential evapotranspiration analysis,
  - estimates of current water use for agricultural purposes and potential future demand, and
  - current water rights status for agricultural users in the WID area;
- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments, to be incorporated into the WID's comprehensive management plan;
- priority actions, responsibilities and timelines.

Specialists: Joanne Greenberg and Jim Bucknell

From Table 2, the suggested priority actions are:

- i. *Support & coordinate with Ag Water Board for*
  - a. *actions related to water rights, and*
  - b. *participation in the Water Supply Work Group (noted from board meeting April 11<sup>th</sup>, 2017);*
- ii. *Hydrological analysis (surface and groundwater), including climate and evapotranspiration, to assess current water use and water availability and identify shortfalls – possibly coordinate with other WIDs on the analysis;\**
- iii. *Pursue and test feasibility within the WID of options such as water exchange or water banking, changes in place of use, change to groundwater, aquifer recharge etc. \**

*\* denotes actions that may need additional resources, and more detailed scope & description*

### 5.1.2 Supporting information related to hydrology, water use and water rights

Additional supporting information related to the recently completed, ongoing and future priorities listed in Table 2 includes:

- Data sources listed in Appendix E of this preliminary plan
- Summary and references for work done on water banking (Water Supply Coalition)
- PUD#1 (2016). [Quantification of Agricultural Irrigation Water Use and Water Rights](#)
- PUD#1 (2016) [Whatcom County Streamflow Analysis](#)
- Summary of results and references for the groundwater modeling project – currently there are documents available at <http://wria1project.whatcomcounty.org/Resource-Library/2016-Groundwater-Forum/116.aspx>

Two reports are useful to understanding the water use in this area: *Quantification of Agricultural Irrigation Water Use and Water Rights*<sup>82</sup> published in 2016, and the *2010 State of the Watershed Report*.<sup>83</sup> Both of these documents organize water use information by watershed. The *Quantification* report provides figures for estimated agricultural water use by WRIA1 watersheds which, in some cases, are larger areas made up of the sub-basins described in this plan.<sup>84</sup> Estimated agricultural water use for the relevant watersheds is reported in the table below. The Johnson Creek watershed is the only watershed that lies mostly within the Sumas WID.

Table 4. Estimated agricultural water use in selected watersheds in the Sumas WID area.

	Total acres	Agricultural acres	Irrigated acres	Estimated water use in acre-feet per year
Watersheds which lie mostly within the WID				
Johnson includes Upper and Lower Johnson, except Sumas City	13,911	6,849	5,618	7,362
Sumas City	146	34	31	27
Watersheds only partly within the WID				
Breckenridge Creek includes Middle and Lower Sumas except Swift Creek	15,815	4,775	3,571	4,834
Upper Sumas (referred to as Dale Creek in the report)	7,607	1,993	1,303	1,817
Saar Creek	12,991	2,247	1,891	2,447
Swift Creek	2,109	27	0	0
Nooksack Deming to Everson includes Nooksack Deming to Everson North and South	15,637	1,344	616	980

The *2010 State of the Watershed Report*<sup>85</sup> states that a little under 10,000 acres are irrigated in the Sumas River watershed, and describes metered and modeled water use in the area. There are seven group A water systems and five group B water systems in the Sumas River watershed (this does not include the Nooksack mainstem (Deming to Everson) or Smith watersheds). Metered water use makes up a small percentage of the overall use - approximately 10% in the Saar, Middle and Lower Sumas and Johnson Creek watersheds; less than 10% in the Nooksack (Deming to Everson watershed), and none in the Smith Creek watershed.

The remaining non-metered water use is estimated from modeled data. Modeled uses include residential, commercial, and agricultural uses. The majority of modeled use is attributed to agriculture and accounts

<sup>82</sup> RH2 Engineering, Inc., 2016. *Quantification of Agricultural Irrigation Water Use and Water Rights*, December 2016. Public Utility District No. 1 of Whatcom County <http://wria1project.whatcomcounty.org/> [last accessed 5/31/17]

<sup>83</sup> Peterson, B., Gill, P. and J. Fleishmann. 2011. *State of the Watershed Report*. WRIA 1 Watershed Joint Board and Whatcom County. [online] <http://wria1project.whatcomcounty.org/> [last accessed February 8, 2017]

<sup>84</sup> See *Surface water delineations boundaries in the WRIA1, version 3 DRAFT* map. WRIA1, 2002. [http://wria1project.whatcomcounty.org/uploads/PDF/Maps/WRIA%201%20Watersheds%20&%20Streams%20V3\\_draftscreen.pdf](http://wria1project.whatcomcounty.org/uploads/PDF/Maps/WRIA%201%20Watersheds%20&%20Streams%20V3_draftscreen.pdf) [last accessed September 27, 2017].

<sup>85</sup> Peterson, B., Gill, P. and J. Fleishmann. 2011. *State of the Watershed Report*. *Ibid.*

for approximately 75% to 90% of overall use in all but the Swift Creek area. Swift Creek is the only sub-watershed described separately in the report. Here modeled agricultural use is smaller at about 70% and the remainder of use is attributed to residential. In the Johnson Creek, Sumas River, and Nooksack Deming to Everson watersheds residential use accounts for a very small percentage (approximately 10%) and in the Saar Creek watershed no modeled water use is attributed to residential. A very small amount of commercial water use, approximately 5% is modeled in the Smith Creek watershed only.

## 5.2 Water quality (surface and groundwater)

### 5.2.1 Desired outcomes, goals and possible actions

In subsequent versions of the management plan, this section would include:

- a review of what information is readily available to determine current status and trends in water quality and implementation of BMPs;
- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments, to be incorporated into the WID's comprehensive management plan;
- priority actions, responsibilities and timelines.

Specialists: Anneke Sweeney, Nichole Embertson

From Table 2, the suggested priority actions are:

- i. *Schedule a spring tour for 2018, and make this a regular event (9/2017 meeting).*
- ii. *Continue WID's ongoing water quality monitoring & response program (noted from March 20 work session);*
- iii. *Encourage all agricultural landowners in the WID to implement appropriate BMPs, with assistance from the Conservation District;\**
- iv. *Maintain watching brief on natural asbestos from Swift Creek site and collaborate as needed with Whatcom County lead (noted from 9/2017 meeting);*
- v. *coordinate with other WIDs on funding for and implementation of DNA testing (noted from March 20 work session);\**
- vi. *Coordinate with Ag Water Board and other WIDs on water quality programs and responses, including Portage Bay Partnership, implementation of best management practices (noted from March 20 work session).*

*\* denotes actions that may need additional resources, and more detailed scope & description*

### 5.2.2 Supporting information related to water quality

Additional supporting information related to the recently completed, ongoing and future priorities listed in Table 2 includes:

- Agricultural and watershed characterization tables contained in Appendix B of this Preliminary Plan;
- Reference maps contained in Appendix C of this Preliminary Plan;
- Data sources listed in Appendix E of this Preliminary Plan.

### 5.3 Agricultural field drainage

#### 5.3.1 Desired outcomes, goals and possible actions

In subsequent versions of the management plan, this section would include:

- next steps that the WID would take to discuss and agree on selected priority actions for maintaining drainage infrastructure and ditches in the WID area in collaboration with DID#15 and CDID#31
- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments for a set of agreed actions, to be incorporated into the WID's comprehensive management plan;
- priority actions, responsibilities and timelines.

Specialists: Frank Corey

From Table 2, the suggested priority actions are:

- Review and update list of priority actions identified at the January 2016 work session (see list in Table 5 and the corresponding map in Figure 8);*
- Select ditch cleaning project for 2017, obtain permits and resources, implement\* (from March 20<sup>th</sup> notes);*
- Develop coordinated plan with the two drainage districts #31 and #15 to cover all areas of the WID needing drainage maintenance;*
- Proactively identify locations for mitigation sites and mitigation actions that could also contribute to advancing watershed & habitat priorities (see Table 5 and section 5.3);\**
- Obtain programmatic permits from WDFW and other permits as needed, with help from the Conservation District.\**

*\* denotes actions that may need additional resources & more detailed scope & description*

#### 5.3.2 Supporting information related to field drainage

The following background information supports the WID's discussions related to agricultural drainage and the development of an action plan for inclusion in the preliminary WID management plan:

- Map of the WID boundary (Figure 7 below), including the boundaries for DID#15 and CDID#31, which also shows the modified waterways and ditches that are maintained as part of the drainage infrastructure.
- Map of priority actions identified by the WID in the January 2016 work session (Figure 8). These actions are almost all related to drainage and flooding.
- Agricultural reference map (Appendix C of this document) indicating where soils are Prime if drained.
- Detailed tables prepared at the WID work session in January 2016 indicate drainage concerns and priorities in different parts of the WID. The tables are contained in Appendix B of this document.
- Data sources listed in Appendix E of this preliminary plan
- Link to online version of DID#15 Drainage Management Plan <http://www.whatcomcd.org/did15>
- Link to information on CDID#31 <http://www.whatcomcd.org/cdid31>
- Information on the programmatic permitting process for stream projects involving drainage and/or habitat (see Table 6).



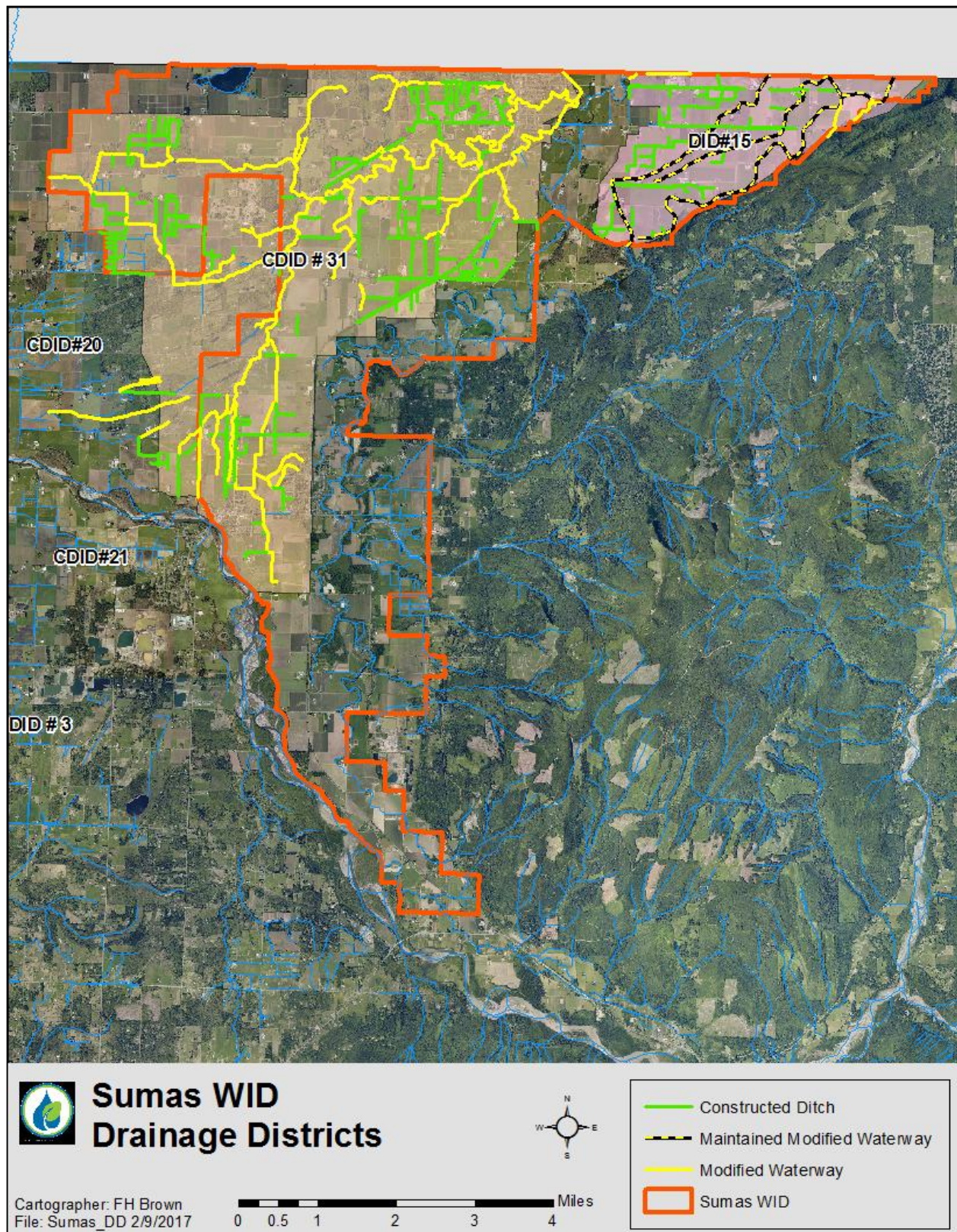


Figure 7. Map showing Sumas WID, DID#15 and CDID#31. Map layers: Whatcom Conservation District.



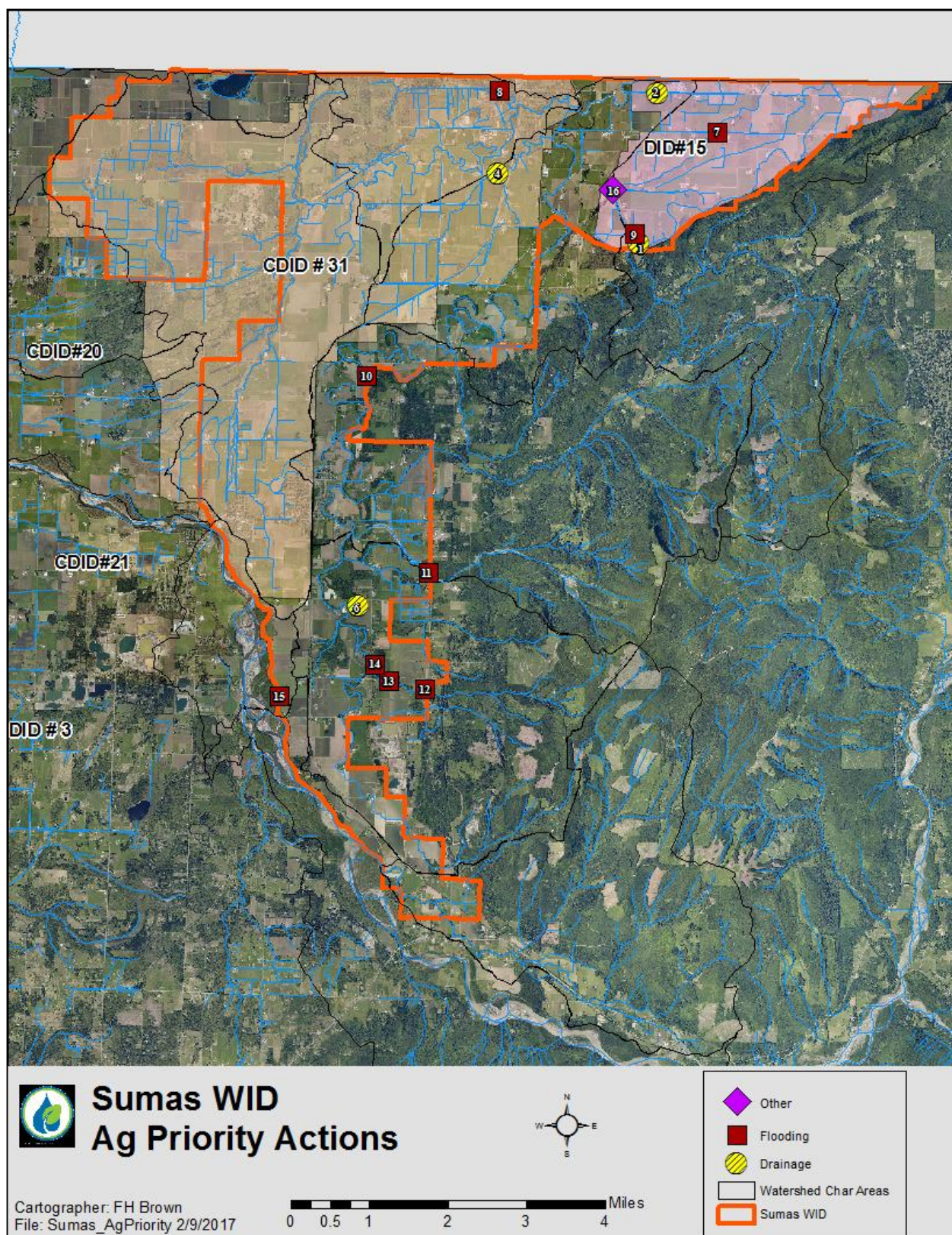


Figure 8. Sumas WID map of specific agricultural priority actions (from WID work session in January 2016). See table below for map key.



Table 5. Key for actions on agricultural priority actions map in Figure 8

<i>Version 4, updated after discussion at WID board meeting of April 11, 2017</i>			
Action number on map	Assessment unit #	Agricultural priority	Notes
1	1079	Drainage	Culvert half full of gravel (see also action #9).
2	1086	Drainage	Gas plant moved ditch. Doesn't drain as well now.
4	1087	Drainage	Bone Creek: Needs dredging to improve drainage.
6	1162	Drainage	Drainage impaired both upstream and downstream.
7	1079	Flooding	Perhaps a sediment capture pond could be built if Saar Creek could no longer be sprayed.
8	1166	Flooding	Beaver management needed, floodway area.
9	1079	Flooding	Sediment pond at base of Reese Hill Rd and systems require regular maintenance by DID.
10	1163	Flooding	Nooksack levee broke in 2015, overtopped 3" and flooded here.
11	1077	Flooding	Swift Creek needs a long-term action plan for sediment management.
12	1161	Flooding	Beaver management needed to keep ditches cleared and reduce flooding.
13	1161	Flooding	Lower Dale Creek blockage.
14	1162	Flooding	Plugged drainage due to sediment.
15	1096	Flooding	Active bank erosion. Rip rap needed on right bank of Nooksack River main channel below end of existing project.
16	1079	Other	Traffic Issue: poor visibility for farm machinery on the highway.
17 (not yet added to the map)		Drainage	Culvert replacement between Pangborn Lake and van Buren Road could serve as a potential mitigation option. Discussed at WID board meeting April 11, 2017.
Notes: Actions #3 and #5 were deleted after review of the draft map by the WID board in May 2016.			

Table 6. Programmatic permitting process for stream projects (drainage, habitat)

(Information provided by Frank Corey, Whatcom Conservation District)		
<u>Washington Department of Fish &amp; Wildlife (WDFW)</u> can issue a 5-year permit (Hydraulic Project Approval) based upon a Drainage Maintenance and Habitat Improvement Plan.		
<u>Whatcom County Planning &amp; Development Services (PDS)</u> can concurrently issue a programmatic Land Disturbance Permit or Shorelines Exemption.		
Basic Plan Components:		
<ul style="list-style-type: none"> <li>• General description of District and important natural and structural features</li> <li>• Watercourse classification map</li> <li>• General list of 5-year drainage maintenance needs</li> <li>• General list of habitat projects to offset impacts of drainage maintenance and voluntary habitat improvement projects</li> <li>• Annual reporting forms</li> <li>• Mitigation sequencing process</li> <li>• Typical cross-section for maintenance dredging</li> <li>• Best management practices</li> <li>• ESA Habitat Assessment and mitigation plan for floodplain areas</li> <li>• WDFW notification requirements individual projects (includes discussion of mitigation)</li> <li>• PDS Natural Resource Notification of Activity (\$35.00) for individual projects</li> <li>• SEPA</li> <li>• LDP or shorelines</li> </ul>		
Permitting pathway:		
<ol style="list-style-type: none"> <li>1. Complete Drainage Maintenance and Habitat Improvement Plan</li> <li>2. Complete non-project SEPA checklist</li> <li>3. Complete Shorelines Exemption or Land Disturbance Permit (LDP) applications</li> <li>4. Complete on-line Joint Aquatic Resource Permit Application (JARPA)</li> <li>5. Submit Plan, SEPA, Shorelines (or LDP), and supporting information to PDS</li> <li>6. Submit JARPA to WDFW</li> <li>7. Notify WDFW (call or email) and PDS (Notification form) for each project prior to implementation.</li> <li>8. Also submit mitigation plans for each project. Preferred mitigation will be on-site and in-kind (example planting). Other mitigation such as replacing culverts that are barriers to fish passage also possible.</li> <li>9. Submit annual reports to WDFW and PDS</li> </ol>		
Permit Fees		
• WDFW		\$175.00
• SEPA		\$535.00
• LDP		\$600.00*
• (or Shorelines Exemption		\$435.00)**
• (Flood Review		\$110.00)**
*Other fees may apply		
**If in floodplain		

## 5.4 Flooding and stormwater management

### 5.4.1 Desired outcomes, goals and possible actions

The map of agricultural priorities (Figure 8) includes several possible actions to maintain flood infrastructure in specific locations within the Sumas WID area.

In subsequent versions of the management plan, this section would include:

- next steps that the WID would take to discuss and agree on selected priority actions for protecting agricultural land from flooding, in collaboration with Whatcom County Public Works;
- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments for a set of agreed actions, to be incorporated into the WID's comprehensive management plan;
- priority actions, responsibilities and timelines.

From Table 2, the suggested priority actions are:

- Review and update priority actions identified at the January 2016 work session (see list in Table 5 and the corresponding map in Figure 8, which include several possible actions to maintain flood infrastructure in specific locations within the Sumas WID area.)*

### 5.4.2 Supporting information related to flooding and stormwater management

The following supporting information supports the WID's discussions related to flooding and stormwater management and the development of an action plan for inclusion in the WID management plan:

- Detailed agricultural and watershed enhancement tables prepared at the WID work session in January 2016 indicate flooding concerns and priorities in different parts of the WID. The tables are contained in Appendix B of this document.
- Data sources listed in Appendix E of this preliminary plan.

## 5.5 Water flow processes; fish and wildlife

### 5.5.1 Desired outcomes, goals and possible actions

During the January 2016 WID work session, priorities for water flow processes and fish and wildlife (including habitats) were discussed in some detail and suggested actions were noted for specific locations within the Sumas WID. The results of these discussions and the supporting analyses are contained in the Sumas WID mapping report.

For easier reference, we have included the summary map of watershed enhancement priorities in Appendix A of this document, and the detailed information on watershed characterization can be found in the tables in Appendix B of this document.

The watershed characterization tables provide suggestions for site-specific watershed actions that the WID can use to begin developing their action plan, and to identify potential mitigation sites that could be included in a drainage management plan. For example, Table 5A in Appendix B contains the following note under "Summary & potential for enhancement":

*“Upper Johnson: Actions should focus on improving recharge by preventing additional impervious surface cover and reducing existing impervious cover; improving delivery by protecting and restoring forest and riparian cover, and finding opportunities to retain surface flows for longer particularly in the headwaters of Johnson Creek (AU1164). These actions can be expected to have additional benefits of improving water quality and salmon habitat in the area.”*

In subsequent versions of the management plan, this section would include:

- next steps that the WID would take to discuss and agree on selected priority actions for protecting or enhancing water flow processes, fish and wildlife habitats in the WID area, using the information in the watershed characterization maps and tables (see Appendix B) and any other relevant information (see Appendix E);
- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments for a set of agreed actions, to be incorporated into the WID’s comprehensive management plan;
- priority actions, responsibilities and timelines.

From Table 2, the suggested priority actions are:

- i. *Review possible actions to enhance or protect water flow processes in specific locations within the Sumas WID area,\* as listed in the watershed characterization tables prepared during the WID work session in January 2016 (see Appendix B of this document, or WID mapping report Table 5).*
  - *Suggested actions in specific parts of the WID include, for example, enhancing surface water storage, reducing or preventing additional impervious cover, protecting and/or restoring riparian and forest cover, reducing subsurface drainage rates;*
- ii. *coordinate possible actions with development of programmatic drainage permits, to address mitigation requirements in drainage permits.\**

*\* denotes actions that may need additional resources & more detailed scope & description*

#### 5.5.2 Supporting information related to water flow processes, fish and wildlife

The following supporting information supports the WID’s discussions related to water flow processes, fish and wildlife, and the development of an action plan for inclusion in the WID management plan:

- Detailed agricultural and watershed enhancement tables prepared at the WID work session in January 2016 indicate priorities for water flow processes, fish and wildlife in different parts of the WID. The tables are contained in Appendix B of this Preliminary Plan.
- Reference maps contained in Appendix C of this Preliminary Plan.
- Data sources listed in Appendix E of this Preliminary Plan.

## 5.6 Agricultural protection (protection of the agricultural industry)

### 5.6.1 Desired outcomes, goals and possible actions

Protection of the agricultural industry will require not just protection of the agricultural land base, but also the provision of agricultural infrastructure and the ability to continue normal farming operations on working farmland.

In subsequent versions of the management plan, this section would include:

- scope of work and resources needed for any additional work that might be needed to collate data or to conduct relevant baseline assessments, to be incorporated into the WID's comprehensive management plan;
- priority actions, responsibilities and timelines.

From Table 2, the suggested priority actions are:

- Consider possible outreach actions with Whatcom County Purchase of Development Rights (PDR) program*
- engage and communicate with non-ag landowners in the WID area about WID priorities and programs, normal farming operations, right-to-farm etc. (include specific actions in the communication strategy)\**
- coordinate with Whatcom Family Farmers to address legal challenges and preserve "one voice outreach" on behalf of agriculture (from March 20 work session)*

*\* denotes actions that may need additional resources, and more detailed scope & description*

### 5.6.2 Supporting information related to agricultural protection

The following supporting information supports the WID's discussions related to agricultural protection, and the development of an action plan for inclusion in the WID management plan:

- Detailed agricultural and watershed enhancement tables prepared at the WID work session in January 2016 indicate priorities for water flow processes, fish and wildlife in different parts of the WID. The tables are contained in Appendix B of this document.
- Gillies J & MacKay H (2016). *Preliminary Assessment of Drivers of Agricultural Land Conversion in Whatcom County, Washington*. Project Memo prepared for the Whatcom County Agriculture-Watershed Pilot Project, Whatcom County Planning & Development Services, Bellingham. <https://sites.google.com/site/wcwatershedag/home>

## 5.7 Communication, outreach, education and reporting strategy

### 5.7.1 Desired outcomes, goals and possible actions

In addition to the technical work associated with preparing a management plan and implementing actions on the ground, the WID board will need to keep communicating internally with WID members and engaging with them on addressing agreed priority issues, and communicating externally with neighboring landowners, other stakeholders and relevant agencies.

While much of the work of external communication and engagement would be coordinated through the Ag Water Board, Sumas-specific information and inputs will be needed for the AWB's efforts.

In subsequent versions of the management plan, this section would include:

- An outline of how the WID currently approaches internal and external communication and engagement;
- Next steps for communication and engagement related to the development of a comprehensive management plan;
- Scope of work and resources needed to assist the WID in communication and engagement related to future implementation of the plan, including templates for regular reporting on progress with priority issues and actions (Table 7 below includes options for indicators that could be used to measure and report progress against specific priority goals);
- priority actions, responsibilities and timelines.

From Table 2, the suggested priority actions are:

- i. *Internal: review and update the Preliminary Management Plan, focusing on manageable sized sections at each board meeting (from 9/2017 meeting minutes).*
- ii. *Internal: establish a template for tracking and regular reporting of WID progress on priority issues, based on a set of simple indicators of progress. \**
- iii. *External: coordinate with other WIDs to share what farmers are doing to benefit water quality and habitat (March 20<sup>th</sup> work session notes)*
- iv. *External: Coordinate with other WIDs to track legislation, rule-making, agendas and impacts on agriculture at County, State, Federal levels (March 20<sup>th</sup> work session notes; Whatcom County Agricultural Advisory Committee & Whatcom County Planning Commission were mentioned)*

*\* denotes actions that may need additional resources, and more detailed scope & description*

Table 7. Possible indicators to measure and report progress towards WID goals.

	Desired outcome(s): suggested text	Goal statement	Progress could be measured by:
1	<i>Water quality</i>		
	<i>Agricultural activities in the Sumas WID do not cause exceedances of relevant water quality standards for surface water and groundwater bodies.</i>	<i>Relevant water quality standards are met for surface and groundwater within agricultural lands</i>	<i>Achievement of required water quality standards</i>
2	<i>Water quantity: Water for agricultural use including irrigation, livestock, processing.</i>		
	<i>Farmers in the Sumas WID have secure (legal) access to sufficient water for agricultural uses.</i>	<i>All agricultural water use in the WID is secured through certificate, water lease or water supplier (such as water association).</i>	<i>% of total agricultural water use in the WID that is secured through certificate, water lease or water supplier (such as water association).</i>
3	<i>Agricultural protection (Protecting the agricultural industry)</i>		
	<i>The Sumas WID's plans and actions contribute to the recognition, protection and strengthening of agriculture in the WID area.</i>	<i>(a) Important agricultural land in the WID is protected from conversion through appropriate zoning and/or voluntary agricultural conservation easements.</i>	<i>Acres of land in the Sumas WID protected by voluntary agricultural conservation easements</i>
		<i>(b) Land use conflicts with neighboring non-agricultural landowners are reduced.</i>	<i>Number of complaints received from non-agricultural landowners by the WID or by Whatcom County.</i>
		<i>(c) Suggestions from WID board for goal statements that might apply here to indicate recognition, protection &amp; strength of agriculture?</i>	<i>Suggestions from WID board for indicators related to ag production? An example of a measurable achievement might be the 2009 adoption of the County Council resolution on preserving 100,000 acres for the ag land base, which recognizes the value of agriculture and associated industries for the local economy.</i>



	Desired outcome(s): suggested text	Goal statement	Progress could be measured by:
4	<i>Communication, outreach, education and reporting</i>		
	<p><i>Internal: WID members are aware of and understand the priority issues and participate actively in WID planning &amp; implementation of priority actions.</i></p> <p><i>External: Non-agricultural residents, other stakeholders and relevant bodies &amp; agencies are aware of, understand and support the Sumas WID's priority actions.</i></p>	<p><i>Goal statement(s):</i></p> <p><i>Suggestions from WID board?</i></p>	<p><i>WID landowner contacts: direct personal contacts to resolve concerns or raise awareness; information shared (e.g. newsletters, website); landowner concerns/priorities addressed; feedback received (informal or through surveys)</i></p> <p><i>External contacts: information shared (e.g. newsletters, website); feedback received (informal or through surveys); evidence of support for WID priorities (e.g. in media coverage)</i></p>
5	<i>Agricultural drainage: Field drainage</i>		
	<p><i>Drainage infrastructure and ditches in the Sumas WID are actively and effectively maintained.</i></p>	<p><i>(a) Regular, scheduled drainage maintenance in the Sumas WID area occurs under programmatic permits, in collaboration with DID#15 and CDID#31, with mitigation as required and using approved Best Management Practices.</i></p>	<p><i>% of agricultural land requiring field drainage in the Sumas WID:</i></p> <ul style="list-style-type: none"> <li><i>• that is covered by programmatic permits for drainage maintenance;</i></li> <li><i>• where drainage infrastructure and ditches have been maintained and repaired as needed.</i></li> </ul>
		<p><i>(b) Ad hoc actions (such as beaver management or sediment removal after a storm) and/or emergency repairs to drainage infrastructure are completed in a timely manner, in collaboration with DID#15, CDID#31 and Whatcom County.</i></p>	<p><i>Number of ad hoc emergency repairs that are completed in a year, compared to the number reported as needing attention.</i></p>
6	<i>Agricultural drainage: Flood management &amp; protection</i>		
	<p><i>Agricultural lands in the Sumas WID are protected from flooding due to surface water runoff at critical times in the growing season.</i></p>	<p><i>(a) Regular, scheduled maintenance is completed for flood protection infrastructure in the Sumas WID area.</i></p>	<p><i>Number of projects, repairs or actions that are completed in a year, compared to the number reported as needing attention.</i></p>
		<p><i>(b) Ad hoc or emergency repairs to flood protection infrastructure are completed in a timely manner, in collaboration with Whatcom County.</i></p>	<p><i>Number of ad hoc emergency repairs that are completed in a year, compared to the number reported as needing attention.</i></p>

	Desired outcome(s): suggested text	Goal statement	Progress could be measured by:
7	<i>Water flow processes; Habitats &amp; species</i>		
	<i>The Sumas WID's plans and actions help to protect and enhance water flow processes and fish and wildlife habitats in the Sumas watershed</i>	<i>Water flow processes (surface storage, discharge, recharge, delivery) are restored or protected as necessary in areas that are important for the watershed (see Figures 14 and 15 in the WID mapping report (Appendix C of this Preliminary Plan)).</i>	<i>Some options for measuring progress:</i> <ul style="list-style-type: none"> <li>– <i>Status of water flow process degradation (H, MH, M, L) in assessment units within the Sumas WID area.</i></li> <li>– <i>% effective shade cover on fish-bearing streams and ditches.</i></li> <li>– <i>Culverts &amp; fish barriers removed vs. remaining</i></li> <li>– <i>Acres of wetland or wildlife habitat restored and/or protected</i></li> </ul>

## Appendix A: Executive Summary of the 2016 Agriculture-Watershed Characterization and Mapping Report for the Sumas WID

Contains maps and a summary table showing the agricultural and watershed enhancement priorities based on the January 2016 work session with Sumas WID members and on additional technical analysis by the Ag-Watershed Project team. The full WID mapping report can be downloaded from the Sumas WID website <https://www.sumaswid.com/> [Alternative download location [here](#)]

Source:

Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <http://www.sumaswid.com/>

Sumas Watershed Improvement District  
Executive Summary: Agriculture-Watershed Characterization and Mapping  
August 2016



Whatcom County Ag-Watershed Project



PROJECT PARTNERS



CONSULTING PROJECT MANAGER  
FHB Consulting Services Inc.



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Project fact sheets and links to all previous work, including technical reports and reference documents can be found at

<http://whatcomcounty.us/2260/Agricultural-Watershed-Pilot-Project>

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Photo credits: Mary Dumas, Roderic Perry

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## Background

The agriculture-watershed characterization maps and tables combine existing spatial data with field experience and farmers' local knowledge to identify agricultural priorities and needs in the lowland areas of Whatcom County and to bring those into the planning conversation with watershed priorities and needs. The results are intended to support integrated land and water planning at watershed scale, and to support the identification and prioritization of agricultural and watershed enhancement actions at farm and reach scale. These products will be provided to the Watershed Improvement Districts (WIDs) and Special Districts to inform and complement their current comprehensive planning work.

The full characterization and mapping report for the Sumas WID<sup>1</sup> contains the reference information, work session information and results of the agriculture-watershed characterization and analysis conducted in 2016. The document is arranged into sections that allow easy access to specific categories of information.

The results of the characterization and mapping have also been incorporated into an online story map at <http://arcg.is/29MYdYu><sup>2</sup>

A customized report has been prepared for each of the six Watershed Improvement Districts in Whatcom County. Full reports

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<sup>1</sup> Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. Download from <http://www.sumaswid.com/>

<sup>2</sup> Whatcom County Agriculture-Watershed Pilot Project (2016), *Agriculture-Watershed Characterization & Mapping, Whatcom County*. Story map prepared for the Whatcom County Agriculture-Watershed Pilot Project, Whatcom County Planning & Development Services, Bellingham

for other Watershed Improvement Districts can be accessed through the WID websites<sup>3</sup> or through the Ag-Watershed Project page.<sup>4</sup>

The characterization and mapping results presented in this report have been derived from multiple information sources. The information is provided for planning purposes only, is not for use in regulatory actions, and is intended to contribute to ongoing Whatcom County Planning and Development Services efforts to improve agricultural and watershed conditions.

Definitions: for the purposes of the Ag-Watershed Project,

- *agricultural enhancement* entails maintaining the land base, soil, water, air, plants, animals, production capacity and natural infrastructure necessary to keep farmers farming over the long term as land uses and economic situations change over time. Thus "agricultural enhancement" and "agricultural protection" include but are not limited to agricultural land protection alone.
- *watershed enhancement* actions are those actions which improve the ability of the watershed to provide its natural benefits and services to communities. Watershed enhancement includes the idea of "repairing" major landscape processes related to hydrology and ecosystems, in order to maintain, protect or improve the delivery of watershed services.

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<sup>3</sup> Links to each WID website can be found at <http://www.agwaterboard.com/>

<sup>4</sup> See <http://www.co.whatcom.wa.us/2260/Agricultural-Watershed-Pilot-Project>

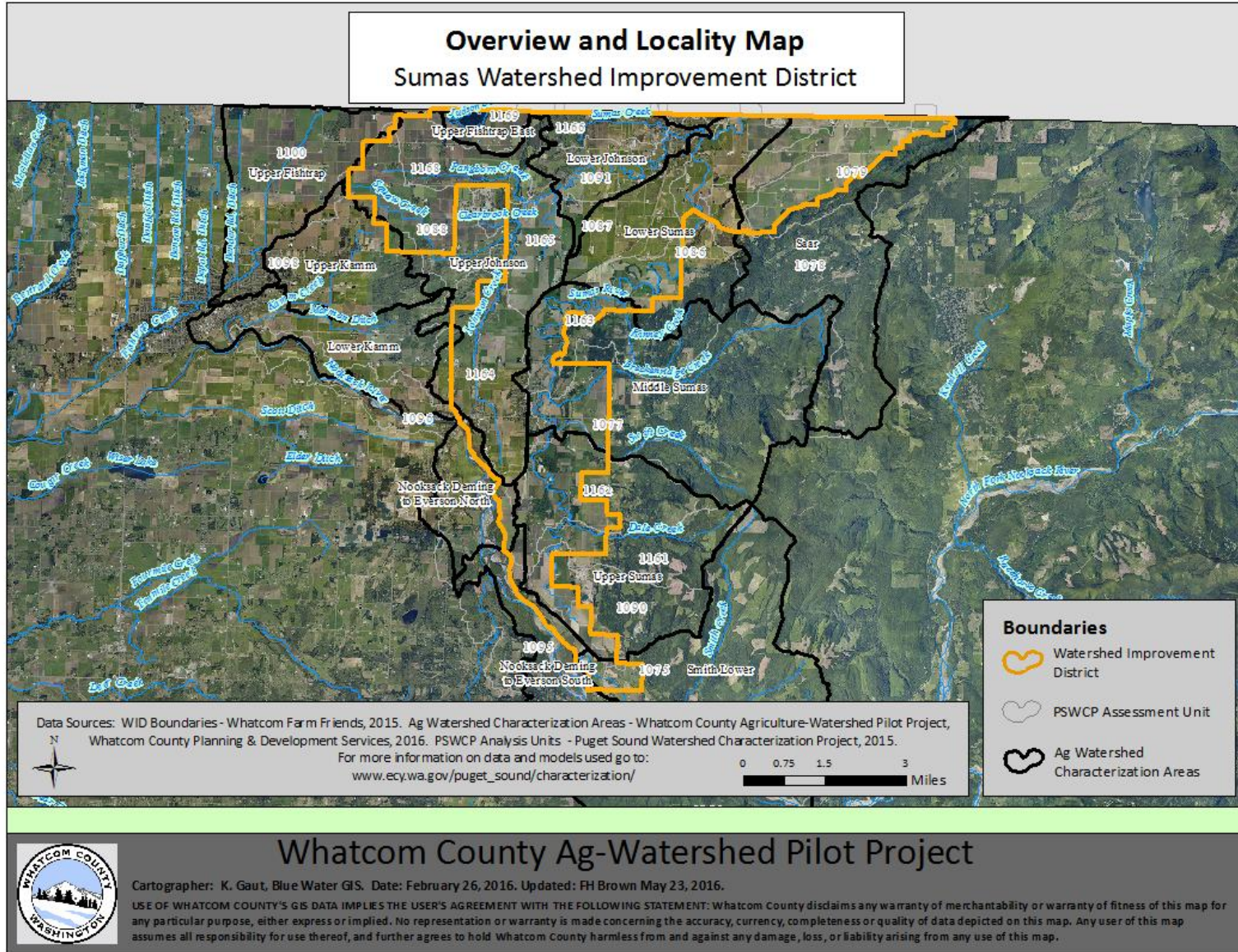


Figure 1. Sumas WID: Overview and locality map

## Approach used for agriculture-watershed characterization

### Pilot characterization and mapping (2012)

The methodology for agriculture-watershed characterization and mapping was developed and pilot-tested during Phase 1 of the Ag-Watershed Project. The pilot focus area covered the Bertrand, Fishtrap and Kamm watersheds. The pilot results are reported in the Phase 1 report on mapping and characterization (Gill, 2013).<sup>5</sup> Project Fact Sheet 2 provides additional background information on the agriculture-watershed characterization and mapping process.<sup>6</sup>

Information that was gathered during the pilot study in 2012 was reviewed and updated and has been incorporated into the 2016 agriculture-watershed characterization reports for the Bertrand, North Lynden and South Lynden Watershed Improvement Districts.

### Methodology used for the 2016 WID characterization and mapping

Areas within the Sumas Watershed Improvement District (WID) have been prioritized for both watershed and agricultural enhancement. This work has used an approach of structured combination and integration of local field knowledge and experience with a series of reference maps and tables, all of which draw on existing information and data.

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<sup>5</sup> Gill P (2013). *Agriculture-Watershed Characterization and Mapping Report for the North Lynden watersheds*. Prepared for the Whatcom County Agriculture-Watershed Pilot Project, Whatcom County Planning & Development Services, Bellingham.  
<http://www.co.whatcom.wa.us/2260/Agricultural-Watershed-Pilot-Project>

<sup>6</sup> Ag-Watershed Project fact sheets can be downloaded from  
<http://whatcomcounty.us/2260/Agricultural-Watershed-Pilot-Project>

A work session was held with Sumas WID members and technical staff of local agencies in January 2016, during which participants used maps to identify and prioritize the type and location of agricultural and watershed services that could potentially be enhanced on agricultural land where there is potential for mutual benefit to both agricultural and watershed systems.

### *Watershed analysis*

The results of the watershed characterization and mapping for the Sumas WID include tables and summary maps which describe the watershed services that are most needed for a healthy watershed (including the restoration of salmon populations) and where they could be enhanced in the watershed.

In order to generate these tables and summary maps for the Sumas WID, the information contained in the watershed reference maps (see section 6 of the main report) was combined with the results of watershed characterization<sup>7</sup> (water flow assessments for WRIA 1 provided by the Department of Ecology in a series of maps showing the areas which are most in need of either restoration or protection of larger-scale water flow processes). The work session participants reviewed this information, provided additional local field knowledge on site-specific watershed priorities, and identified potential actions or projects that could help to achieve watershed priorities. A more detailed description of the watershed characterization methodology is provided in section 5 and Appendix C of the main report.

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<sup>7</sup> Watershed 'characterization' is a set of water and habitat assessments that compare areas within a watershed for restoration and protection value. It is a coarse-scale tool that supports decisions regarding where on the landscape should efforts be focused first, and what types of actions are most appropriate to that place. See  
[http://www.ecy.wa.gov/puget\\_sound/characterization/index.html](http://www.ecy.wa.gov/puget_sound/characterization/index.html)



### *Agricultural analysis*

The results of the agricultural characterization and mapping for the Sumas WID include tables and summary maps which describe the agricultural services that are most needed for the long-term success of agriculture, and where they could be enhanced in the watershed. The primary focus was on the “natural infrastructure” for agriculture: soils, water, adequate drainage and flood protection, and long-term protection of the agricultural land base.

Methods used to prioritize agricultural needs are based on a combination of: information from (i) existing agricultural land protection programs in Whatcom County, (ii) available GIS data contained in the agricultural reference maps (see section 6 of the main report) and (iii) local knowledge provided at the WID work session.

At the WID work session, participants assisted the project team to collate and evaluate information on agricultural system needs and priorities in the WID area, and to locate the different agricultural system needs and priorities on base maps of the WID area.

A more detailed description of the methodology is provided in section 4 of the main report.

**Application: How to use the results of the agriculture-watershed characterization and mapping**

The WID can use the characterization maps and tables of agricultural and watershed priorities to support their land and water planning, management, and project funding.

The characterization maps and tables should help the WID to identify, prioritize, and strategically locate practical beneficial

projects and actions at the farm or reach-scale, and to enhance agricultural operations and watershed functions in the WID area.

The characterization maps and tables should also help the WID identify project opportunities that enhance watershed processes while strengthening agriculture where agricultural and watershed priorities are complementary, and to find acceptable trade-offs where they compete.

These results, which incorporate local knowledge and farmer insights, may also be used to communicate the WIDs’ priority enhancement needs to planners for consideration in broad scale planning such as Whatcom County’s Comprehensive Planning Process. More information on how to use these results in planning can be found in the Ag-Watershed Project Fact Sheet 5, included as Appendix D of this report.

### **Summarized results for the Sumas Watershed Improvement District**

The summary table below (Table 1) and the summary maps in Figure 2 highlight the most significant watershed and agricultural enhancement opportunities within the Sumas WID area. Check marks in Table 1 indicate where a specific enhancement priority was identified during the characterization and mapping process. Detailed descriptions of priorities, the sources for data and information on priorities, and descriptions of opportunities for enhancement through specific actions can be found in Tables 3 and 5 of the main report.



Table 1. Summary results of agriculture-watershed characterization and mapping for the Sumas WID  
(See locality map in Figure 1 for locations of agriculture-watershed characterization areas)

Agriculture-Watershed Characterization Area:	Johnson Creek			Lower Sumas		Middle Sumas		Upper Sumas		Nooksack River	
	Upper Johnson	Lower Johnson	Upper Fishtrap E	Saar	Lower Sumas River	Breckenridge	Swift	Dale & Upper Sumas River	Smith	Nooksack main channel (S)	Nooksack main channel (N) & lower Smith
Agricultural Enhancement Priority (See Table 3 in the main report for details)											
Prime agricultural soils	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü
Water quality for crops and livestock	-	Ü	-	Ü	-	Ü	Ü	-	-	-	-
Water quantity	Ü	Ü	Ü	Ü	Ü	Ü	-	Ü	-	Ü	-
Agricultural drainage	Ü	Ü	-	-	Ü	Ü	-	Ü	-	-	-
Flood protection	Ü	Ü	Ü	-	Ü	Ü	Ü	Ü	Ü	Ü	Ü
Agricultural land base:											
Important agricultural land	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü
Protection from development pressure	Ü	-	-	-	-	-	-	Ü	Ü	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Watershed Enhancement Priority (See Table 5 in the main report for details)											
Water Quality:											
Nutrients, Ammonia-N	-	-	-	-	-	-	-	-	-	-	-
Bacteria	Ü	Ü	-	-	Ü	Ü	-	-	-	Ü	
Temperature	-	-	-	-	-	-	-	Ü	-	-	-
Dissolved oxygen	Ü	Ü	-	-	Ü	-	-	-	Ü	Ü	
Other:	-	-	-	-	-	Ü (bioassessment)	Ü asbestos (natural)	Ü (bioassessment)	-	-	-
Habitat:											
Salmon spawning (current, documented)	Ü	-	-	Ü	-	Ü	-	Ü	Ü	Ü	
Anadromous fish	Ü	Ü	-	Ü	Ü	Ü	Ü	Ü	Ü	Ü	
Wildlife	Ü	-	Ü	Ü	Ü	Ü	Ü	Ü	-	-	-
Wetland	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	
Water flow processes: <sup>8</sup>											
Delivery	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	-	Ü	
Discharge	-	-	Ü	-	-	Ü	-	-	Ü	Ü	
Recharge	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü	-	Ü	
Storage	Ü	-	-	-	Ü	-	-	-	Ü	Ü	
Other											

<sup>8</sup> Check marks are shown in the summary table if the recommendation for any water flow process is indicated as highest restoration/restoration/highest protection/protection.

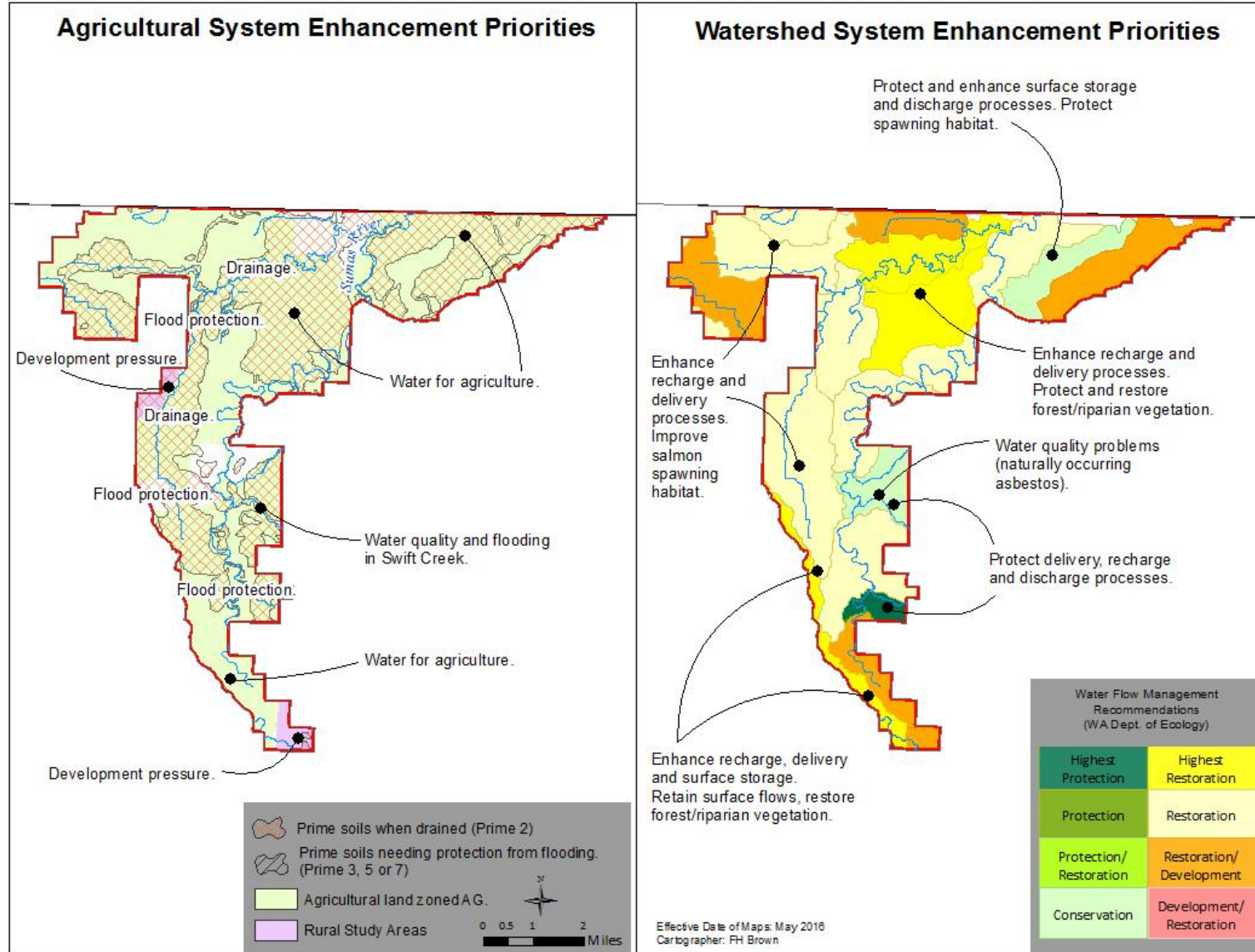


Figure 2. Sumas WID: Summary maps of agricultural and watershed enhancement priorities

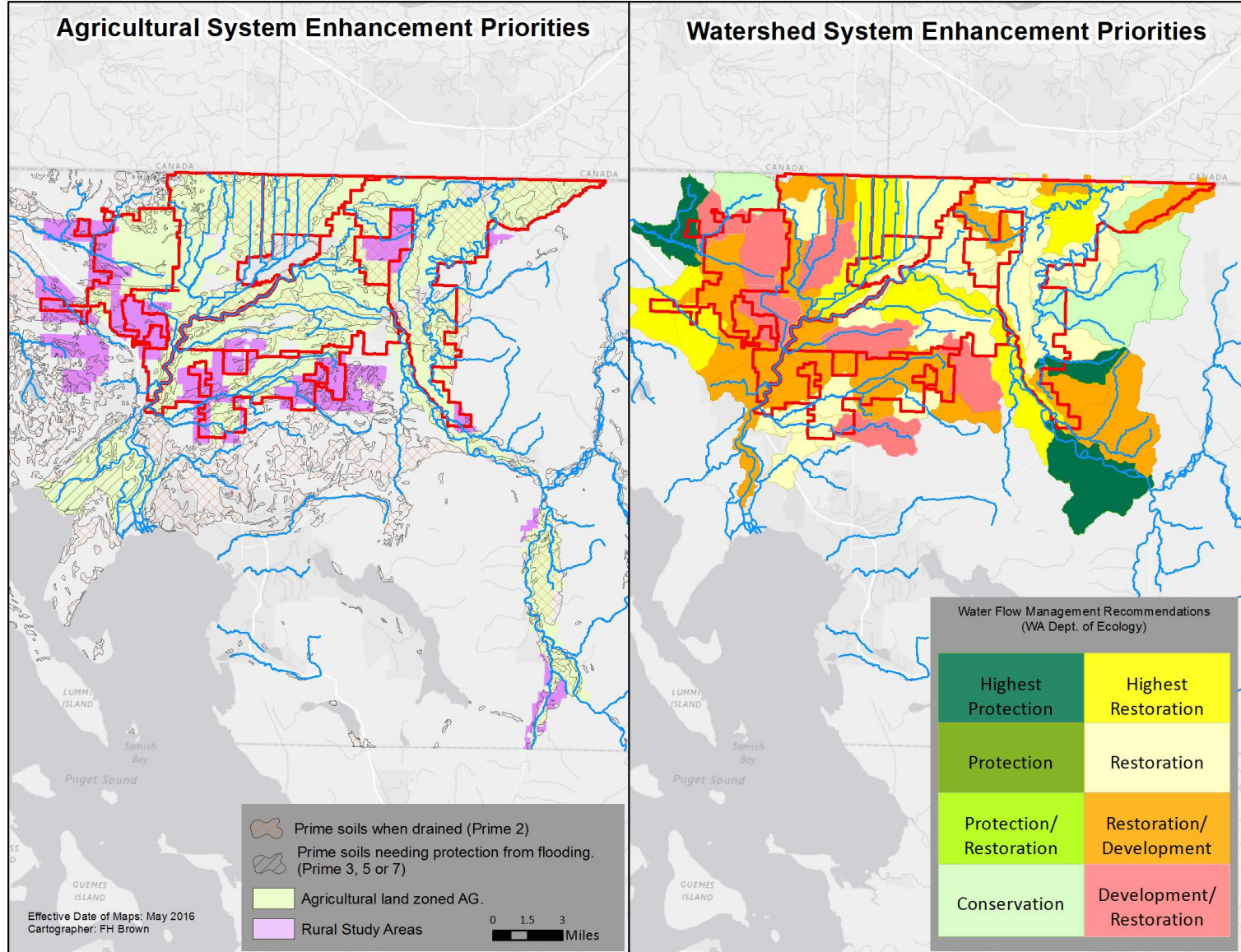


Figure 3. General agricultural and watershed enhancement priorities for the lowland areas of Whatcom County

## Possible future challenges and priorities

Future challenges (1- 10 years) may include issues listed below. See Table 1 for the full summary results of agriculture-watershed characterization and mapping for the Sumas WID.

- Water quantity: Access to legal irrigation water is a key priority in 8 of the 11 sub-basins within the Sumas WID (87 new applications have been filed in the WID area). Johnson Creek and the Sumas River are closed year-round to further appropriations unless mitigated. Smith Creek is closed to new withdrawals from May 1 to October 31 each year.<sup>9</sup> Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flows levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.<sup>10</sup> Some Group A public water suppliers do not have adequate water rights in proper locations to meet projected future demand.<sup>11</sup>
- Protection of agricultural land from development pressure: All 11 sub-basins within the Sumas WID area contain important agricultural land and prime agricultural soils. Land in the Sumas is WID is largely zone Agriculture (AG). Additional residential growth is projected in small sections of the Upper Johnson and Smith sub-basins.
- Water quality: Eight sub-basins have reported surface water quality impairments due to either high levels of fecal coliform bacteria, low dissolved oxygen, temperature, bio-assessment, or a combination of these. Naturally occurring asbestos is present in Swift Creek sediments. Groundwater in the Sumas-Blaine aquifer, which underlays much of the Sumas WID, is contaminated with nitrates and there are high iron concentrations in the Sumas Valley area.
- Drainage & flood management: Six sub-basins contain prime if drained soils. Flood protection is a priority throughout most of the WID area, and drainage is important in the central WID area, north of Smith and west of Saar (excluding Upper Fishtrap East). Maintaining the effectiveness of drainage ditches is important for drainage, flooding and water quality.

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<sup>9</sup> WA Dept. of Ecology, 2012. *Focus on Water Availability*, Publication 11-11-006. <https://fortress.wa.gov/ecy/publications/documents/1111006.pdf> [last accessed June 3, 2016]

<sup>10</sup> [WAC 173-501](#) (1985). Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

<sup>11</sup> Whatcom County Coordinated Water System Plan Update (2016) <http://www.whatcomcounty.us/1035/Coordinated-Water-System-Plan-Update>

## Appendix B: Agricultural and watershed characterization tables for the Sumas WID

Contains the detailed tables listing and describing agricultural and watershed enhancement priorities as discussed at the January 2016 work session of the Sumas WID. The tables are included in the full Agriculture-Watershed Characterization Report (2016) but are presented in this appendix for easy reference.

Source for these tables:

Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <http://www.sumaswid.com/>



## Agriculture characterization tables for Sumas WID

NOTE: Possible actions include: Specific actions identified by WID Actions Map # location (e.g. S2) and Assessment Unit (AU), and general actions which do not have locations specified. Some of these actions do not appear on the WID Priority Actions Map due to: (i) action is general in description no location is noted; (ii) action is specific in description but no location noted; (iii) action is general in description, located outside the WID area; (iv) action is specific in description, located outside the WID.

3A. Agricultural Enhancement Priorities: Upper Johnson Creek							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Upper Johnson  AU 1164 AU1165 AU1088 AU1168 Notes from reference maps and other documents	>25 new water right applications in Upper Johnson – See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination documented in groundwater over large areas of the Sumas-Blaine Aquifer for over 40 years. <sup>1 2</sup> Johnson Creek is in category 4a for bacteria & DO. <sup>3</sup>	>50% of soils are prime if drained in Upper Johnson. – See Ag Priorities maps: Drainage <b>Ag drainage priority</b>  CDID #31 occupies Upper Johnson watershed. <sup>4</sup>	Area adjacent to Johnson Creek in Upper Johnson watershed is in the 100-year flood zone. Southern tip of watershed is in floodway. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	96% of soils are prime 1-10 in Upper Johnson – See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b> 94% of land is Ag Zoning and Rural Study Area. <b>Ag land base priority</b> A rural study area occupies land in the center of Upper Johnson. –See Ag Priorities maps: Ag Land Base <b>Protection from development pressure</b>		
Upper Johnson AU 1164 AU1165 AU1088 AU1168  Notes from work session January 2016.	AU 1168: Peat soils in area north & south of Halverstick Road stay wet – less irrigation needed here. Clearbrook Creek does not dry up. Canadian drilling for ag water use found no fresh water at 340', salt water at 300'. Laxton Lake on Canadian side has an overflow into the western part of Judson Lake. The overflow is west of the Holmquist Rd and east of where O Avenue turns north. A Canadian landowner deepened Laxton Lake a few years ago put the spoils up on the land. Some of the spoils ended up filling Judson Lake's western part. Water flows from Judson Lake underground to Pangborn Lake. Gravel pit in Canada that may be affecting the level of Judson Lake as the water level for this time of year is not as high as historically, or possibly Abbotsford airport has diverted surface water into another drainage. Former Ag West Gravel Pit is seeking permit for additional 60' depth, below groundwater table W of Van Buren Rd. between Clearbrook X Hwy 546. Clay layer in the area may protect from impacts to groundwater & group wells.	-Water quality for agriculture is acceptable though peat soils influence water quality. -Meadowbrook and Sumas water quality is good but the well on May Rd has high nitrate concentrations. Nitrate levels have been falling over the years due to corrective actions.	-In upper west area, soils contain gravel and drain well. -This area also receiving drainage from the hillside to the east. -There is a wet area west of Judson Lake, mainly on Canadian side between Judson Lake, w. of Holmquist Rd, and Laxton Lake. -The Lake outflow is privately managed. -West of Van Buren Rd. between Clearbrook X Hwy 546 forested area in Clearbrook creek receives outflow, is boggy.	AU 1168: Flow out of Pangborn Lake used to move water west toward Squaw Creek. Pangborn Lake was much bigger than it is today and it had two outlets, one to the west that flowed into Squaw Creek and one to Johnson Creek. Pangborn Creek, which was a big bog, was straightened out in 1948 - the last part near the lake was blown with dynamite and Pangborn Lake was lowered at least 4 to 6 feet. - West of Van Buren Rd. between Clearbrook X Hwy 546, high volume drainage into Squaw. Many springs along Squaw Creek, especially on the hillsides.		AU 1088: Commercial Pollination used in blackberry and black current crops located west of Trapline Rd. between Birch Bay Lynden and Pangborn Rd.	

<sup>1</sup> Category 4a - has a TMDL: water bodies that have an approved TMDL in place and are actively being implemented. WA Department of Ecology, 2015. *Water Quality Assessment Categories*. <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>2</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>3</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/wq/303d/index.html>

<sup>4</sup> WCD, 2014. *Agricultural Drainage for Drainage Districts*. <http://www.whatcomcd.org/ag-drainage-districts>

3B. Agricultural Enhancement Priorities: Lower Johnson Creek							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Lower Johnson AU1166 AU1086 portion of AU1078  Notes from reference maps and other documents	1-10 new applications for water rights in Lower Johnson. – See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>5</sup>  Johnson Creek is in category 4a <sup>6</sup> for bacteria and DO. <sup>7</sup>	>50% of soils are prime if drained in Lower Johnson. – See Ag Priorities maps: Drainage <b>Ag drainage priority</b>  CDID #31 occupies Lower Johnson watershed. <sup>8</sup>	Area adjacent to Johnson Creek in Lower Johnson is in 100-year flood zone. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	83% of soils are prime 1-10 in Lower Johnson – See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b>  73% of land is Ag zoning in Lower Johnson. – See Ag Priorities maps: Ag Land Base <b>Ag land base priority</b>		
Lower Johnson AU1166 AU1086 portion of AU1078 Notes from work session January 2016.		AU 1166: Johnson Creek sediment higher after rain events. AU 1086 & 1166: Some contribution to sediment loads from ag fields. Improved attention to cover crops could reduce this. Nitrate in groundwater. <b>Ag water quality priority</b>	Low gradient here. Some drainage issues. Canary grass invasion and sediment buildup in ditches.	Landowners in this area (as in the Saar) have historically assessed themselves to pay for & attend to drainage and minor flood issues.		AU 1086: about 50 dairies were historically located along the hillsides in this area.	<u>(S2/4) AU 1086:</u> Gas plant moved ditch. Doesn't drain as well now.  <u>(S8/5)- AU 1166</u> Beaver management needed, floodway area.

<sup>5</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>6</sup> Category 4a - has a TMDL: water bodies that have an approved TMDL in place and are actively being implemented. WA Department of Ecology, 2015. *Water Quality Assessment Categories*. <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>7</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>8</sup> WCD, 2014. *Agricultural Drainage for Drainage Districts*. <http://www.whatcomcd.org/ag-drainage-districts>

3C. Agricultural Enhancement Priorities: Upper Fishtrap East							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Upper Fishtrap East AU1169  Notes from reference maps and other documents	1-10 new applications for water rights in Lower Fishtrap East. – See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>9</sup>	<25% of soils are prime if drained in Upper Fishtrap East. – See Ag Priorities maps: Drainage.	An area of Upper Fishtrap East adjacent to the US Canada border is in the 1:100-year flood zone. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	84% of soils are prime 1-10 in Upper Fishtrap East – See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b> 100% of land is AG zoning in Upper Fishtrap. – See Ag Priorities maps: Ag Land Base <b>Ag land base priority</b>		
Upper Fishtrap East AU1169 Notes from work session January 2016.						AU 1169: Primarily berries in upper, west area. AU 1169: There is an old gold mine area west of Terpstra's.	

<sup>9</sup> Ecology, 2012. Sumas-Blaine Aquifer Nitrate Contamination Summary. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

3D. Agricultural Enhancement Priorities: Lower Sumas (Saar Creek)							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Saar AU1079 AU 1078  Notes from reference maps and other documents	1- 10 new applications for water rights in Saar. – See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>10</sup>  Iron found in most areas of Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area, and concentrations greater than or equal to 3000 micrograms/liter were found in most wells in the Sumas Valley. <sup>11</sup> <b>Ag water quality priority</b>	25 - 50% of soils are prime if drained in Saar. See Ag Priorities maps: Drainage.  DID #15 occupies northern part of Saar watershed. <sup>12</sup>	Much of the northern part of Saar watershed is in the 1:100-year flood zone. - See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	36% of soils are prime 1-10 in Saar overall, but the portion of Saar that is within the WID is almost entirely Prime soils – See Agriculture reference map: Prime Soils <b>Prime soils priority</b> 33% of land is Ag zoning in Saar overall, but the portion of Saar that is within the WID is entirely AG zoning. – See Agriculture reference map: Agriculture priority areas. <b>Ag land base priority</b>		
Saar AU1079 AU 1078  Notes from work session January 2016.	AU 1079: As timber harvest area regrows, there is less water in the creek each year. Saar Creek ran completely dry last summer.  Plenty of groundwater.  AU 1079: Sumas Lake used to be located at the north east end of the Saar sub-basin.  AU 1079: The hillside to the east of Saar sub-basin has many natural springs.	There is iron in the groundwater. Residents the area rely on city water for drinking and stock watering. AU 1086: Only well without iron in the water is located west end of Bishop Road.	AU 1079: Drainage is good on higher ground. Further away from the hills farmers have installed tile drains. AU 1078: Creek northeast of Hillview Rd has sand accumulation. Ever-greens were planted to shade out canary grass. AU1079: Where willows have been planted along creeks there can be more localized flooding as the willows fall in. Ongoing beaver management is required. Sediment accumulation is improving. Lower flows but less sediment coming down Saar Creek as timber in the harvest area upstream regrows. Farm field along base of hillside at south end of Saar sub-basin is too wet to work in the spring. Fields west of Clarke Rd have some drainage issues. Hillview Rd fields have good drainage.	Work session participants reported that they had no problems with flooding currently. There is some puddling on the fields after a heavy rain.  Bowen has created new flow toward Fraser River. Water backs up behind Sumas train trestle.	This is some of the best farm land in the County. There are no residential conflicts to speak of. Land still largely in farms, currently grass, dairy and berries.  Improve development codes so that urban growth does not impact ag lands and prime soils in this part of the Sumas WID.	Occasionally bears come out of the hills and trample and eat the corn.  There is poor visibility for farm equipment traveling to the highway from Hillview Road toward Telegraph Road.	<u>(S1/1) AU 1079:</u> Culvert half full of gravel.  <u>(S7/2) AU1079:</u> Perhaps a sediment capture pond could be built if Saar Creek could no longer be sprayed.  <u>(S16/3) AU1079:</u> Traffic Issue: poor visibility for farm machinery on the highway.  <u>(S9/7) AU 1079:</u> Sediment pond at base of Reese Hill Rd and systems require regular maintenance by DID.

<sup>10</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>11</sup> Cox, S. E., and Kahle, S. C., 1999. *Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada; Water-Resources Investigations Report 98-4195*. USGS. <<http://pubs.usgs.gov/wri/1998/4195/report.pdf>> (last accessed 4/4/2016).

<sup>12</sup> WCD, 2014. *Agricultural Drainage for Drainage Districts*. <http://www.whatcomcd.org/ag-drainage-districts>

3E. Agricultural Enhancement Priorities: Lower Sumas (Sumas River)							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Lower Sumas AU1086 AU1087 + small portion of AU1078  Notes from reference maps and other documents	10 – 25 new applications for water rights in Lower Sumas. – See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>13</sup>  Sumas River in Lower Sumas is in category 5 <sup>14</sup> (polluted water that requires TMDL or other WQI project) for DO, and 4a (has a TMDL) for bacteria. <sup>15</sup>	>50% of soils are prime if drained in Lower Sumas. – See Ag Priorities maps: Drainage. <b>Ag drainage priority</b>  CDID #31 occupies northwestern portion of Lower Sumas watershed. <sup>16</sup>	Northern area in Lower Sumas watershed is in the 1:100-year flood zone. Area adjacent to Sumas Creek in southern part of watershed is in floodway. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	82% of soils are prime 1-10 in Lower Sumas – See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b>  77% of land is Ag zoning in Lower Sumas.– See Ag Priorities maps: Ag Land Base <b>Ag land base priority</b>		
Lower Sumas AU1086 AU1087 + small portion of AU1078 Notes from work session January 2016.							<u>(S4/9) AU 1087:</u> Bone Creek: Needs dredging to improve drainage.

<sup>13</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>14</sup> Category 5 - Polluted waters that require a TMDL (total maximum daily load) or other WQI (water quality Improvement) project: the traditional list of impaired water bodies traditionally known as the 303(d) list. Starting with the 2008 Water Quality Assessment, Washington's 303(d) list of polluted waters were placed under Category 5 in the approved assessment. Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan. WA Department of Ecology, 2015. *Water Quality Assessment Categories*. <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>15</sup> Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

<sup>16</sup> WCD, 2014. *Agricultural Drainage for Drainage Districts*. <http://www.whatcomcd.org/ag-drainage-districts>



3F. Agricultural Enhancement Priorities: Middle Sumas (Breckenridge Creek & Swift Creek)							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
<p>Breckenridge Creek (northern part of AU1077), mid Sumas River (AU1163) and Swift Creek (southern part of AU1077)</p> <p>Notes from reference maps and other documents</p>	<p>10 - 25 new applications for water rights in Middle Sumas AWCA. See Ag Priorities maps: Water Quantity</p> <p><b>Water quantity priority</b></p> <p>Only 1 new application in the WID area that includes Swift Creek.</p>	<p>Widespread nitrate contamination in Sumas Blaine Aquifer.<sup>17</sup></p> <p>Section of middle Sumas River is in category 5 for bacteria.<sup>18</sup></p> <p>Swift Creek has history of sediment loading and naturally occurring asbestos in sediment.<sup>19</sup></p> <p><b>Ag water quality priority</b></p>	<p>&lt;25% of soils are prime if drained in this area but in the portion within the WID the soils are prime 1 &amp; some prime 2 - See Ag Priorities maps: Drainage.</p>	<p>Area around confluence of Breckenridge Creek with Sumas River is in 1:100-year flood zone. See Ag Priorities maps: Flooding</p> <p>Swift Creek has long history of sediment loading and reduced hydraulic capacity. A natural landslide in Swift Creek has resulted in increased localized flooding.<sup>20</sup></p> <p><b>Ag flood protection priority</b></p>	<p>37% of soils are prime 1-10 in the Middle Sumas but in the portion within the WID the soils are all prime 1 &amp; prime 2. See Ag Priorities maps: Prime Soils</p> <p><b>Ag prime soils priority</b></p> <p>17% of land is Ag zoning in the middle Sumas area but the area within the WID is mostly AG zoning. See Ag Priorities maps: Ag Land Base.</p> <p><b>Ag land base priority</b></p>		
<p>Breckenridge Creek (northern part of AU1077) and mid Sumas River (AU1163)</p> <p>Notes from work session January 2016.</p>		<p>Sumas River and tributaries have problems with sediment loading in runoff from farms, and there are complaints about runoff.</p> <p>Swift Creek water flows into Sumas River bringing asbestos north.</p>		<p>AU 1163: Floodway &amp; overflow area along Nooksack flooded when water overtopped the Nooksack levee - first event couple of inches over, 2nd event 3" over, water flowed into field, did not reach farm at Nooksack River south bank Fekkes Dairy. During this event the water in Johnson Creek only got to 2/3rds full.</p>		<p>More than 50 dairies used to be located along the hillside and farmland south of Sumas toward Nooksack. Land is now converting to berries and fewer, larger dairies.</p>	<p><u>(S10/8) AU 1163:</u> In 2015, levee was overtopped 3" on Nooksack River.</p>
<p>Swift Creek (southern part of AU1077)</p> <p>Notes from work session January 2016.</p>		<p>Swift Creek water has high turbidity, and sediment is high in asbestos.</p> <p>Participant(s) surmise that logging upstream is a potential source of sediment.</p>	<p>A major problem in this sub-watershed is sediment from the Swift Creek slide entering Sumas River. It creates drainage issues upstream and downstream from Canada border upstream to Massey Rd.</p> <p><b>Ag drainage priority</b></p>	<p>Swift Creek channel has historically overtopped during runoff events and deposited sediment on farmland.</p>		<p>Sediment loading within Swift Creek creates conditions that inhibit animal life and growth of vegetation in and adjacent to the Creek.<sup>21</sup></p>	<p><u>(S11/11) AU 1077</u> Swift Creek needs a long term action plan for sediment management.</p>

<sup>17</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>18</sup> Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

<sup>19</sup> Whatcom County River & Flood < <http://www.whatcomcounty.us/513/Swift-Creek> >

<sup>20</sup> Whatcom County River & Flood. < <http://www.whatcomcounty.us/513/Swift-Creek> >

<sup>21</sup> Swift Creek Sediment Management Action Plan Staff report, June 25, 2013. Whatcom County Public Works. <http://www.whatcomcounty.us/DocumentCenter/View/1077>

3G. Agricultural Enhancement Priorities: Upper Sumas (Dale Creek and upper Sumas River)							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Upper Sumas River (AU1162) and Dale Creek (AU1090)  Notes from reference maps and other documents	10 - 25 new applications for water rights in Upper Sumas. See Ag Priorities maps: Water Quantity <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>22</sup>  Section of Upper Sumas River is in category 5 for bioassessment and Hoff Creek is category 5 for temperature. <sup>23</sup>	<25% of soils are prime if drained in Upper Dale, but the area within the WID contains mostly prime 2 (prime of drained) and some prime 1 soils. See Ag Priorities maps: Drainage and Ag Reference map: Prime soils. <b>Ag drainage priority</b>	Area immediately adjacent to Sumas Creek in Upper Sumas is in 1:100-year flood zone. – See Ag Priorities maps: Flooding	45% of soils are prime 1-10 in Upper Sumas, but the area within the WID is almost all prime soils. See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b> 41% of land in the Upper Sumas area is AG zoning, but the area within the WID is almost entirely Ag zoning with a small portion of Rural Study Area in the south See Ag Priorities maps: Ag Land Base and Ag Reference map: Ag Priority Areas. <b>Ag land base priority</b>  <b>Protection from development pressure</b>		
Upper Sumas River (AU1162) and Dale Creek (AU1090)  Notes from work session January 2016.	Participants considered that water quantity was not a top priority.	Some sediment delivery to the river, possibly from logging in forested foothills.  Nutrients and sediment concentrations have become higher in Sumas River, possibly due to berry fields.	Dale Creek has sediment problems, possibly due to logging activities upstream.  Drainage impaired due to Swift Creek sediment build-up.	Backwater and sediment from Swift Creek impacting the Sumas River from Oat Coles Road to Lawrence Road south toward Hughes Road. <b>Ag flood protection priority</b>			<u>(S12/12) AU 1161:</u> Flood Protection. Beaver management needed to keep ditches cleared and reduce flooding.  <u>(S13/13) AU 1161:</u> Lower Dale Creek blockage.  <u>(S14/14) AU 1162:</u> Plugged drainage due to sediment.  <u>(S6/16) AU 1162:</u> Drainage impaired both upstream and downstream.

<sup>22</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>23</sup> Ecology, 2012. *Water Quality Assessment for Washington* < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

3H. Agricultural Enhancement Priorities: Upper Sumas (Smith Creek)							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Smith Creek AU1075  Notes from reference maps and other documents	No new applications for water rights in this portion of Smith. See Ag Priorities maps: Water Quantity	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>24</sup>	<25% of soils are prime if drained in Smith. The area that is within the WID contains mostly prime 1 soils with a small area of prime 2 soils. See Ag Priorities maps: Drainage and Ag Reference Map: Prime soils.	The area within the WID is within the flood way and the 1:100-year flood zone. A flood control district occupies a small area of the Smith watershed. – See Ag Priorities maps: Special Districts <b>Ag flood protection priority</b>	22% of soils are prime 1-10 in the lower Smith but the area within the WID is almost all prime soils. – See Ag Priorities maps: Prime Soils and Ag Reference Map: Prime soils. <b>Ag prime soils priority</b>  11% of land in the lower Smith area is in AG zoning, but the area that is within the WID is a combination of AG zoning and Rural Study Area. – See Ag Priorities maps: Ag Land Base and Ag Reference Map: Agriculture Priority Areas. <b>Ag land base priority.</b>  <b>Protection from development pressure.</b>		
Lower Smith Creek AU1075 Notes from work session January 2016.	No notes were added at the work session.						

<sup>24</sup> Ecology, 2012. Sumas-Blaine Aquifer Nitrate Contamination Summary. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

3I. Agricultural Enhancement Priorities: Nooksack main channel Deming to Everson							
	Water quantity: Irrigation, stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Nooksack main channel Deming to Nugent's Corner AU1074  Notes from reference maps and other documents	1-10 new applications for water rights in this area (3 of these are within the WID). See Ag Priorities maps: Water Quantity and Ag Reference Map: Water rights. <b>Water quantity priority</b>	Widespread nitrate contamination in Sumas Blaine Aquifer. <sup>25</sup>  Nooksack River mainstem is in category 5 for pH and temperature in this area. <sup>26</sup>	<25% of soils are prime if drained in this area. The area that is within the WID contains mostly prime 1 soils with a small area of prime 2 soils. See Ag Priorities maps: Drainage and Ag Reference Map: Prime soils.	Nooksack River in this area is in the floodway. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	32% of soils are prime 1-10 in this area but in the portion within the WID all soils are prime. See Ag Priorities maps: Prime Soils and Ag Reference map: Prime soils. <b>Ag prime soils priority</b>  24% of land is in AG zoning in this area, but in the portion within the WID the land is all in AG zoning. – See Ag Priorities maps: Ag Land Base. <b>Ag land base priority</b>		
Nooksack main channel Nugent's Corner to Everson AU1095 AU1096	1 new application for water right in this area. See Ag Priorities maps: Water Quantity and Ag Reference Map: Water Rights.	Smith Creek in this area is in category 5 for DO, and 4a for bacteria. <sup>27</sup>	<25% of soils are prime if drained in this area. The area that is within the WID contains mostly prime 1 soils with a small area of prime 2 soils. See Ag Priorities maps: Drainage and Ag Reference Map: Prime soils.	Nooksack River in this area is in the floodway. – See Ag Priorities maps: Flooding <b>Ag flood protection priority</b>	81% of soils are prime 1-10 in this area. See Ag Priorities maps: Prime Soils <b>Ag prime soils priority</b>  65% of land is AG zoning in this area. See Ag Priorities maps: Ag Land Base. <b>Ag land base priority</b>		
Nooksack main channel Deming to Everson AU1074 AU1095 AU1096  Notes from work session January 2016.				Bank erosion and channel migration threaten farmland. Nooksack River flow could potentially divert into Sumas R. during extreme flood event downstream of Hopewell Rd. Active Nooksack River Bank erosion south of HWY 9: river could redirect north in historic flow channels toward Sumas River.			(S15/15) AU 1096: Active bank erosion. Rip rap needed on right bank of Nooksack River main channel below end of existing project.

<sup>25</sup> Ecology, 2012. *Sumas-Blaine Aquifer Nitrate Contamination Summary*. Pub #12-03-026. < <https://fortress.wa.gov/ecy/publications/documents/1203026.pdf> >

<sup>26</sup> Ecology, 2012. *Water Quality Assessment for Washington* < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>27</sup> Ecology, 2012. *Water Quality Assessment for Washington* < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

## Watershed characterization tables for the Sumas WID

NOTE: Possible actions include: Specific actions identified by WID Actions Map # location and Assessment Unit (AUs), and General actions which do not have locations specified. Some of these actions do not appear on the WID Priority Actions Map due to: (i) action is general in description no location is noted; (ii) action is specific in description but no location noted; (iii) action is general in description, located outside the WID area; (iv) action is specific in description, located outside the WID.

5A. Watershed Enhancement Priorities: Upper Johnson Creek				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Upper Johnson AU 1164 AU1165 AU1088 AU1168  Notes from reference maps and other documents	Critical Habitat: Band tailed pigeon, great blue heron, waterfowl concentrations, trumpeter swan and wetland. Sandhill crane <sup>28</sup> in AU1088.  (See Watershed reference map: Priority Habitats & Species)  Rare Plant: soft-leaved willow <sup>29</sup>	Coho, cutthroat <sup>30</sup> (See Watershed reference map: Fish presence & fish barriers)  Documented coho spawning in Upper Johnson <sup>31</sup>	Johnson Creek in AU1164 is in category 4a <sup>32</sup> for bacteria and Dissolved Oxygen. <sup>33</sup> Clearbrook Creek in AU1165 is in category 4a for bacteria. <sup>34</sup> Pangborn Creek in AU1168 is in category 4a for DO and bacteria. <sup>35</sup> Squaw Creek in AU 1088 is in category 4a for bacteria. <sup>36</sup>	<u>Results of PSWC water flow assessment:</u> AU1164: An area of high importance for recharge and delivery processes and moderately high importance for surface storage. AU1165: An area of high importance for recharge and delivery processes and moderate importance for surface storage. AU1168: An area of high importance for delivery and recharge processes and moderately high importance for discharge. AU1088: An area of high importance for recharge and delivery processes and moderate importance for surface storage.  <u>Summary:</u> Much of this area is of moderate-high importance for water flow processes, particularly recharge and delivery processes, but overall water flow processes are highly degraded. Several water quality impairments are listed (bacteria and dissolved oxygen).  <u>Potential for enhancement</u> Actions should focus on improving recharge by preventing additional impervious surface cover and reducing existing impervious cover; improving delivery by protecting and restoring forest and riparian cover, and finding opportunities to retain surface flows for longer particularly in the headwaters of Johnson Creek (AU1164). These actions can be expected to have additional benefits of improving water quality and salmon habitat in the area.
Upper Johnson AU 1164 AU1165 AU1088 AU1168 Notes from January 2016 work session	NF Johnson is one of the more productive spawning areas according to WDFW. (Comment from WID work session.)	Salmon spawning occurs in Sumas, Pangborn <sup>37</sup> (used to be called Cummings), Clearbrook and Squaw Creeks. Salmon used to be very abundant in Sumas Creek. All of these creeks need salmon habitat improvement. (Work session participant comment.)		

<sup>28</sup> Sandhill Crane designation appears to be based on a sighting in 1994. Joel Ingram, WDFW. Pers. comm. April 2016.

<sup>29</sup> WA Department of Natural Resources (2015). *Washington Natural Heritage Program*. <http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html>

<sup>30</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>31</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

<sup>32</sup> Category 4a - has a TMDL: water bodies that have an approved TMDL in place and are actively being implemented. WA Department of Ecology, 2015. *Water Quality Assessment Categories*. <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>33</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>34</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>35</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>36</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >

<sup>37</sup> Video of salmon spawning in Pangborn/Cummings Creek can be found at < <https://www.youtube.com/watch?v=umbOHHz6MK0> >. Provided by R. Perry, April 2016.



5B. Watershed Enhancement Priorities: Lower Johnson Creek				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
<p>Lower Johnson</p> <p>AU 1166 AU1091 Portion of AU1087</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Wetland</p> <p>(See Watershed reference map: Priority Habitats &amp; Species)</p>	<p>Chinook, chum, coho, cutthroat, sockeye &amp; steelhead<sup>38</sup></p>	<p>Sumas Creek is in AU1166 is in category 4a for DO and bacteria.<sup>39</sup></p> <p>Most of Johnson Creek in AU1091 is in category 4a for DO and bacteria.<sup>40</sup></p>	<p><u>Results of PSWC water flow assessment:</u></p> <p>AU1166: An area of high importance for delivery and moderately high importance for discharge and recharge processes.</p> <p>AU1091: An area of high importance for recharge and delivery processes and moderate importance for discharge and surface storage processes.</p> <p>AU1087: An area of high importance for recharge and delivery processes and moderately high importance for surface storage.</p> <p><u>Summary:</u></p> <p>This is one of the areas of highest importance for water flow in the Sumas watershed, particularly for recharge and delivery processes, but overall water flow processes are highly degraded. Water quality is impaired in much of this area (dissolved oxygen and bacteria).</p> <p><u>Potential for enhancement</u></p> <p>The urban area of Sumas covers the eastern portion of this area, which somewhat limits the options for restoration of water flow processes at a larger scale. Actions should focus on improving recharge by preventing additional impervious surface cover and reducing existing impervious cover; improving delivery by protecting and restoring forest and riparian cover. These actions can be expected to have additional benefits of improving water quality.</p>
<p>Lower Johnson</p> <p>AU 1166 AU1091 Portion of AU1087</p> <p>Notes from January 2016 work session</p>			<p>Meadowbrook and Sumas have good water quality but the well on the May Rd is high in nitrates, supposedly from chicken farms north of the border some years ago. The May Rd well water is pumped to the co-generation plant and over the years the nitrate levels are becoming lower from that well. (Participant comment)</p>	

<sup>38</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>39</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

<sup>40</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

5C. Watershed Enhancement Priorities: Upper Fishtrap East				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
<p>Upper Fishtrap (East) AU1169</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Trumpeter swan, waterfowl concentrations and wetland</p> <p>(See Watershed reference map: Priority Habitats &amp; Species)</p>	None listed	None listed	<p><u>Results of PSWC water flow assessment:</u> AU1169: An area of high importance for discharge and moderately high importance for recharge.</p> <p><u>Summary:</u> Overall water flow processes are highly degraded, but this is one of the areas of lower relative importance for water flow processes.</p> <p><u>Potential for enhancement</u> Decreasing the rate and quantity of subsurface drainage will help to improve discharge processes, while preventing additional impervious cover and reducing existing impervious cover will improve recharge processes.</p>
<p>Upper Fishtrap (East) AU1169</p> <p>Notes from January 2016 work session</p>	No notes were added at the work session.			

5D. Watershed Enhancement Priorities: Lower Sumas (Saar Creek)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Saar Creek AU1079 AU 1078  Notes from reference maps and other documents	Critical Habitat: Bald eagle (1), trumpeter swan (1) and wetland (1)  (See Watershed reference map: Priority Habitats & Species)	Chinook, chum, coho, cutthroat, pink, sockeye, steelhead <sup>41</sup>  Documented coho spawning in Saar <sup>42</sup>	None listed	<p><u>Results of PSWC water flow assessment:</u>            AU1078: An area of high importance for surface storage and moderately high importance for discharge.            AU1079: An area of high importance for surface storage and moderately high importance for discharge.</p> <p><u>Summary:</u>            This is an area of lower to moderate importance overall for water flow processes, relative to other sub-basins in the Sumas River watershed. However, a number of springs and streams enter the lowland area from the foothills above and contribute to streamflow in Saar Creek and smaller tributaries. Overall water flow processes are moderately degraded.</p> <p><u>Potential for enhancement:</u>            Actions should focus on retaining surface flows longer and decreasing the rate and quantity of drainage of subsurface waters where possible.</p>
Saar Creek AU1079 AU 1078  Notes from January 2016 work session	Trumpeter swans and eagles are abundant in AU1079.	No major fish barriers. Bridges could affect habitat (participant comment).		<p>[S9] AU1079 Lots of salmon in Saar Creek. Thousands of fish can collect in the sediment trap (sediment trap is marked on map: Figure 11).</p> <p>[S1] AU1079 One culvert half full of gravel.</p>

<sup>41</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>42</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

5E. Watershed Enhancement Priorities: Lower Sumas River				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Lower Sumas River AU1086 AU1087  Notes from reference maps and other documents	Critical Habitat: Wetland  (See Watershed reference map: Priority Habitats & Species)	Chinook, chum, coho, cutthroat, steelhead, sockeye (AU1086 only) <sup>43</sup>	Sections of the Sumas River in AU1086 are in category 5 <sup>44</sup> for DO, and 4a for DO and bacteria. <sup>45</sup>	<p><u>Results of PSWC water flow assessment:</u>  AU1086: An area of high importance for recharge and delivery processed and moderate importance for discharge and surface storage processes. Surface storage processes are highly degraded.  AU1087: An area of high importance for recharge and delivery processes and moderately high importance for surface storage. Both delivery and surface storage processes are highly degraded.</p> <p><u>Summary:</u>  This is one of the areas of highest importance for water flow, but overall water flow processes are of moderately-high to highly degraded, particularly storage and delivery processes. Water quality impairments are listed for dissolved oxygen and bacteria.</p> <p><u>Potential for enhancement:</u>  Restoration of recharge and delivery processes is important in this area. Consider improving recharge through preventing additional impervious cover and reducing existing impervious cover. Protection and restoration of forest cover and riparian cover will help to improve delivery processes. Part of the City of Sumas is contained within this area, which somewhat limits the options for restoration of water flow processes.</p>
Lower Sumas River AU1086 AU1087  Notes from January 2016 work session	No notes were added at the work session.			

<sup>43</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>44</sup> Category 5 - Polluted waters that require a TMDL (total maximum daily load) or other WQI (water quality Improvement) project: the traditional list of impaired water bodies traditionally known as the 303(d) list. Starting with the 2008 Water Quality Assessment, Washington's 303(d) list of polluted waters were placed under Category 5 in the approved assessment. Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan. WA Department of Ecology, 2015. *Water Quality Assessment Categories*. <http://www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html> (Accessed March 28, 2016)

<sup>45</sup> Department of Ecology (2012). *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

5F. Watershed Enhancement Priorities: Middle Sumas (Middle Sumas River & Kinney Creek)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
<p>Middle Sumas River &amp; Kinney Creek AU1163</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Band tailed pigeon, wetland</p> <p>(See Watershed reference map: Priority Habitats &amp; Species)</p>	<p>Chinook, chum, coho, cutthroat &amp; steelhead<sup>46</sup></p>	<p>Section of Sumas River in AU1163 is in category 5 for bacteria.<sup>47</sup></p>	<p><u>Results of PSWC water flow assessment:</u> AU1163: An area of high importance for recharge and delivery processes, which are degraded at a moderate-high level. The area is of moderately high importance for discharge, which is highly degraded.</p> <p><u>Summary:</u> This is an area of moderate-high importance overall for water flow processes, but water flow processes are of moderately-high degradation. Water quality is listed as impaired (bacteria) in the main channel of Sumas River.</p> <p><u>Potential for enhancement:</u> Actions should focus on restoring surface storage and discharge processes, by retaining surface flows for longer and by decreasing the rate and quantity of drainage of subsurface waters.</p>
<p>Middle Sumas River &amp; Kinney Creek AU1163</p> <p>Notes from January 2016 work session</p>	<p>No notes were added at the work session.</p>			

<sup>46</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>47</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. < <http://www.ecy.wa.gov/programs/Wq/303d/index.html> >



5G. Watershed Enhancement Priorities: Middle Sumas (Breckenridge & Swift Creeks)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Breckenridge & Swift Creeks AU1077  Notes from reference maps and other documents	Critical Habitat: Bald eagle, great blue heron, wetland  (See Watershed reference map: Priority Habitats & Species)	Chum, coho, cutthroat & steelhead <sup>48</sup>  Documented coho spawning in Breckenridge Creek <sup>49</sup>	Section of Sumas River in AU1077 is in category 5 for bioassessment. <sup>50</sup>	<p><u>Results of PSWC water flow assessment:</u>            AU1077: An area of high importance for discharge and surface storage processes. Surface storage processes are moderate-highly degraded, but other water flow processes are only moderately degraded.</p> <p><u>Summary:</u>            Overall water flow processes are moderately degraded. This is an area of lower importance for water flow processes overall, but there is naturally occurring asbestos in Swift Creek due to a landslide upstream.</p> <p><u>Potential for enhancement:</u>            Consider actions to retain surface flows for longer in order to restore surface storage processes. Decreasing the rate and quantity of sub-surface drainage will help to restore discharge processes.</p>
Breckenridge & Swift Creeks AU1077  Notes from January 2016 work session			Low dissolved oxygen in Swift Creek. Nothing grows along Swift Creek, possibly due to high calcium and magnesium levels in the water? (Participant comment from WID work session.)	

<sup>48</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>49</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

<sup>50</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <<http://www.ecy.wa.gov/programs/Wq/303d/index.html>>

5H. Watershed Enhancement Priorities: Upper Sumas (Dale Creek)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
<p>Dale Creek AU1161</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Wetland</p> <p>(See Watershed reference map: Priority Habitats &amp; Species)</p>	<p>Coho, cutthroat <sup>51</sup></p>	<p>None listed.</p>	<p><u>Results of PSWC water flow assessment:</u> AU1161: An area of high importance for recharge and delivery processes and lower importance for surface storage and discharge processes. Recharge and delivery processes are moderately degraded.</p> <p><u>Summary:</u> This area is one of the most important for water flow processes overall and is only moderately degraded. Much of the headwater area is forested. There are no water quality impairments listed.</p> <p><u>Potential for enhancement:</u> Actions should focus on protection of water flow processes generally in this area, but with specific attention to preventing additional impervious cover in order to maintain recharge processes, and to protecting forest and riparian cover in order to ensure continued delivery of water to streams in the area.</p>
<p>Dale Creek AU1161</p> <p>Notes from January 2016 work session</p>	<p>No notes were added at the work session.</p>			

<sup>51</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

5I. Watershed Enhancement Priorities: Upper Sumas River				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Upper Sumas River AU1162 & portion of AU1090 Notes from reference maps and other documents	Critical Habitat: Great blue heron and wetland	Coho & cutthroat <sup>52</sup>  Coho spawning documented in Upper Sumas <sup>53</sup>	Section of Sumas River is in category 5 for bioassessment in AU1162. <sup>54</sup>  Hoff Creek is category 5 for temperature in AU1090. <sup>55</sup>	<p><u>Results of PSWC water flow assessment:</u>  AU1162: An area of high importance for recharge and delivery processes and moderately important for surface storage and discharge processes. Surface storage processes are highly degraded; other flow processes show moderate-high degradation.  AU1090: An area of high importance for recharge and delivery processes, low importance for surface storage and discharge. All water flow processes show moderate-high degradation.</p> <p><u>Summary:</u>  This area is of moderate-high importance for water flow processes. Overall water flow processes show moderate-high degradation. There are impairments listed for temperature and bioassessment.</p> <p><u>Potential for enhancement:</u>  Actions should focus on improving recharge and delivery processes by reducing impervious cover and preventing additional impervious cover, and by protecting and restoring forest and riparian cover. Improving riparian shading cover should also have the added beneficial effect of reducing water temperature in smaller streams.</p>
Upper Sumas River AU1162 & portion of AU1090 Notes from January 2016 work session		Salmon-bearing stream – Comment from WID work session Salmon use tributaries along Goodwin Rd from Cabrant to Gilmore Rds. – Comment from WID work session		

<sup>52</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>53</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

<sup>54</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

<sup>55</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

5J. Watershed Enhancement Priorities: Upper Sumas (Smith Creek)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Smith Creek AU1075 Notes from reference maps and other documents	Critical Habitat: Wetland	Chinook, chum, coho, cutthroat & steelhead <sup>56</sup>  Coho and Winter steelhead spawning documented in Macaulay, and Mitchell Creeks. Winter steelhead spawning documented in Smith Creek <sup>57</sup>	No listings in this AU1075, but a section of Smith Creek downstream in AU1095 is in category 5 for dissolved oxygen and category 4a for bacteria.	<p><u>Results of PSWC water flow assessment:</u> AU1075: An area of high importance for discharge and surface storage processes, but both of these processes show moderate-high levels of degradation.</p> <p><u>Summary:</u> Overall water flow processes are moderately degraded, but this area is of moderate importance overall for water flow processes. Much of this area is forested, with agriculture being confined to the lower reaches where the land is flatter.</p> <p><u>Potential for enhancement:</u> Actions should focus on protecting discharge and surface storage processes and restoring these where possible, by decreasing the rate and quantity of subsurface drainage and by retaining surface flows for longer.</p>
Smith Creek AU1075  Notes from January 2016 work session	No notes were added at the work session.			

<sup>56</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>57</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

5K. Watershed Enhancement Priorities: Nooksack River main channel (Deming to Everson)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
<p>Nooksack River - Deming to Everson (South) AU1095 (includes lower portion of Smith Creek to confluence)</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Wetland</p>	<p>Char, Chinook, chum, coho, cutthroat &amp; steelhead<sup>58</sup></p> <p>Fall Chinook, winter steelhead, and odd year pink.</p> <p>Salmon spawning documented in Nooksack Deming to Everson South<sup>59</sup></p>	<p>A section of Smith Creek is in category 5 for dissolved oxygen, and 4a for bacteria, and sections of Anderson Creek are in category 5 for fine sediments and dissolved oxygen and category 4a for bacteria in AU1095.<sup>60</sup></p>	<p><u>Results of PSWC water flow assessment:</u> AU1095: An area of high importance for recharge, delivery and discharge processes and moderately high importance for surface storage. All water flow processes show moderate-high levels of degradation.</p> <p><u>Summary:</u> This is one of the areas of highest importance for water flow processes, and is particularly important for salmonids moving upstream to spawning grounds in the Nooksack River tributaries. Overall water flow processes show moderate-high level of degradation, and there are water quality problems (dissolved oxygen, bacteria and fine sediments) in the lower reaches of the tributaries where the most intensive agricultural activity is located.</p> <p><u>Potential for enhancement:</u> Restoring forest and riparian cover should help to improve delivery and recharge processes and to reduce the amount of sediment reaching the streams.</p>
<p>Nooksack River - Deming to Everson (North) AU1096</p> <p>Notes from reference maps and other documents</p>	<p>Critical Habitat: Wetland</p> <p>Rare Plant: Soft-leaved willow<sup>61</sup></p>		<p>A section of the Nooksack mainstem is in category 5 for dissolved oxygen in AU1096.<sup>62</sup></p>	<p><u>Results of PSWC water flow assessment:</u> AU1096: An area of high importance for recharge and surface storage processes and moderately high importance for delivery and discharge processes. Surface storage processes are highly degraded.</p> <p><u>Summary:</u> This is an area of moderate-high importance overall for water flow processes, but water flow processes are highly degraded. The area is also important for salmonids moving upstream to spawning grounds in the Nooksack River tributaries. Water quality is impaired in this area (dissolved oxygen).</p> <p><u>Potential for enhancement</u> Actions should focus on improving surface storage by retaining surface flows for longer, and on improving recharge by reducing impervious cover and preventing additional impervious cover.</p>
<p>Nooksack River - Deming to Everson</p> <p>Notes from January 2016 work session</p>	<p>No notes were added at the work session.</p>			

<sup>58</sup> Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

<sup>59</sup> WDFW, n.d. SalmonScape [interactive webmap] <<http://apps.wdfw.wa.gov/salmonscape/>> [last accessed May 04, 2016]

<sup>60</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <http://www.ecy.wa.gov/programs/Wq/303d/index.html>

<sup>61</sup> WA Department of Natural Resources (2015). *Washington Natural Heritage Program*. <http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html>

<sup>62</sup> Department of Ecology, 2012. *Water Quality Assessment for Washington*. <<http://www.ecy.wa.gov/programs/Wq/303d/index.html>>



## Appendix C: Selected Reference Maps for the Sumas WID

Contains a selection of reference maps related to the Sumas watershed and various WID priorities. Most of the maps in this appendix were also included in the 2016 Agriculture-Watershed Characterization and Mapping Report, and are appended here for readers' convenience. Figure and page numbers for these maps are unchanged from the original report.

Source for these maps:

Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <http://www.sumaswid.com/>

In future technical work associated with the WID's management plan, these maps might be updated or refined to include more detail as required for baseline studies and development of an action plan.

Maps included in this appendix:

- Figure 17. Sumas WID Reference map: Agriculture priority areas
- Figure 18. Sumas WID Reference map: Agricultural land use inventory
- Figure 19. Sumas WID Reference map: Prime soils
- Figure 20. Sumas WID Reference map: Assessment of potential development rights
- Figure 21. Sumas WID Reference map: Water right points of diversion
- Figure 22. Sumas WID Reference map: Special districts
- Figure 14. Sumas WID: Overall importance and degradation of water flow processes
- Figure 15. Sumas WID: Overall water flow restoration and protection priorities
- Figure 24. Sumas WID Reference map: Priority species and habitat
- Figure 25. Sumas WID Reference map: Fish distribution and fish barriers
- Figure 26. Sumas WID Reference map: Condition of riparian zone
- Figure 27. Sumas WID Reference map: Water quality impairments (2012)
- Figure 28. Sumas WID: Routine water quality monitoring results.

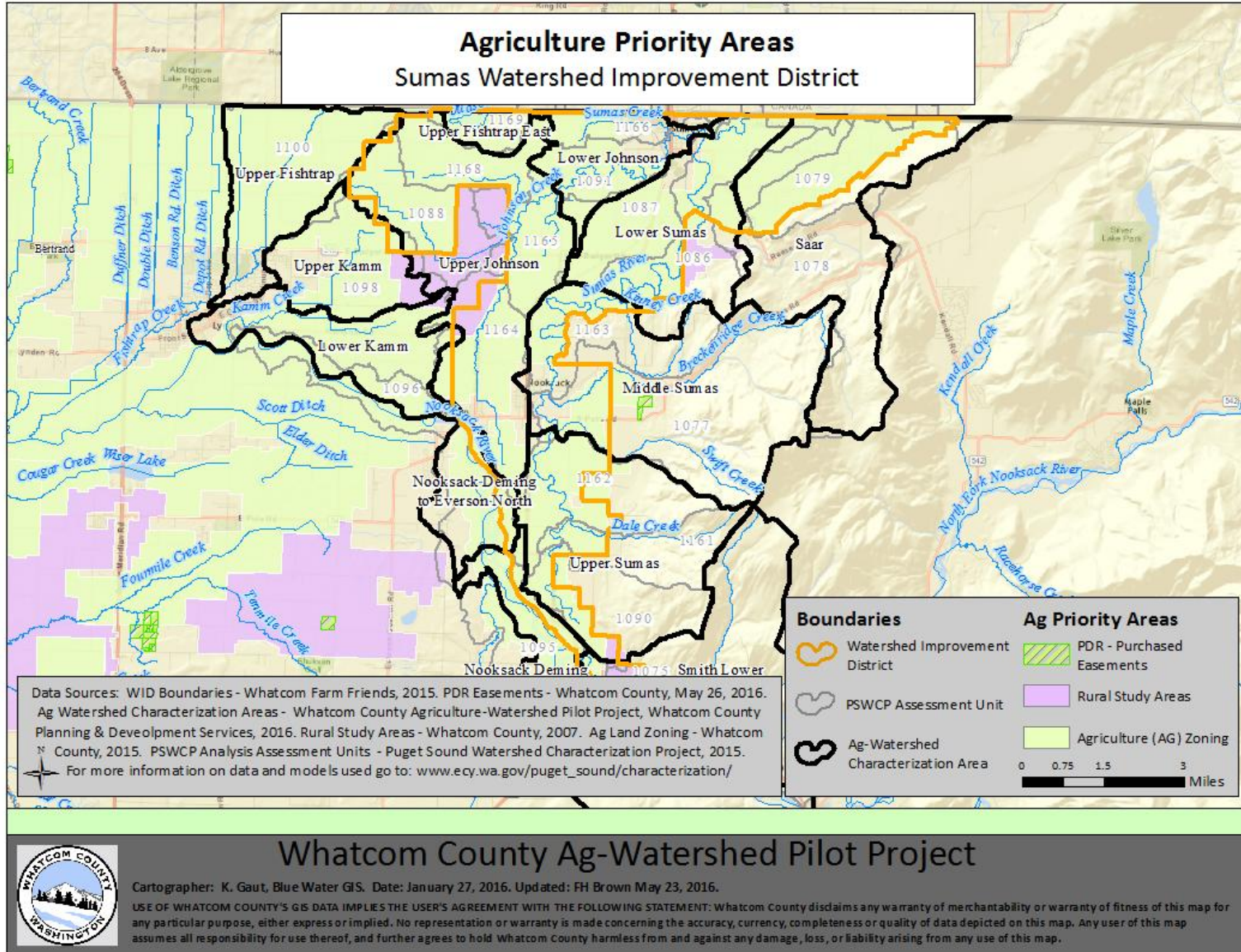


Figure 17. Sumas WID Reference map: Agriculture priority areas



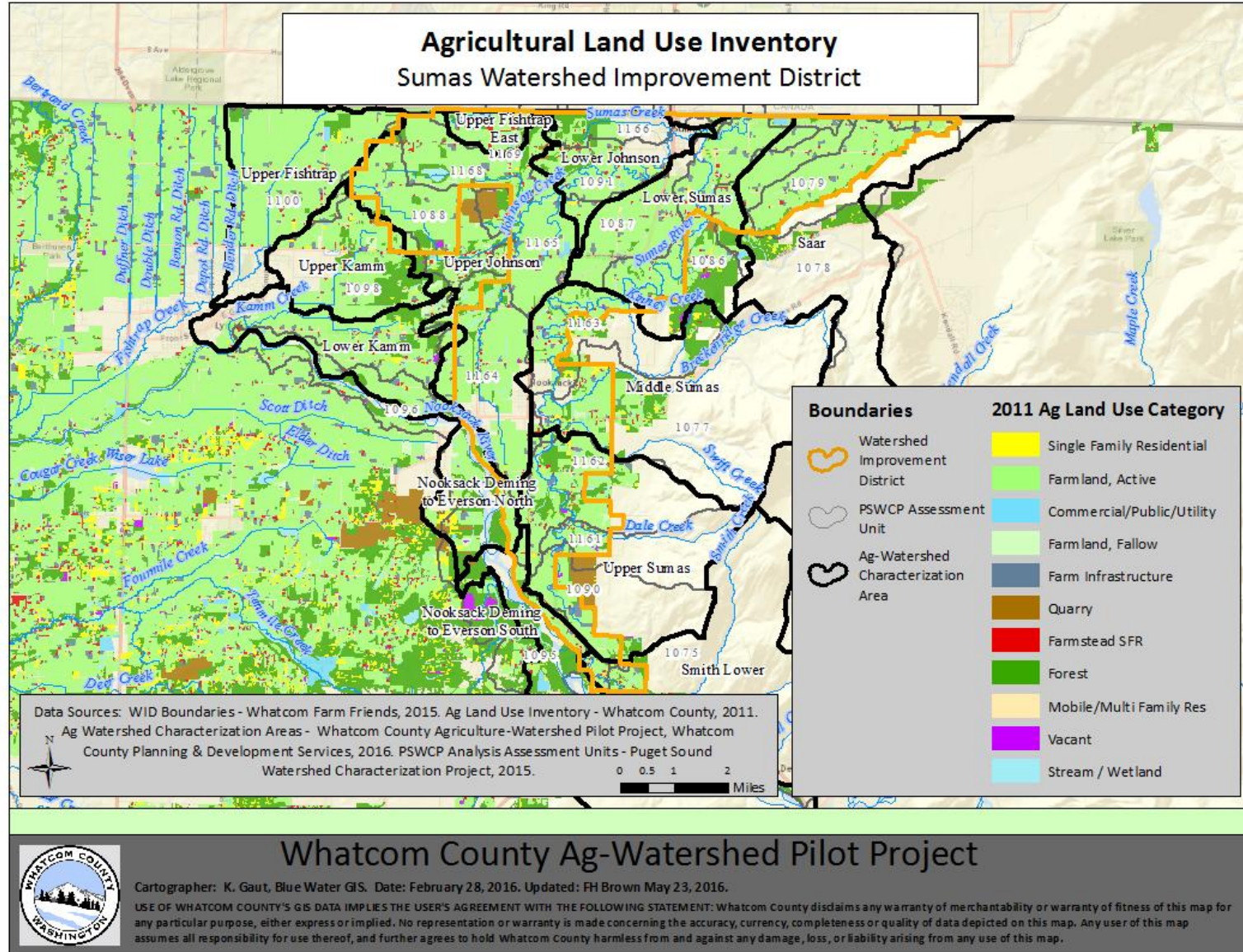


Figure 18. Sumas WID Reference map: Agricultural land use inventory



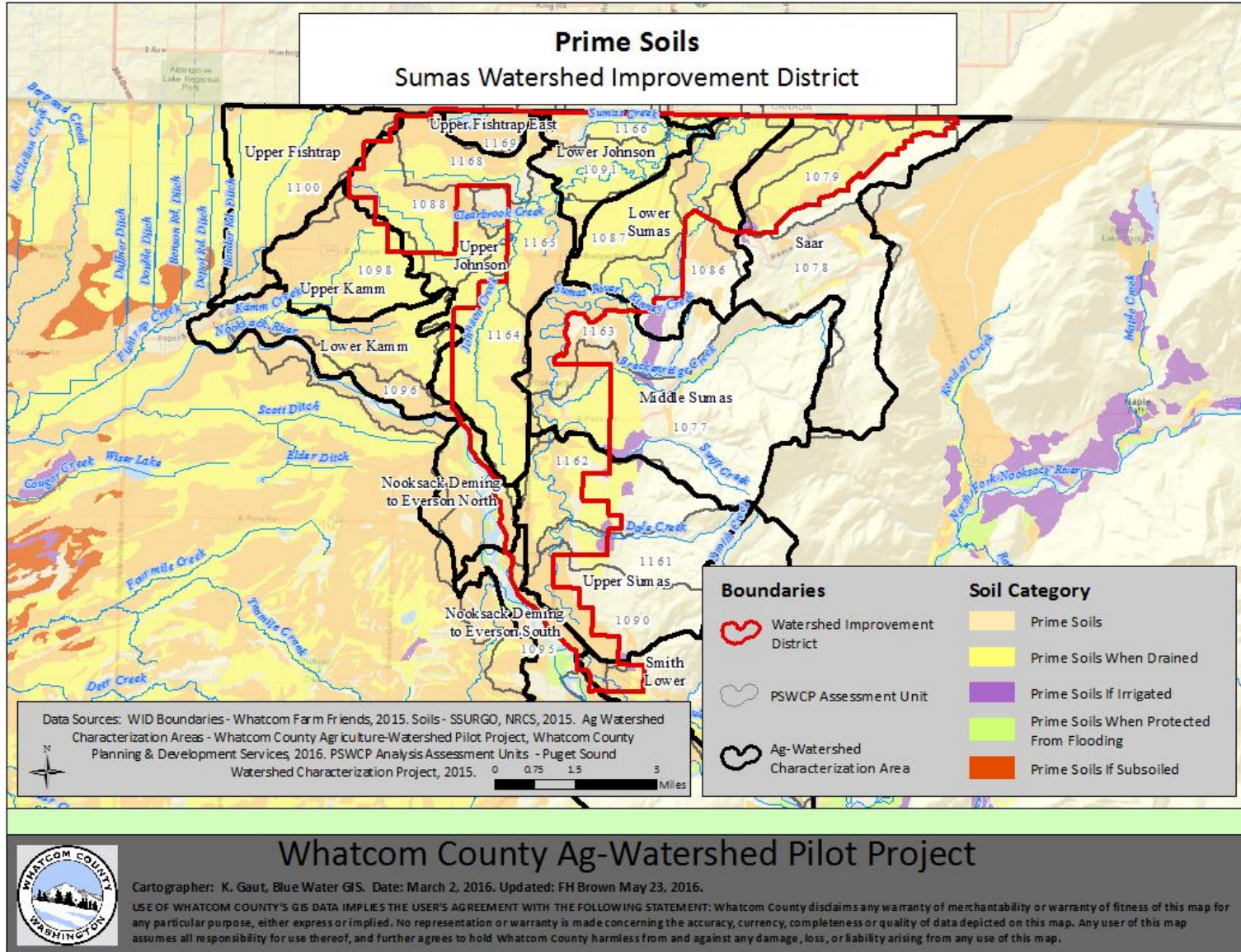


Figure 19. Sumas WID Reference map: Prime soils



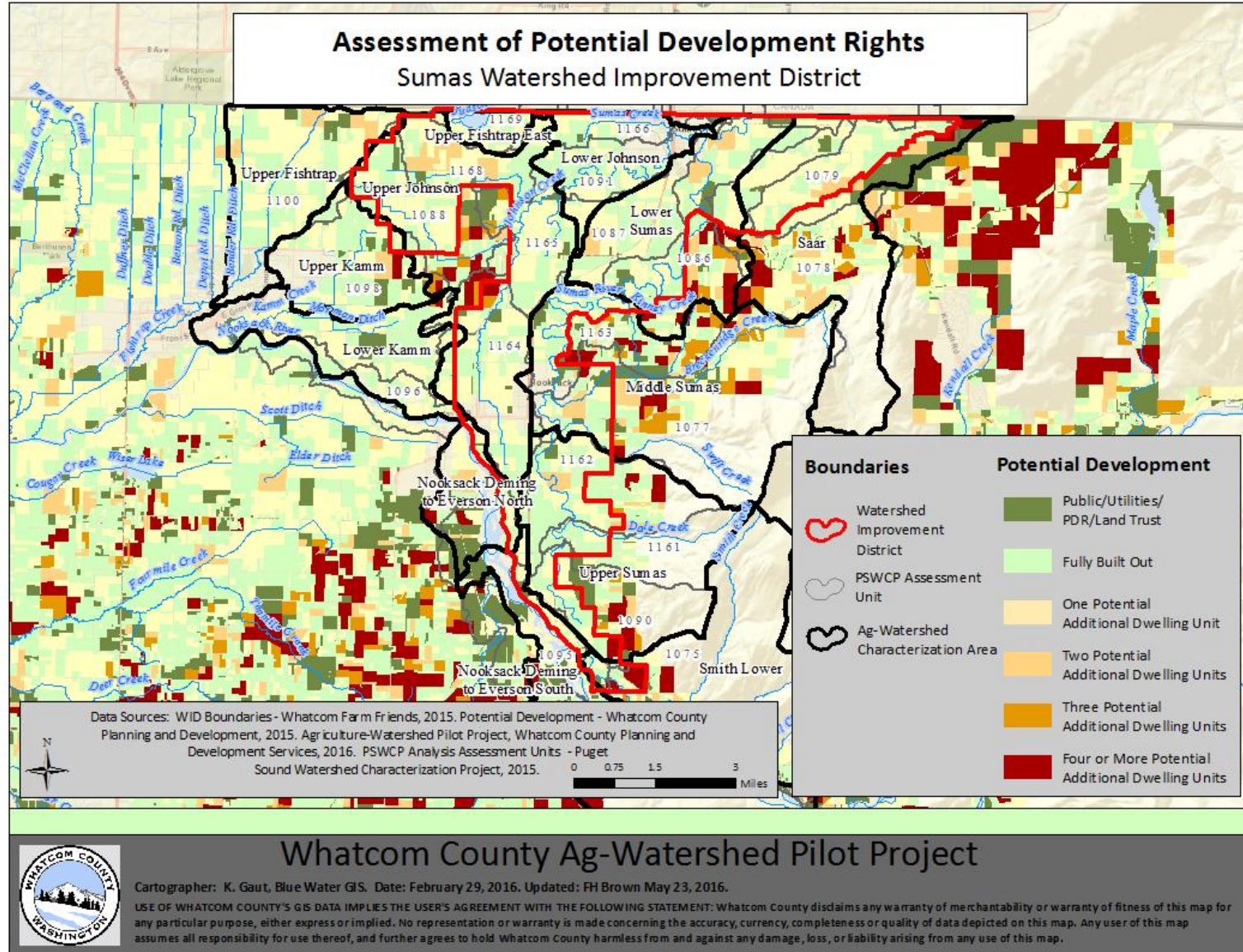


Figure 20. Sumas WID Reference map: Assessment of potential development rights



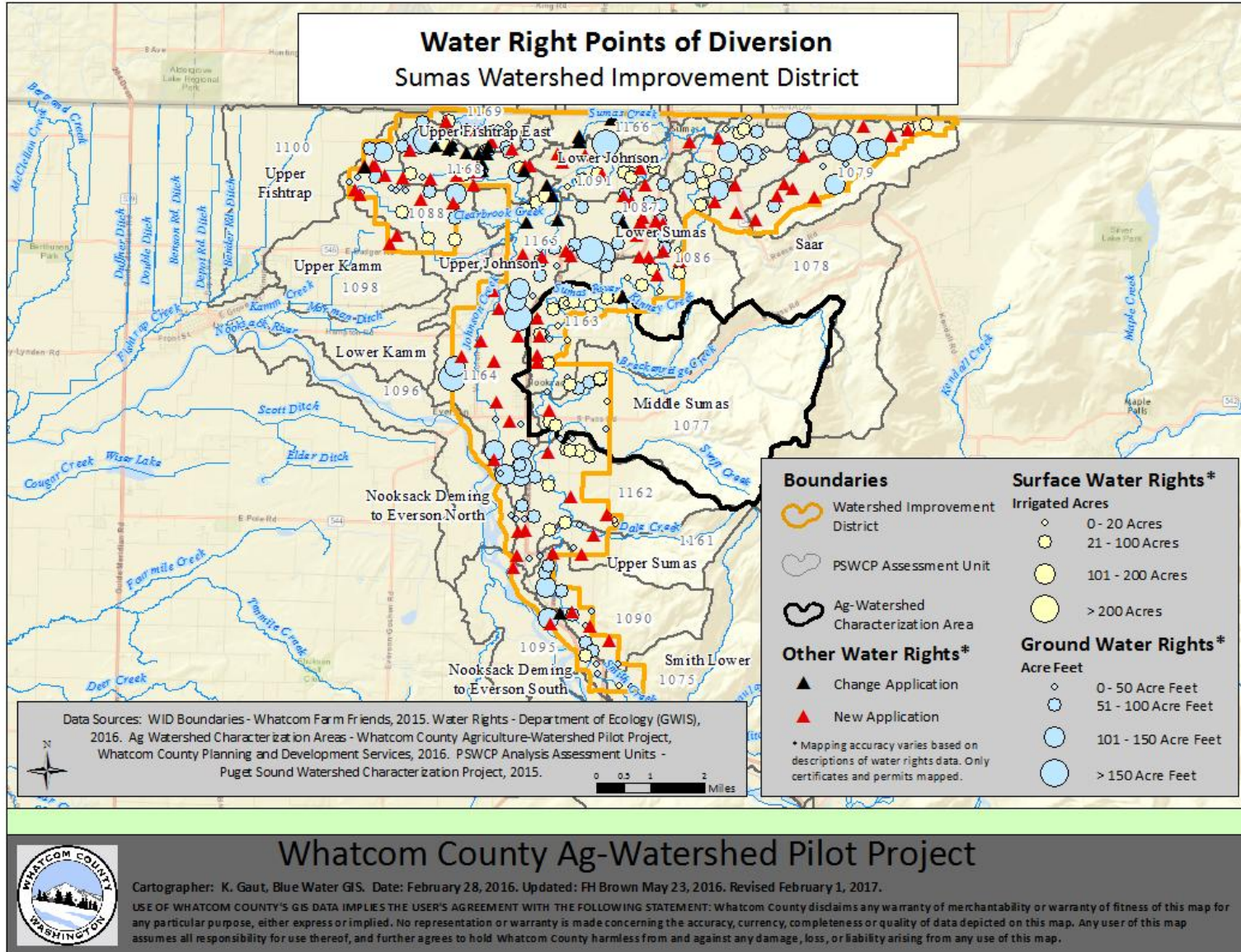


Figure 21. Sumas WID Reference map: Water right points of diversion



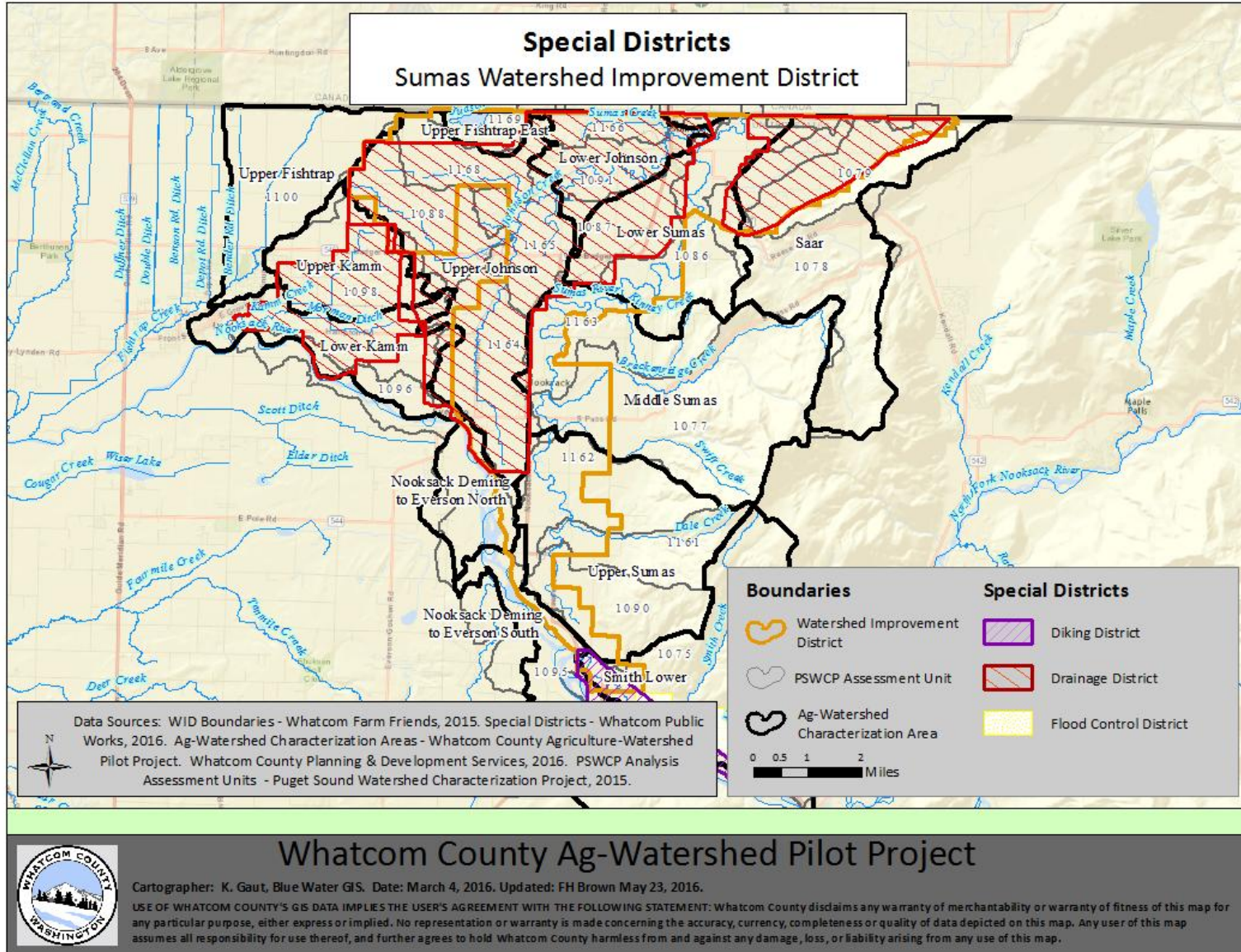


Figure 22. Sumas WID Reference map: Special districts



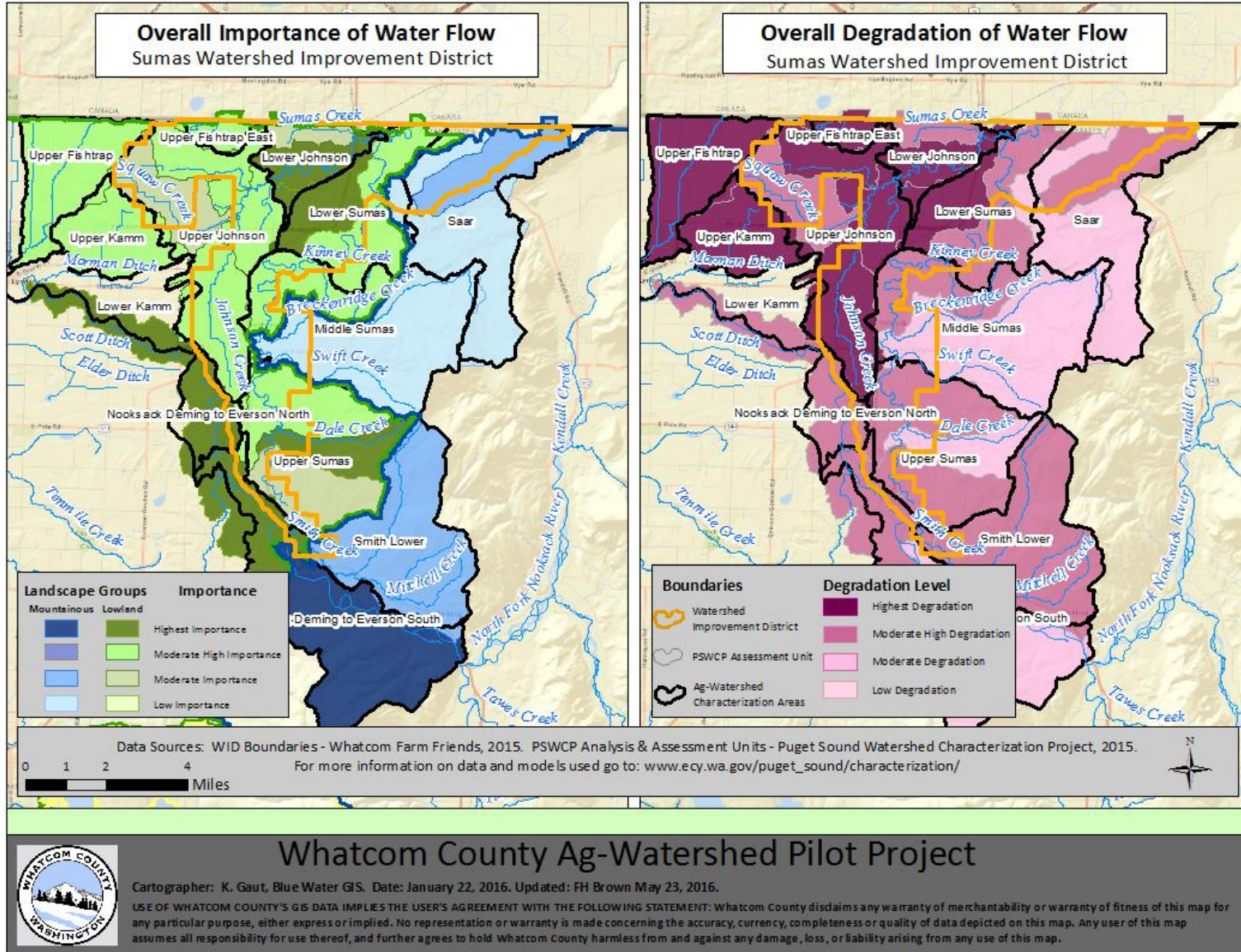


Figure 14. Sumas WID: Overall importance and degradation of water flow processes



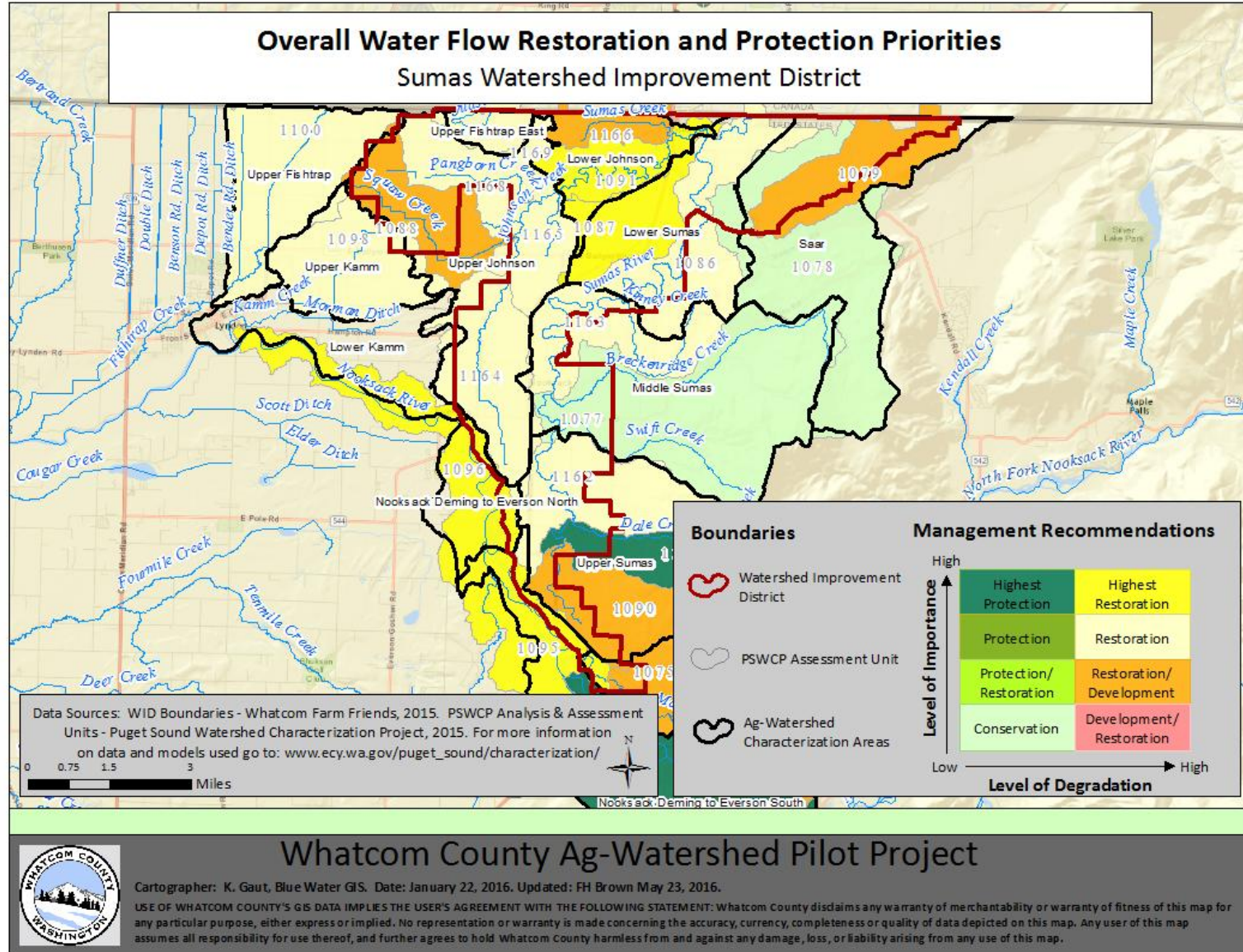


Figure 15. Sumas WID: Overall water flow restoration and protection priorities



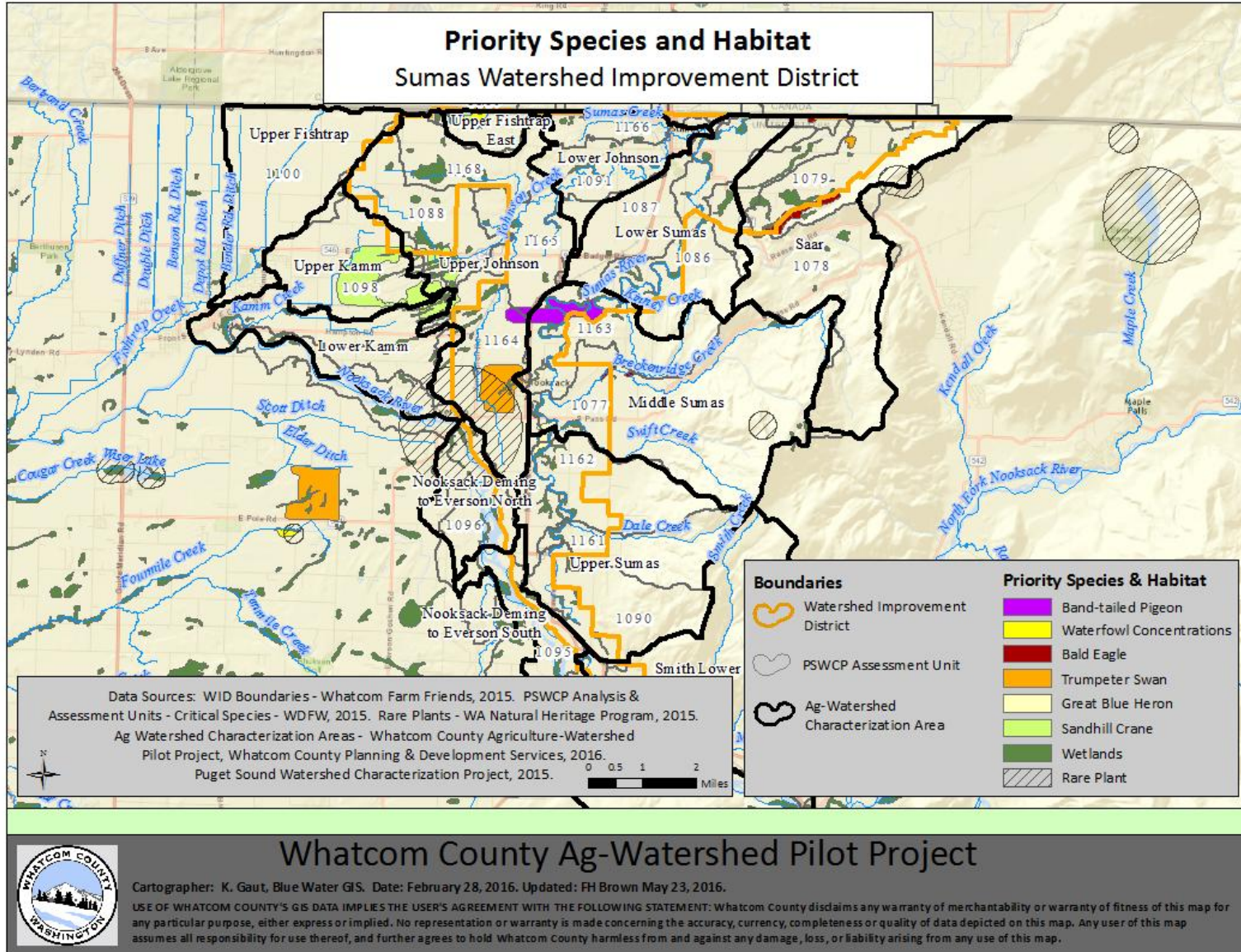


Figure 24. Sumas WID Reference map: Priority species and habitat



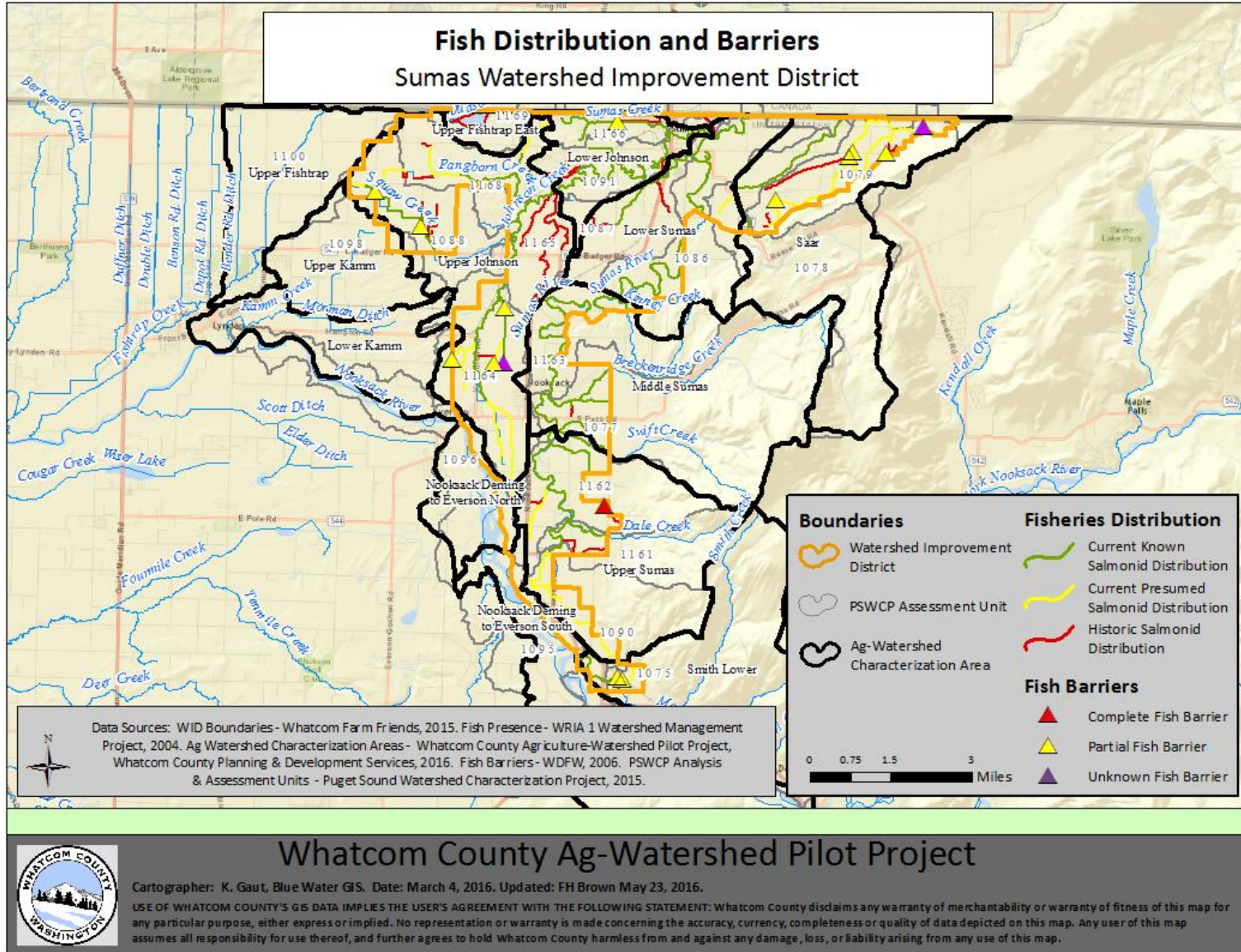


Figure 25. Sumas WID Reference map: Fish distribution and fish barriers



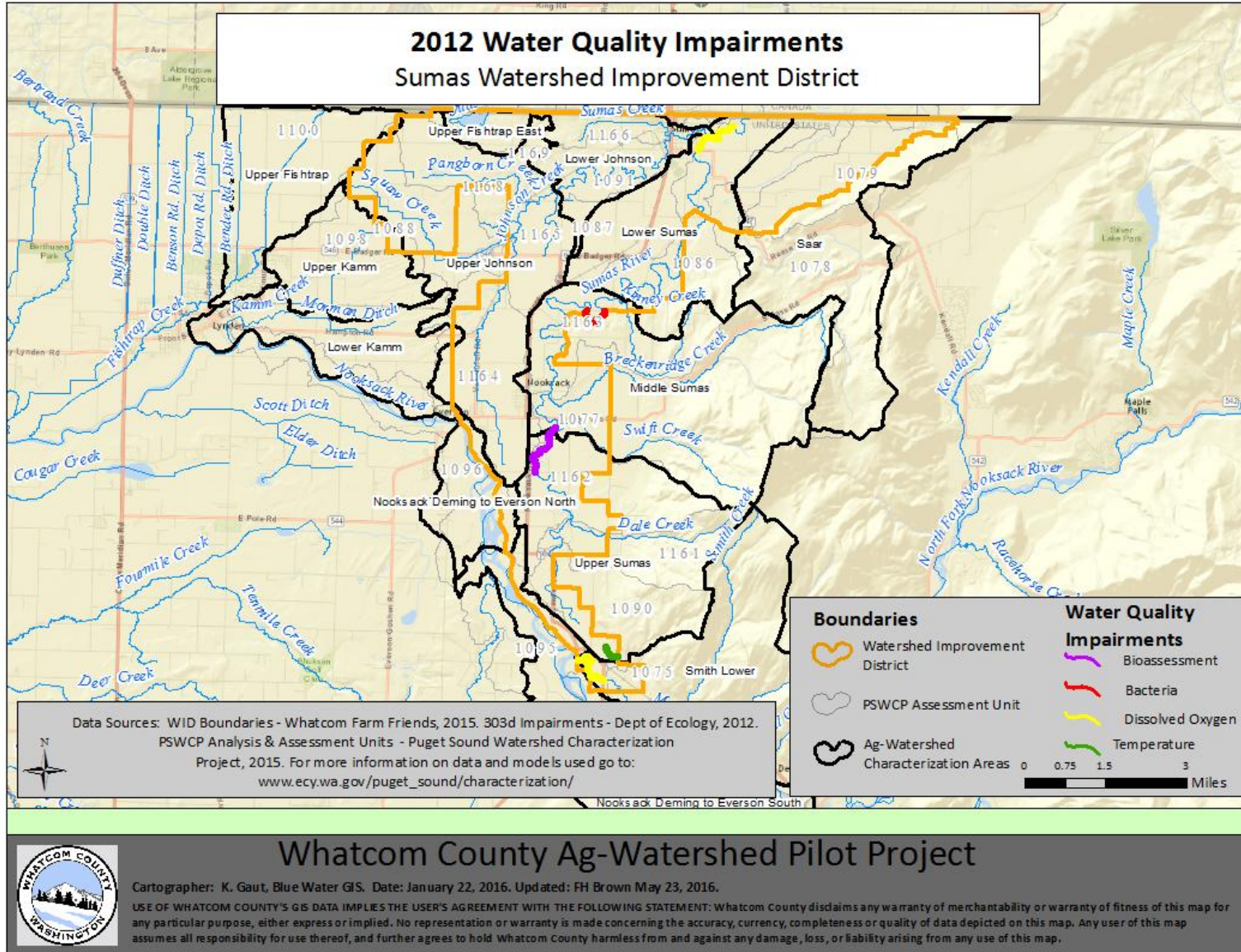
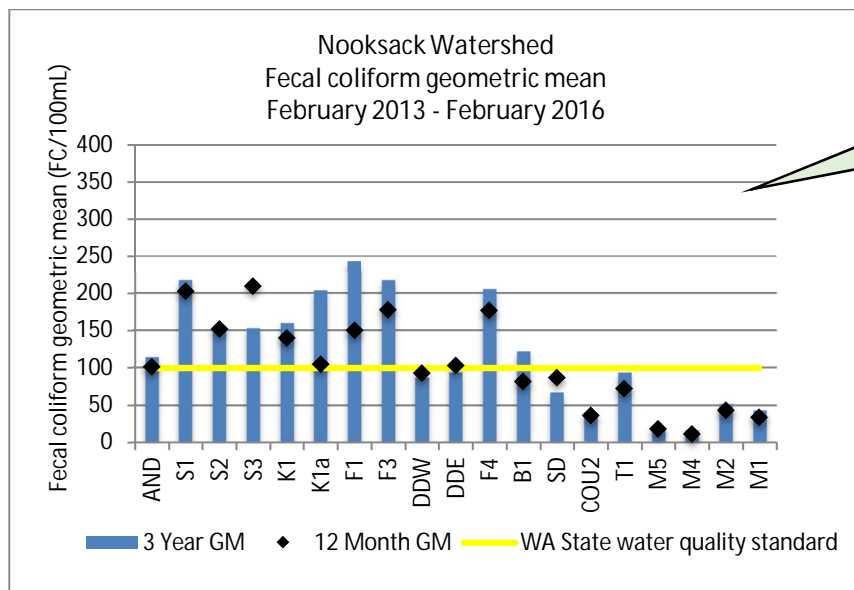
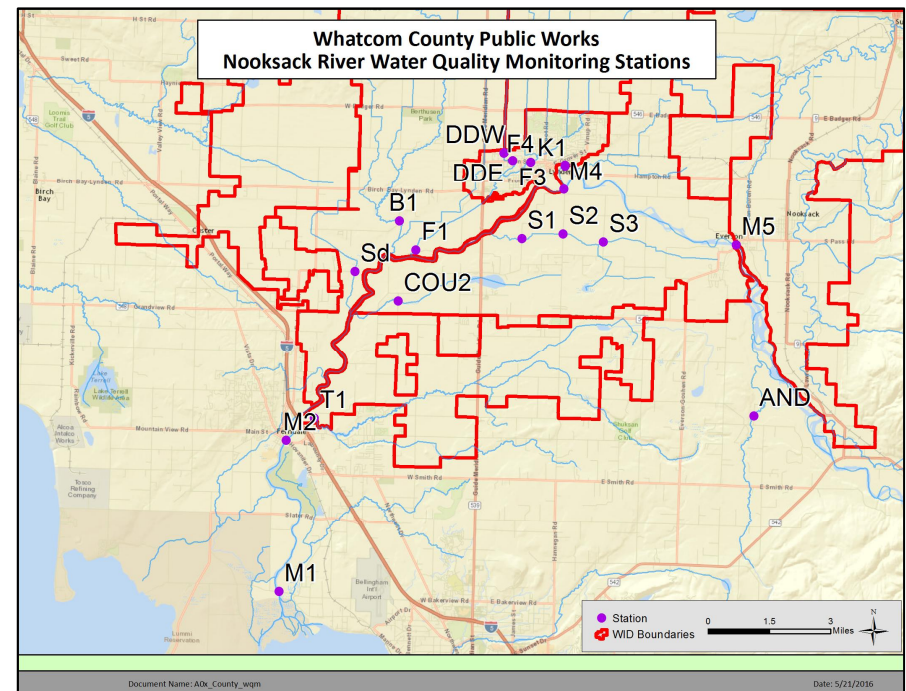
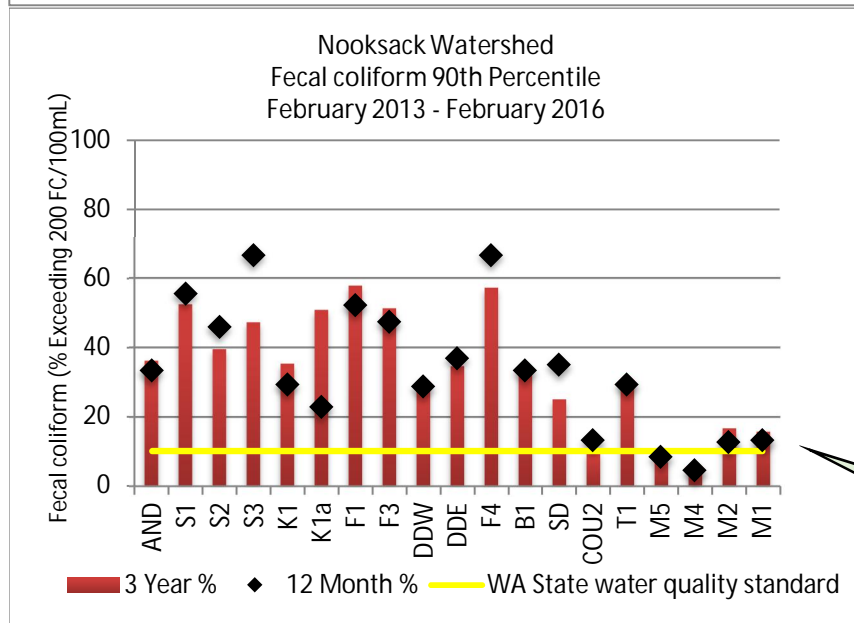


Figure 27. Sumas WID Reference map: Water quality impairments (2012)



This graph illustrates fecal coliform geometric means at routine stations. A black dot located above the blue bar indicates that bacteria levels have been increasing in the past twelve months at that site. Data from Whatcom County Public Works.



This graph illustrates the percent of samples exceeding 200 FC/100mL at routine monitoring stations. A black dot above the red bar indicates that bacteria levels have been increasing in the past twelve months at that site. Data from Whatcom County Public Works.

Figure 28. Sumas WID: Routine water quality monitoring results. Data from Whatcom County Public Works

Appendix D: Relevant goals and policy statements for the WRIA 1 Watershed Management Project and the Whatcom County Comprehensive Plan (2016), compared to suggested priorities for the Sumas WID

Priority	WRIA1 watershed management project	Whatcom County Comprehensive Plan (Aug 2016)
	WRIA1 Watershed Management Project (2008). <i>Goals of the WMP</i> . <a href="http://wria1project.whatcomcounty.org/About-The-Project/Goals-Of-WMP/17.aspx">http://wria1project.whatcomcounty.org/About-The-Project/Goals-Of-WMP/17.aspx</a>	Whatcom County Comprehensive Plan, adopted August 2016. <a href="http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/21056">http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/21056</a> <sup>1</sup>
Water quantity - water availability (hydrology)	To assess water supply and use, and develop strategies to meet current and future needs. The strategies should retain or provide adequate amounts of water to protect and restore fish habitat, provide water for future out-of-stream uses, and ensure that adequate water supplies are available for agriculture, energy production, and population and economic growth under the requirements of the state's Growth Management Act.	Chapter 2 Land Use, Goal 2A Chapter 8 Resource Lands, Goal 8A, 8F Chapter 10, Goal 10D, 10F, 10G, 10I
Water quantity - access to water (rights/legal access)	To assess water supply and use, and develop strategies to meet current and future needs. The strategies should retain or provide adequate amounts of water to protect and restore fish habitat, provide water for future out-of-stream uses, and ensure that adequate water supplies are available for agriculture, energy production, and population and economic growth under the requirements of the state's Growth Management Act.	Chapter 2, Land Use Goal 2A Chapter 7 Economics, Goal 7K Chapter 8 Resource Lands, Goal 8F (also viable ag)
Water quality	To ensure that the quality of our water is sufficient for current and future uses, including restoring and protecting water quality to meet the needs of salmon and shellfish, contact recreational uses, cultural uses, protection of wildlife, providing affordable, safe domestic water supplies, and other beneficial uses. The initial objectives of the water quality management strategy will be to meet the water quality standards.	Chapter 8 Resource Lands, Goal 8A, 8E Chapter 10 Environment, Goal 10F, 10H, 10G, 10I, 10K, 10L

Priority	WRIA1 watershed management project	Whatcom County Comprehensive Plan (Aug 2016)
Drainage - subsurface field drainage	n/a	Chapter 8 Resource Lands, Goal 8D, 8E Chapter 10 Environment, Goal 10H
Drainage - floodwater	n/a	Chapter 10 Environment, Goal 10H
Education & communication	n/a	Chapter 2 Land Use, Goal 2M Chapter 10 Environment, Goal 10B
Representation (This priority is pulled from the minutes not the stated priorities on the website and representation overlaps with Water Rights).	n/a	Chapter 8 Resource Lands, Goal 8A Chapter 10 Environment, Goal 10L
Media/community relations (this priority is pulled from the minutes not the stated priorities on the website)	n/a	n/a
Habitat	To protect or enhance fish habitat in the management area and to restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.	Chapter 2 Land Use, goal 2A, 2M Chapter 7 Economics, goal 7H Chapter 8 Resource lands, goal 8B (habitat and reg.s), 8D, 8E Chapter 10 Environment, goal 10A, 10B 10C (reg.s), 10F, 10H, 10K, 10L, 10M (wetland)
Water flow processes	n/a	Chapter 10 Environment, Goal 10H, 10G
Land	n/a	Chapter 2 Land Use, Goal 2A Chapter 7 Economics, Goal 7H (also viable ag) Chapter 8 Resource Lands, Goal 8A (also viable ag),

Appendix E: Sources of available data for Sumas WID (August 2017).

Updated version of the original 2016 information in the Sumas WID mapping report (2016).

Source for this material:

Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the Sumas Watershed Improvement District*. Whatcom County Planning & Development Services. <http://www.sumaswid.com/>





# Sources of Available Data for Sumas WID

Updated August 2017

Prepared by Cheryl Lovato Niles & Heather MacKay

## Whatcom County Ag-Watershed Project

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### Purpose of this document

The purpose of this document is to collate relevant sources of data, particularly sources for data sets generated through longer-term routine monitoring programs. These data sets are potentially useful for field and desk work in the Sumas Watershed Improvement District (WID).

Sources for the following data types have been collated for the Johnson, Sumas, Saar, Smith, Nooksack Deming, and Nooksack South Watersheds:

- Water quality measures (fecal coliform, temperature, dissolved oxygen, turbidity, nitrogen, and phosphorous) from 2000 to the present,
- Hydrography,
- Stream flow from 2000 to the present,
- Erosion and avulsion hazard in the Nooksack River channel migration zone,
- Ground water measurements from 2000 to the present,
- Watershed level assessments of flow, storage, water quality, and habitat,
- Water rights and agricultural irrigation water use,
- Present and future needs of public water systems,
- Fish presence and habitat evaluations from 1990 to the present,
- Salmon and steelhead population boundaries,
- Aquatic nuisance species,
- Instream and streambank vegetation from 1990 to the present,
- Land use and land cover from 2000 to the present,
- Wildlife, and
- Soils.

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Table 1: Fecal coliform monitoring maps and reports for Sumas WID area

Watershed/Area	Parameter	Source	Description	URL
Nooksack Deming	Fecal coliform	Whatcom County	Map of routine monitoring sites and reports of sampling results updated monthly	<a href="http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results">http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results</a> (see note below for information on how to download FC data)
Nooksack Deming	Fecal coliform	Conservation District	Watershed Health Assessment (November 2015)	<a href="http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results">http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results</a>
Whatcom County (Department of Agriculture tests numerous stations routinely and also in response to high FC counts – station locations vary)	Fecal coliform	Washington State Departments of Agriculture and Ecology. WSDA data is available upon request from WSDA Dairy Nutrient Management group - Michael Isensee 360-961-7412	Map of recent preliminary source tracking results	<a href="http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results">http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results</a>

Accessing water quality data from routine monitoring sites: Figure 1 shows the locations of routine water quality monitoring sites that are within the Sumas Watershed Improvement District.

Whatcom County, the Tribes, Washington State Department of Ecology, and Washington Department of Agriculture coordinate their water quality monitoring efforts. To see the most recent couple of months of data from the map of routine water quality monitoring online at the County's website <http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results>, open the map at <http://wacds.maps.arcgis.com/apps/webappviewer/index.html?id=71fa677503c949c8847066178a531099>, and click on the layers symbol in the upper right hand corner. This opens a box titled Layer List. Select the box to the left of "Preliminary WQ Data Results (All)", and then click on the arrow to the right to open up the drop down menu. Select "Open Attribute Table". A detailed table will open up. Under "Options" in the upper left corner of the table, you can choose to export the data and it will automatically populate an Excel spreadsheet. The purple dots indicate station locations; the blue squares indicate that there is data associated with that station in this system. To find earlier data see Table 2 below.

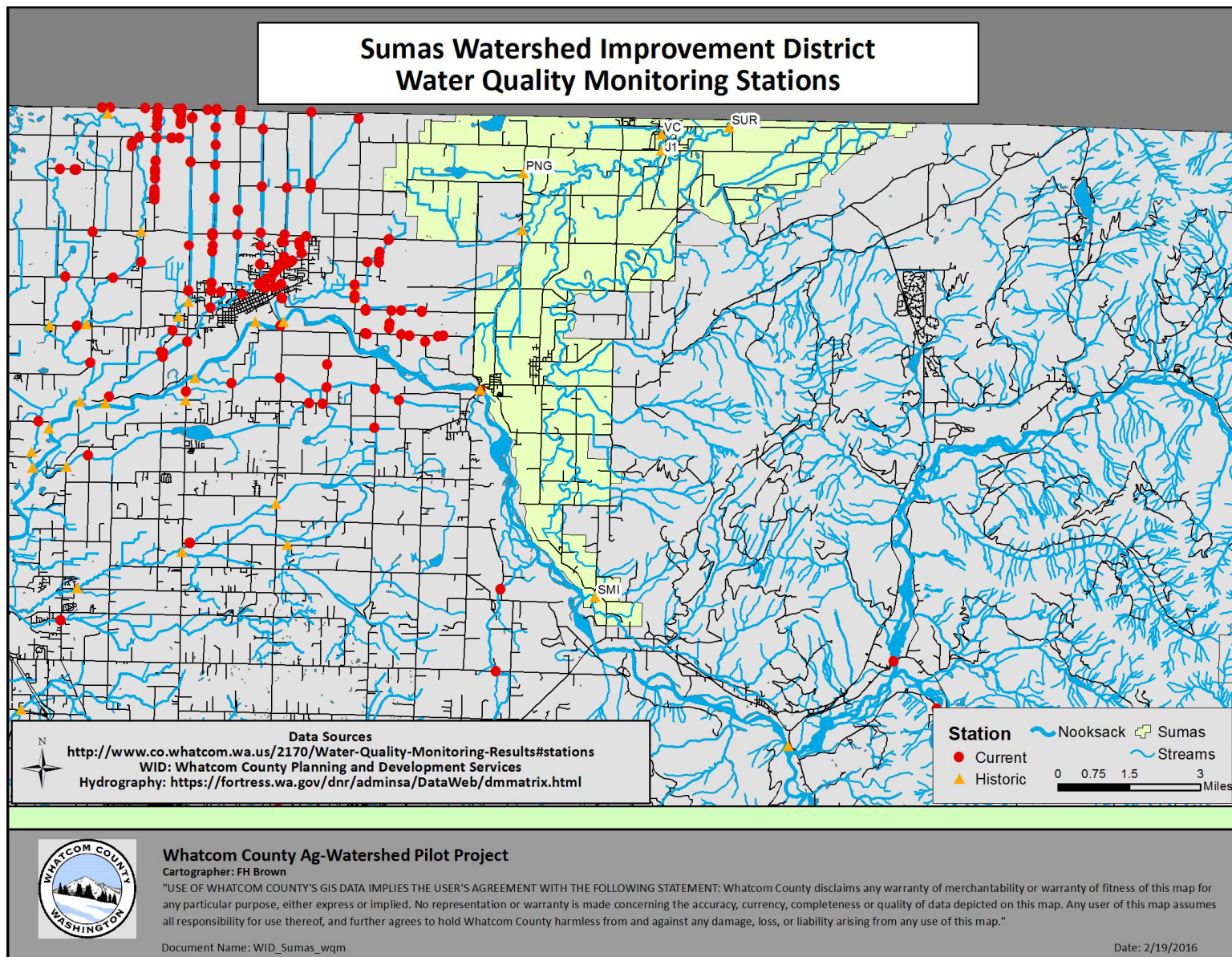


Figure 1: Sumas WID: Routine water quality monitoring stations. See Tables 1 and 2 for more information.

Table 2: Where to find earlier water quality data from monitoring stations in Whatcom County: Water Quality Monitoring Results for Sumas WID area. Data for the County Health Department is not included here because their monitoring focuses entirely on marine water. Earlier Washington Department of Agriculture data is available by request. See table 1 for contact information.

Who	Department of Ecology	Whatcom County Public Works
What	Data generally includes FC, pH, T, Conductivity, and DO. Occasionally flow and wetted width are recorded.	Focused on fecal coliform
How	You may request the data from the Department of Ecology Bellingham Field office. Details below.	Annual reports for 2011 through 2013 are available online at url below.
Details	You may request data for a watershed subbasin from Jessica Kirkpatrick, Steve Hood, or Chris Luerkens at 360-715-5200.	< <a href="http://www.co.whatcom.wa.us/2172/Resource-Library">http://www.co.whatcom.wa.us/2172/Resource-Library</a> >
Station Names	AND 01D080 NWIC-J1 NWIC-SMI NWIC-SQ NWIC-SUR PNG VC	AND

Table 3: Washington State list of water bodies impaired by pollution

WID/Area	Parameter	Source	URL
All	Water quality Assessment and 303(d) list	WA Department of Ecology	<a href="http://www.ecy.wa.gov/programs/wq/303d/">http://www.ecy.wa.gov/programs/wq/303d/</a>

Table 4: Streamflow

WID/Area	Watershed	Ongoing/ Completed	Station ID	Description	Lat	Long	Collected by	Source	URL
Sumas	Johnson	Ongoing	12214500	Sumas River near Sumas	485830	1221500	USGS	USGS "Summary Information for Continuous Streamflow Gages in and near the WRIA 1 Study Area"	<a href="http://wa.water.usgs.gov/projects/wria01/sw.htm">http://wa.water.usgs.gov/projects/wria01/sw.htm</a> [last accessed October 1, 2015]
Sumas	Lower Johnson	Ongoing	12215100	Sumas River near Huntington, BC	490009	1221350	USGS, and Env. Canada	USGS "Summary Information for Continuous Streamflow Gages in and near the WRIA 1 Study Area"	<a href="http://wa.water.usgs.gov/projects/wria01/sw.htm">http://wa.water.usgs.gov/projects/wria01/sw.htm</a> [last accessed October 1, 2015]
Sumas	Saar	Ongoing	12215500	Saar Creek near Sumas	485935	1221235	USGS	USGS "Summary Information for Continuous Streamflow Gages in and near the WRIA 1 Study Area"	<a href="http://wa.water.usgs.gov/projects/wria01/sw.htm">http://wa.water.usgs.gov/projects/wria01/sw.htm</a> [last accessed October 1, 2015]



Table 5: Streamflow plus additional measures

WID/Area	Watershed	Additn'l parameters	Station ID	Station location	Ongoing/ Completed	Collected by	Source	URL
Sumas	Lower Johnson	T, Pressure, cond., DO, pH, also available	12215000	Johnson Creek at Sumas	ongoing	USGS	USGS Washington Water Science Center	<a href="http://maps.waterdata.usgs.gov/mapper/index.html">http://maps.waterdata.usgs.gov/mapper/index.html</a>
Sumas	Lower Johnson	Unknown	12214895	Johnson Creek below Bone Creek at Sumas	unknown	USGS	USGS Washington Water Science Center	No data online for this site. Email inquiries using form linked at < <a href="http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&amp;site_no=12214895">http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&amp;site_no=12214895</a> >

Table 6: Hydrography

Area	Parameter	Source	URL
US	Hydrography	USGS. The National Map, Hydrography	<a href="http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd">http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd</a> [last accessed September 30, 2015]

Table 7: Erosion and avulsion in Nooksack River channel migration zone

Area	Parameter	Document Title	Author	Date	URL
Sumas, S. Lynden, N. Lynden, Bertrand, Laurel	Erosion and Avulsion	Erosion and Avulsion Hazard Mapping and Methodologies for use in the Nooksack River Channel Migration Zone Mapping	Paul Pittman, LEG Whatcom County Public Works and Peter Gill, Whatcom County Planning and Development Services,	2009	<a href="http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15492">http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15492</a> [last accessed February 29, 2016]

Table 8: Groundwater Data

WID/ Area	Water- shed	Parameter	Title of Table/Source	Station ID	Source	URL	Notes
all	all	Well location, use, depth, installation date, open interval	Summary Information for Wells in the WRIA 1 Study Area	1297 wells listed. Latitude and Longitude provided for all.	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/data/well_info.htm">http://wa.water.usgs.gov/projects/wria01/data/well_info.htm</a> via <a href="http://wa.water.usgs.gov/projects/wria01/gw.htm">http://wa.water.usgs.gov/projects/wria01/gw.htm</a> [both last accessed October 1, 2015]	This table contains data for all wells in the WRIA 1 study area that were in the USGS database as of December 14, 1999. There are many wells in the WRIA 1 study area that are not in the database. Additional information regarding wells in this table can be obtained by contacting Luis Fuste, the Information Officer of the USGS Washington Water Science Center of the USGS, at (253) 428-3600 x2653. Information in this table may overlap with information in the database of the Whatcom County Health and Human Services Department See Summary Information for Whatcom County Health and Human Services Department Wells in the WRIA 1 Study Area).
all	all	Well location, use, depth, installation date, open interval	Summary Information for Wells in the WRIA 1 Study Area, Downloaded from the Whatcom County Health and Human Services Department Database	Numerous wells listed. Township, range, section, and quarter section listed for all.	Whatcom County Health and Human Services	<a href="http://wa.water.usgs.gov/projects/wria01/data/table/GW2.htm">http://wa.water.usgs.gov/projects/wria01/data/table/GW2.htm</a> [last accessed October 1, 2015]	This table contains selected data for all wells in the WRIA 1 study area that were in the Whatcom County Health and Human Services Department database as of January 7, 2000. There are many wells in the WRIA 1 study area that are not in the database. Additional information regarding wells in this table can be obtained by contacting Anne Marie Karlberg at the Whatcom County Health and Human Services Department, at (360) 738-2504 x50819. Information in this table may overlap with information in the database of the USGS (see Summary Information for Wells in the WRIA 1 Area, Downloaded from the USGS National Water Information System). Disclaimer: The locations of these wells have not been field checked. Construction information was gathered from driller's logs and may contain errors.

WID/ Area	Water- shed	Parameter	Title of Table/Source	Station ID	Source	URL	Notes
all	all	Well location, use, depth, installation date, open interval	Wells with Sufficient Information to Compute Hydraulic Conductivities, Downloaded from the USGS National Water Information System (NWIS)	Numerous wells listed. Lat. and long. listed for all.	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/data/table/GW4.htm">http://wa.water.usgs.gov/projects/wria01/data/table/GW4.htm</a> [last accessed October 1, 2015]	All information in this table is provisional and subject to revision. The data in the database were collected and entered for a wide variety of projects and purposes over a long period of time and the resulting dataset varies in quality and detail. Although many wells have accurate information (especially those checked and used in recent studies), some problems are known to exist for older entries. Examples of known problems include, but are not limited to, inaccurate well locations, old information regarding the primary use of the well, incorrect installation dates, and erroneous labeling of well locations as having been field-checked. No checks were performed to assure consistency between the latitude and longitude of a well and its assigned local name
all	all	Water level below surface, date of measurement, method	Historical Ground-Water Levels in the WRIA 1 Study Area	Numerous wells listed. USGS ID is lat long.	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/data/water_levels.htm">http://wa.water.usgs.gov/projects/wria01/data/water_levels.htm</a> [last accessed October 1, 2015]	Table contains historical water-level information for wells in the WRIA 1 study area that were in the USGS National Water Information System (NWIS) on December 14, 1999, and for which water-level information was available. Additional information regarding wells in this table can be obtained by contacting Luis Fuste, the Information Officer of the USGS Washington Water Science Center of the USGS, at (253) 428-3600 x2653.
Sumas	Lower Johnson, Lower Sumas	Hydraulic conductivity	Summary Information for Aquifer Tests in the WRIA 1 Study Area	Sumas	USGS, Ecology, Cascades Env. Svs., and Water Resources Cons. Team	<a href="http://wa.water.usgs.gov/projects/wria01/gw.htm">http://wa.water.usgs.gov/projects/wria01/gw.htm</a> [last accessed October 1, 2015]	The published source of the data may be found by cross-referencing the code in the column labeled "Catalogue Number" with information in a Microsoft Access* database developed by Greenberg and others (1996) and expanded by the USGS as part of the current (January, 2000) study.

Table 9: Additional reports on groundwater

Watershed	Title	Published	Authors	URL
all	Nitrate Contamination in the Sumas-Blaine Aquifer, Whatcom County, Washington	Publication No. 11-03-027, May 2011	Melanie Redding, Barbara Carey and Kirk Sinclair Washington State Department of Ecology	<a href="https://fortress.wa.gov/ecy/publications/documents/1103027.pdf">https://fortress.wa.gov/ecy/publications/documents/1103027.pdf</a> [last accessed February 1, 2016]
all	Sumas-Blaine Aquifer Nitrate Contamination Summary	Department of Ecology Pub. No. 12-03-026, June 2012	Barbara Carey	<a href="http://www.ecy.wa.gov/biblio/1203026.html">www.ecy.wa.gov/biblio/1203026.html</a> [last accessed February 1, 2016]
all	Hydrogeology, ground water quality, and sources of nitrate in lowland glacial aquifers of Whatcom County, Washington, and British Columbia, Canada	US Geological Survey Water-Resources Investigations Report 98-4195. 1999. 251 pages, 5 plates.	Cox, S. E., and S. C. Kahle	
Bertrand, N. Lynden, S. Lynden, Sumas	Water Quality: Abbotsford-Sumas Final Report.	Western Washington University, 2005.	Mitchell, R. J., et al	<a href="http://kula.geol.wvu.edu/rjmitch/Report_2005.pdf">http://kula.geol.wvu.edu/rjmitch/Report_2005.pdf</a> [last accessed August 29, 2017]
WRIA1	WRIA 1 Groundwater Data Assessment: Overview. In Bandaragoda, C., C. Lindsay, J. Greenberg, and M. Dumas, editors. WRIA 1 Groundwater Data Assessment	Whatcom County PUD #1, Whatcom County, WA. WRIA 1 Joint Board, 2013.	Lindsay, C. and C. Bandaragoda	<a href="http://wria1project.whatcomcounty.org/">http://wria1project.whatcomcounty.org/</a> [last accessed 2/1/16]

Table 10: Groundwater maps

WID/ Area	Parameter	Title	Last modified	Source	URL	Notes
all	Ground- water movement	Generalized Pattern of Ground -Water Movement for the Puget Sound Aquifer System in the WRIA 1 Study Area	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW2.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW2.pdf</a> [last accessed October 1, 2015]	Modified from Vaccaro, J.J., Hasen, A.J. and Jones, M.A., 1998. Hydrogeologic Framework of the Puget Sound Aquifer System, Washington and British Columbia; US Geological Survey Professional Paper 1424-D.
all	Selected well locations	Locations of Selected Wells in the WRIA 1 Study Area by Primary Water Use	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW4.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW4.pdf</a> [last accessed October 1, 2015]	USGS National Water Information System (NWIS), downloaded December 14, 1999. Not all well locations have been verified and therefore they may plot in the wrong locations.
all	Ground- water levels	Water-Level Contours in the Uppermost Aquifer of the Lynden-Everson-Nooksack-Sumas (LENS) Study Area	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW3.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW3.pdf</a> [last accessed October 1, 2015]	From: Cox, S.E., and Kahle, S.C., 1999, Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada: U.S. Geological Survey Water-Resources Investigations Report 98-4195, 5 plates, 251 p.
all	Aquifer tests	Approximate Locations of Aquifer Tests in the WRIA 1 Study Area	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW5.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW5.pdf</a> [last accessed October 1, 2015]	From: Various Hydrogeologic Studies in the WRIA 1 Study Area
all	Selected well locations	Locations of Selected Wells in the WRIA 1 Study Area with Sufficient Information to Compute Hydraulic Conductivities	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW6.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW6.pdf</a> [last accessed October 1, 2015]	From: USGS National Water Information System (NWIS), downloaded December 14, 1999. Not all well locations have been verified, therefore they may plot in the wrong locations.
all	Selected well locations	Locations of Selected Wells in the WRIA 1 Study Area with Five or More Historical Water Levels	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW7.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW7.pdf</a> [last accessed October 1, 2015]	From: USGS National Water Information System (NWIS), downloaded December 14, 1999. Not all well locations have been verified and therefore they may plot in the wrong locations



all	Soil types	Distribution of Soil Map Units in the WRIA 1 Study Area	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW8.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW8.pdf</a> [last accessed October 1, 2015]	From: U.S. Department of Agriculture, 1994, State Soil Geographic (STATSGO) Data Base: Date use information, Soil Conservation Service, National Cartography and GIS Center, Fort Worth, Texas, accessed January 28, 2000, at URL <a href="http://www.ftw.nrcs.usda.gov/stat_data.html">http://www.ftw.nrcs.usda.gov/stat_data.html</a> . Note: The soil information for this map was Natural Resources Conservation Service 1994 STATSGO data. STATSGO was compiled at 1:250,000 and designed to be used primarily for regional, multi-state, state, and river-basin resource planning, management, and monitoring.
all	Soil permeability	Soil Permeability in Parts of the WRIA 1 Study Area	2000	USGS	<a href="http://wa.water.usgs.gov/projects/wria01/maps/mapGW9.pdf">http://wa.water.usgs.gov/projects/wria01/maps/mapGW9.pdf</a> [last accessed October 1, 2015]	Modified from: U.S. Department of Agriculture-Soil Conservation Service, 1992, Soil Survey of Whatcom County Area, Washington, 54 sheets, 481 p.

Table 11: Water rights

Area	Parameter	Title	Source	URL	Notes
all	Quantity, place of use, source, purpose, all documents associated with water rights, and well logs	Water Resources Explorer	Washington State Department of Ecology	<a href="http://www.ecy.wa.gov/programs/wr/info/webmap.html">http://www.ecy.wa.gov/programs/wr/info/webmap.html</a> [last accessed October 1, 2015]	You can search with an interactive map, or using information such as address, township and range, or latitude and longitude.
all	Water rights	WRIA 1 Water Rights Atlas, 2003	Public Utility District No. 1	<a href="http://wria1project.whatcomcounty.org/Resource-Library/Studies-And-Reports/Water-Rights/65.aspx">http://wria1project.whatcomcounty.org/Resource-Library/Studies-And-Reports/Water-Rights/65.aspx</a> [last accessed February 1, 2016]	

Table 12: Present and future needs of public water systems

Area	Parameter	Title	Source	URL
All	Present and future needs for public water systems	Whatcom County Coordinated Water System Plan, 2016	Whatcom County Public Works	<a href="http://www.whatcomcounty.us/DocumentCenter/View/24143">http://www.whatcomcounty.us/DocumentCenter/View/24143</a> [last accessed August 28, 2017]

Table 13: Agricultural irrigation water use and water rights

Area	Parameter	Title	Source	URL
All	Agricultural Irrigation water	Quantification of Agricultural Irrigation Water Use and Water Rights, December 2016.	Public Utility District no. 1 of Whatcom County	<a href="http://wria1project.whatcomcounty.org/">http://wria1project.whatcomcounty.org/</a>

Table 14: Watershed level assessment of water flow and storage, water quality, and habitat

Area	Parameter	Title	Source	URL
All	Watershed characterization: water flow (delivery and storage), water quality, and habitat assessments	Puget Sound Watershed Characterization Project	Washington State Department of Ecology	<a href="http://www.ecy.wa.gov/puget_sound/characterization/index.html">http://www.ecy.wa.gov/puget_sound/characterization/index.html</a>

Table 15: Land use/Land cover

WID/Area	Watershed	Parameter	Document	URL
Whatcom County		Agricultural Land Cover Analysis	Whatcom County Agricultural Land Cover Analysis version 2.3. 2013. Whatcom County Planning and Development Services	<a href="http://www.whatcomcounty.us/documentcenter/view/3989">http://www.whatcomcounty.us/documentcenter/view/3989</a> [last accessed October 1, 2015]
Whatcom County		Critical Areas Ordinance Maps	Whatcom County's Critical Areas (CAO) are environmentally sensitive natural resources that have been designated for protection and management in accordance with the requirements of the Growth Management Act.	<a href="http://www.whatcomcounty.us/811/County-Wide-Critical-Area-Ordinance-Maps">http://www.whatcomcounty.us/811/County-Wide-Critical-Area-Ordinance-Maps</a> [last accessed February 26, 2016]
Whatcom County		Land Cover Change	WDFW High Resolution Change Detection Project; Whatcom County: Land Cover Change by Sub-Basin	<a href="http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15805">http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15805</a> [last accessed February 26, 2016]

Table 16: Land use/Land cover map and charts from Lower Nooksack Water Budget Overview -*Report includes Smith, Nooksack South, and Nooksack Deming) areas*

From: Bandaragoda, C., J. Greenberg, M. Dumas and P. Gill. (2012). Lower Nooksack Water Budget (Chapter 5, Land Cover). Whatcom County, WA: WRIA 1 Joint Board. Retrieved from <a href="http://wria1project.whatcomcounty.org/">http://wria1project.whatcomcounty.org/</a> [last accessed October 1, 2015 ]	Figure
WRIA 1 map of existing land cover	Figure 1
WRIA 1 map of historic land cover classes, produced by Utah State University (Winkelaar 2004).	Figure 2
Areal distribution of existing and historical land cover classes in the Lower Nooksack watershed (top) and the Nooksack Forks watershed (bottom).	Figure 7
Final land cover classification, original data source class, and Lower Nooksack Water Budget land cover parameters.	Table 1
Crop types in the Lower Nooksack Subbasin.	Table 2

Table 17: Land use/Land cover electronic data from Lower Nooksack Water Budget Overview – *Report includes Smith, Nooksack South, Nooksack Deming areas*

From: Bandaragoda, C., J. Greenberg, M. Dumas and P. Gill. (2012). Lower Nooksack Water Budget (Chapter 5, Land Cover). Whatcom County, WA: WRIA 1 Joint Board. Retrieved from <a href="http://wria1project.whatcomcounty.org/">http://wria1project.whatcomcounty.org/</a> [last accessed October 1, 2015].	Title
Tables of crop type summarized by the 16 drainages of the Lower Nooksack Subbasin	Appendix Chap5A_LN_AgLandUse.pdf
Classes and descriptions of original NOAA CCAP dataset	Appendix Chap5B_LandCoverClass.pdf
Classes and descriptions of original Whatcom County Agricultural Land Cover Analysis	Appendix Chap5C_WhatcomCountyLandCover.pdf
GIS data, Whatcom County Agricultural Land Cover Analysis	Agrural-use-pds2011.shp
Parameter grids (ascii files) and Excel spreadsheets of parameter values by land cover class	Land Cover Model Parameter Lookup Tables (Folder: Ascii grids/ see lulc_existing.xls and lulc_historic.xls
Matlabcode to convert raster, lookup tables, and shapefile data to area averaged parameter values	Topnet-WM Preprocessing Program files
ArcGIS 10 Files Geodatabase Raster Grids 30 Meter Pixel resolution; Metadata xml	wria1_lulc_water_budget.gdb, 1. Existing Land Cover GIS data (<Lulc_exist>) 2. Historical Land Cover GIS data (<Lulc_hist>)
Lower Nooksack Subbasin Land cover tables and charts from GIS data	Lulc_charts_lowerNookonly.xlsx
WRIA 1 Land cover codes, tables, and charts from GIS data	Lulc_charts_wria1.xlsx

Table 18: NSEA spawner surveys

*NSEA has spawner survey reports from 1998 to the present. This table includes every relevant reach surveyed since 2005. Some reaches were not surveyed every year.*

Watershed	Creek	Station Location	Collected by	Source	Notes
Smith Creek	Smith Creek	RM 2.5-3.5	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. <a href="http://www.n-sea.org/archived-publications">http://www.n-sea.org/archived-publications</a> [last accessed Feb 1, 2016]	Live salmon, carcasses and redds are recorded. The reports include brief descriptions of the reach. The monitored reaches have changed somewhat over time.
Smith Creek	Macaulay Creek, lower	RM 0.5-1.0	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. <a href="http://www.n-sea.org/archived-publications">http://www.n-sea.org/archived-publications</a> [last accessed Feb 1, 2016]	Live salmon, carcasses and redds are recorded. The reports include brief descriptions of the reach. The monitored reaches have changed somewhat over time.
Smith Creek	Macaulay Creek, upper	RM 1.0-1.5	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. <a href="http://www.n-sea.org/archived-publications">http://www.n-sea.org/archived-publications</a> [last accessed Feb 1, 2016]	Live salmon, carcasses and redds are recorded. The reports include brief descriptions of the reach. The monitored reaches have changed somewhat over time.
Smith Creek	Mitchell Creek	RM 0.3-1.0	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. <a href="http://www.n-sea.org/archived-publications">http://www.n-sea.org/archived-publications</a> [last accessed Feb 1, 2016]	Live salmon, carcasses and redds are recorded. The reports include brief descriptions of the reach. The monitored reaches have changed somewhat over time.

Table 19: WDFW spawner surveys

WID/Area	Parameter	Creek	Station location	Frequency	Date	Collected by	Source
California Cr, Dakota Cr, Scott, Schneider, Wiser Lake/Cougar Creek Sumas River, Saar, Fourmile and Ten Mile Creeks	Limited field data from a one year survey to assess adult Steelhead spawning habitat: Steelhead redds or suitable gravel for Steelhead spawning.	Specifics are available upon request	Specifics are available upon request	One-time	2009	WDFW and NSEA field crews	WDFW Tasha Geiger Nooksack River Stock Assessment 360-305-2023 Natasha.geiger@dfw.wa.gov

Table 20: Aquatic nuisance species

Area	Title - Parameter	Notes	Frequency	Date		Source
Washington State	Aquatic invasive species	Description of aquatic nuisance species with distribution maps. Organized by organism.	ongoing		<a href="http://wdfw.wa.gov/ais">http://wdfw.wa.gov/ais</a> [last accessed October 1, 2015]	WDFW
Washington State	Washington Herp Atlas		unknown	Maps updated 2013	<a href="http://www1.dnr.wa.gov/nhp/efdesk/herp/herpmain.html">http://www1.dnr.wa.gov/nhp/efdesk/herp/herpmain.html</a> [last accessed October 1, 2015]	DNR
Washington State	Washington Nature Mapping Program – wildlife distribution maps		unknown	unknown	<a href="http://naturemappingfoundation.org/natmap/maps/">http://naturemappingfoundation.org/natmap/maps/</a> [last accessed October 1, 2015]	NatureMapping Program
US	USGS NAS – Nonindigenous Aquatic Species – presence and distribution	Searchable database/maps of nonindigenous aquatic species sightings organized by group, i.e. amphibians, fish, mammals.	unknown	Date of info varies	<a href="http://nas.er.usgs.gov/queries/default.aspx">http://nas.er.usgs.gov/queries/default.aspx</a> [last accessed October 1, 2015]	USGS
Washington State	Washington Department of Ecology Environmental Assessment Aquatic Plant Monitoring	Description of aquatic nuisance plants with distribution maps, searchable survey results by county, lake, or plant name, and downloadable survey data.	ongoing	Date of info varies	<a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/index.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/index.html</a> [last accessed October 1, 2015]	WA Department of Ecology
Whatcom County	Whatcom County Noxious Weeds webpages	Distribution map of some noxious weeds. Field guides and information about noxious weeds.	unknown	Map date is 2008. Website date is 2007. Other material is undated.	<a href="http://www.whatcomcounty.us/DocumentCenter/View/2506">http://www.whatcomcounty.us/DocumentCenter/View/2506</a> [last accessed October 1, 2015]	Whatcom County
Pacific Northwest	Aquatic and Riparian Effectiveness Monitoring Program Invasive Species Report	Description of monitoring program and presence of invasive species in surveyed areas.	2010	2011	<a href="http://www.reo.gov/monitoring/reports/watershed/AREMP%20Aquatic%20Invasive%20Species%20Report%202010.pdf">http://www.reo.gov/monitoring/reports/watershed/AREMP%20Aquatic%20Invasive%20Species%20Report%202010.pdf</a> [last accessed October 1, 2015]	UW Forest Service and Bureau of Land Management



Table 21: Additional habitat/wildlife documents

Watershed/area	Parameter	Document
Relevant to all WID areas	Fish barriers	Whatcom County Public Works, 2006. Whatcom County Fish Passage Barrier Inventory Final Report - IAC Project Number: 01-1258 N. January, 2006. < <a href="http://salmon.wria1.org/resources/documents">http://salmon.wria1.org/resources/documents</a> > [last accessed January 4, 2016]
WRIA 1	Fish habitat	Smith, C.J. 2002. Salmon and steelhead habitat limiting factors in WRIA 1, the Nooksack basin. Washington State Conservation Commission, Lacey, Washington. 325 pp.
Middle and Lower Sumas watersheds, Smith watershed, Nooksack South, Nooksack Deming	2013 Data Integration of WRIA 1 Hydraulic, Fish Habitat, and Hydrology Models	Bandaragoda, C. Joanne Greenberg, and Mary Dumas (2013). Data integration of WRIA 1 Hydraulic, Fish Habitat, and Hydrology Models. 134 pp. Nooksack Indian Tribe, Whatcom County, WA. WRIA 1 Joint Board. Retrieved [Date], from <a href="http://wria1project.whatcomcounty.org/">http://wria1project.whatcomcounty.org/</a> [last accessed February 1, 2016]
Nooksack	Fish presence	Nooksack Tribe, 2004. Referenced in North Lynden Watershed Improvement District Management Plan for Drainage, flooding, Irrigation and Fish Issues, 2009. Bibliography entry is unclear.
WRIA 1	Fish presence	Anchor Environmental, LLC. 2003. Fish periodicity in WRIA 1. Prepared for City of Bellingham Public Works Department. Seattle, Washington. 43 pp+ Appendices
Whatcom County	Biodiversity	Nelson, R., 2007. Mapping Biodiversity in Whatcom County: Data and Methods. Submitted to the Whatcom Legacy Project, August 2007. < <a href="http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15493">http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15493</a> > [last accessed February 29, 2016]
Whatcom County	Wildlife	Eissinger, A., 1994. Significant Wildlife Areas. (Available through the public library)

Table 22: Additional habitat/wildlife maps and databases

Watershed/ Area	Parameter	Document/Website	URL	Source
Whatcom County	Fish Presence Char, Chinook, Chum, Coho, Cutthroat, Pink, Steelhead, Bull Trout/Dolly Varden	Maps: Fish Presence by species available on Whatcom County Critical Areas Ordinance Maps page	< <a href="http://www.co.whatcom.wa.us/811/County-Wide-Critical-Area-Ordinance-Maps">http://www.co.whatcom.wa.us/811/County-Wide-Critical-Area-Ordinance-Maps</a> > [last accessed February 24, 2016]	Whatcom County
Whatcom County	Wildlife	The Whatcom County mappings were completed in 2007, as part of a project to characterize ecosystem processes and wildlife habitat in the Birch Bay Watershed.	<a href="http://wdfw.wa.gov/conservation/habitat/planning/lha/whatcom.html">http://wdfw.wa.gov/conservation/habitat/planning/lha/whatcom.html</a> [last accessed February 1, 2016]	Washington Department of Ecology and Washington Department of Fish and Wildlife
Washington State	Priority Habitats and Species on the Web	PHS on the Web is a Washington Department of Fish and Wildlife web-based, interactive map for citizens, landowners, cities and counties, tribal governments, other agencies, developers, conservation groups, and interested parties to find basic information about the known location of Priority Habitats and Species (PHS) in Washington State.	<a href="http://wdfw.wa.gov/mapping/phs/">http://wdfw.wa.gov/mapping/phs/</a> [last accessed October 1, 2015]	Washington Department of Fish and Wildlife
Washington State	Salmon distribution, status, and habitats	SalmonScape is an interactive mapping application designed to display and report a wide range of data related to salmon distribution, status, and habitats. The data sources used by SalmonScape include stream specific fish and habitat data, and information about stock status and recovery evaluations.	< <a href="http://apps.wdfw.wa.gov/salmonscape/">http://apps.wdfw.wa.gov/salmonscape/</a> > [last accessed October 1, 2015]	Washington Department of Fish and Wildlife
West Coast	Salmon	Maps of salmon and steelhead population boundaries	< <a href="http://www.westcoast.fisheries.noaa.gov/maps_data/maps_and_gis_data.html">http://www.westcoast.fisheries.noaa.gov/maps_data/maps_and_gis_data.html</a> > [last accessed October 1, 2015]	NOAA Fisheries, West Coast Region
Whatcom County	Marine species and Habitats	Whatcom County Marine Resources maps of marine species and habitats	<a href="http://www.mrc.whatcomcounty.org/library">http://www.mrc.whatcomcounty.org/library</a> [last accessed October 1, 2015]	Whatcom County Marine Resources Committee Library
US	Critical habitat maps for marine and anadromous	Website links to data and maps. The critical habitat maps provided here are for illustrative purposes only. Textual descriptions of critical habitats, which are provided in the	<a href="http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm">http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm</a> [last accessed January 21, 2016]	NMFS NOAA

Watershed/ Area	Parameter	Document/Website	URL	Source
	fishes	associated <i>Federal Register</i> notices (see links below), are the definitive sources for determining critical habitat boundaries. Map and <i>Federal Register</i> notice links are PDF files.		
US	Threatened and Endangered Species	Environmental Conservation Online System, data and maps.	<a href="http://ecos.fws.gov/ecp/">http://ecos.fws.gov/ecp/</a> [last accessed February 18, 2016]	US FWS
Washington State	Rare plants, animals, ecological communities	Reference Desk of the Washington Natural Heritage Program. Includes searchable databases	<a href="http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html">http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html</a> [last accessed October 1, 2015]	Washington State Department of Natural Resources
Puget Sound Region	Wetlands	National Wetlands Inventory, data and maps	<a href="http://www.fws.gov/wetlands/">http://www.fws.gov/wetlands/</a> [last accessed February 1, 2016]	US FWS

Table 23: Soils

WID/Area	Parameter	Document	URL	Source
National	Soils	Web Soil Survey	<a href="http://websoilsurvey.nrcs.usda.gov/app/">http://websoilsurvey.nrcs.usda.gov/app/</a> last accessed October 1, 2015	USDA Natural Resource Conservation Service

Table 24: WRIA 1 materials online - *In addition to the WRIA 1 materials included in this memo, there are many additional resources available on the WRIA 1 Resource Library webpages*

Watersheds	Type of Resource	Topics or Titles	URL
all	Studies	Water rights, Water Quantity, Water Quality, and Habitat and Instream Flow; The 2010 State of the Watershed Report, 2013 WRIA Groundwater Data Assessment, 2013 Data Integration of WRIA 1 Hydraulic, Fish Habitat and Hydrology Models, The Whatcom County Coordinated Water System Plan (2000). A more recent version is available at <a href="http://www.whatcomcounty.us/DocumentCenter/View/24143">http://www.whatcomcounty.us/DocumentCenter/View/24143</a> ), and 2005 Numerical Groundwater Flow Model of the Abbotsford-Sumas Aquifer	< <a href="http://wria1project.whatcomcounty.org/Resource-Library/8.aspx">http://wria1project.whatcomcounty.org/Resource-Library/8.aspx</a> > [last accessed February 1, 2016]
all	Maps	WRIA 1 Watersheds Map V3 Historic Land Cover Map - USU Existing Land Cover Future Land Cover – USGS Impervious Surfaces – NOAA Population Density – WA DOE Approximate Depth to Water Combined Hydrology Mechanisms, Draft – 11 Precipitation – PRISM Surface Water Storage Alterations Water Right Watershed Status Long Term Monitoring Adopted Map, and Interactive WRIA Monitoring Stations.	< <a href="http://wria1project.whatcomcounty.org/Resource-Library/Maps/38.aspx">http://wria1project.whatcomcounty.org/Resource-Library/Maps/38.aspx</a> > [last accessed February 1, 2016]

Appendix F: Notes from the Whatcom Watershed Improvement Districts Work Session in Lynden, March 20, 2017.



# Notes

## Whatcom Watershed Improvement Districts Work Session

Steakhouse 9 - Lynden, WA

March 20, 2015 – 10:30 am to 3:00 pm

Facilitator – Ray Ledgerwood

### Meeting Purpose:

- § Identify strategic priorities in each WID, discuss coordination on certain priorities, and learn techniques for comprehensive plans.

### Opening Comments

Come together to see what we have done, what we want to do as WIDs...individually and collectively.

### Watershed Improvement District (WID) Reports of What Has Been Done since April 2015

WID	Report
Bertrand WID	<ul style="list-style-type: none"><li>• Raised assessment to have revenue for technical and legal assistance</li><li>• Surface to ground water</li><li>• New tide gate on Schell Creek</li><li>• Active on Lummi negotiations</li><li>• Streamflow augmentation project</li><li>• Funding for ground water model</li><li>• Guide Meridian ditch work</li><li>• Water quality sampling</li><li>• Worked with Heather on resource inventory</li><li>• Culvert replacements</li></ul>
North Lynden WID	<ul style="list-style-type: none"><li>• Smallest WID</li><li>• Water quality testing with county...PIC program...very intense</li><li>• Farmers in area substantiated by monitoring indicating Canada issues</li><li>• City of Lynden working on getting septic systems connected and/or addressed</li><li>• Ditch maintenance on local ditches...difference in water quality sampling improvement</li><li>• Contacts with neighbors regarding practices</li><li>• Spray ditches annually for Reed Canary Grass</li></ul>
Laurel WID	<ul style="list-style-type: none"><li>• Have discussions on problem areas, identify areas with issues...go out and talk with land owners</li><li>• Water quality reporting...challenge in bracketing...showing where the problems were noted</li><li>• Workshop on horse management</li><li>• Developing a 5 year plan</li><li>• Developing relationships with other groups</li><li>• Supporting the bigger water board</li><li>• Working with 10 mile group</li></ul>

South Lynden WID	<ul style="list-style-type: none"> <li>• Water quality testing...some things did not make sense</li> <li>• Worked on known problems</li> <li>• Worked on water banking concept, storage of water for later use, deep well possibilities,</li> <li>• Protecting water rights</li> <li>• Comprehensive plan development</li> <li>• Talking with fellow farmers regarding water quality</li> <li>• Drainage issues and river running through our area</li> <li>• Ditch spraying</li> <li>• Possibilities of improving drainage of the river</li> <li>• Supporting AWB</li> </ul>
Sumas WID	<ul style="list-style-type: none"> <li>• Thorough water testing...added sites</li> <li>• Interesting monitoring information</li> <li>• Share water quality data with farmers</li> <li>• Mapping project with help from Heather</li> <li>• Looking at the various areas to do work</li> <li>• Looking at a management plan for the WID with available funding</li> <li>• Outreach lunch in Sumas to take our work to the people in the WID...shared results of water testing</li> <li>• Tour scheduled cancelled because of snow...when Keith is available to see which potential projects are out there</li> <li>• Did drainage work with local drainage district</li> <li>• Looking at prioritizing projects</li> <li>• Met with RESources to work on quality monitoring - elephants in room</li> </ul>
Drayton WID	<ul style="list-style-type: none"> <li>• Work with Birch Bay Sewer and Water and other partner organizations and specialists</li> <li>• Deep water aquifer project and water resource data</li> <li>• Looking at water resource potential, water rights, supply issues</li> <li>• Water quality monitoring</li> <li>• Drayton Harbor shellfish beds opened up...credit due...goal</li> <li>• Conservation workshop</li> <li>• WIDS do more than just the projects we are talking about</li> <li>• AWB work (coordination) with the tribes</li> <li>• Work on legal and political issues...Whatcom Family Farmers...important that we formed WIDs when we did</li> <li>• Disappointed in another organization with a recent assertion that we have not done anything</li> <li>• Entering a most critical phase of negotiation with the tribes</li> <li>• Water conservation, water quality projects completed</li> <li>• Work with Whatcom Family Farmers regarding most serious issues, influence</li> </ul>
Resource Specialists	<ul style="list-style-type: none"> <li>• Got our pollution prevention program going in county</li> <li>• PUD and RH2 worked on water quality report</li> <li>• First 3 phase of ground water data collection</li> <li>• Whatcom Water Supply working group</li> <li>• PUD on drought contingency planning effort</li> <li>• Lummi infrastructure study</li> </ul>

	<ul style="list-style-type: none"> <li>• Integrate water supply efforts...merging boards...system wide improvement of levies</li> <li>• Comprehensive plan update</li> <li>• Purchase development rights program (issue)</li> <li>• Threshold on impervious surfaces (issue that could damage agriculture)...meeting this Thursday</li> </ul>
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#### Summary Whatcom WIDs Strategic Priorities (revised 3.20.17)

WID	Priority 1	Priority 2	Priority 3	Priority 4
Bertrand WID	Water Rights	Water Quality	Drainage	Flood Management
Drayton WID	Water Rights	Water Quality	Comprehensive Plan	
North Lynden WID	Drainage	Water Quality	Water Rights	Flood Management
Laurel WID	Water Rights	Drainage	Water Quality	Flood Management
South Lynden WID	Water Quality	Water Rights	Drainage	Flood Management
Sumas WID	Water Quality	Water Rights	Agricultural Protection	Communication, Outreach, Education

#### Top Activities for Upcoming Year

If we had time, money, energy for one, then that one and one more, those two...etc.

WID	Top Activities for Upcoming Year
Bertrand WID	<ol style="list-style-type: none"> <li>1. Water augmentation project finished</li> <li>2. Surface to groundwater transfers...support legislation and legal effort</li> <li>3. Continue water quality testing to bring quality back</li> <li>4. Update Comprehensive plan</li> </ol>
Drayton WID	<ol style="list-style-type: none"> <li>1. Continue to work on deep water aquifer...move beyond just the exploration...to supply or mitigation of new water rights</li> <li>2. Continue to monitor water quality and find hot spots</li> <li>3. Working with farmers on legal avenues to move water around...spreading, piping, water bank, transfers</li> <li>4. Public relations...family farmers to dispute misinformation</li> </ol>
North Lynden WID	<ol style="list-style-type: none"> <li>1. 5 year permit for drainage maintenance...Find the funding for development of the 5 year plan...chase paperwork</li> <li>2. Continue our water quality work with Whatcom County Public Works, and Lynden</li> <li>3. Work on culvert repair/replacement</li> </ol>
Laurel WID	<ol style="list-style-type: none"> <li>1. Support the AWB for efforts in legal negotiation and lobbying</li> <li>2. Develop a 5 year plan for drainage</li> <li>3. Set up the DNA testing for water quality</li> </ol>
South Lynden WID	<ol style="list-style-type: none"> <li>1. Work with resources on DNA sequencing</li> <li>2. Continue water quality testing</li> <li>3. Work on water rights...obtain, distribute water rights...lobby to get it done</li> </ol>

Sumas WID	<ol style="list-style-type: none"> <li>1. Ditch cleaning project</li> <li>2. Continued water quality testing</li> <li>3. Outreach and education with our land owners</li> </ol>
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### Strategies for Working Together

Strategy	Lead
<i>Communication/Outreach</i>	
<ul style="list-style-type: none"> <li>Preserving the "one voice" outreach...continue work with key partners...work together to defend agriculture and get the word out</li> </ul>	<ul style="list-style-type: none"> <li>Whatcom Family Farmers – Fred, specific partners – eg public affairs people in organizations</li> <li>Story specific for information</li> <li>Brad &amp; Rich</li> </ul>
<ul style="list-style-type: none"> <li>Communication and community outreach...message in positive way</li> </ul>	<ul style="list-style-type: none"> <li>See above</li> </ul>
<ul style="list-style-type: none"> <li>Habitat for species...telling people what farmers are doing to benefit habitat</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
<i>Legal</i>	
<ul style="list-style-type: none"> <li>Continue to identify legal access to water supply...acquiring, getting water where it needs to go</li> </ul>	<ul style="list-style-type: none"> <li>Bill, Marty, Henry, Chuck, Greg</li> </ul>
<ul style="list-style-type: none"> <li>Work together on tribal negotiations on water quality and supply</li> </ul>	<ul style="list-style-type: none"> <li>Negotiation Team, Fred, Greg</li> <li>Needs expanded and probably a different team as supply is addressed</li> </ul>
<ul style="list-style-type: none"> <li>Legal challenges, and holding them off</li> </ul>	<ul style="list-style-type: none"> <li>Bill, Marty, Scott, Jeff, Greg, Henry</li> </ul>
<i>Quality</i>	
<ul style="list-style-type: none"> <li>Work together on funding for and implementation of DNA testing</li> </ul>	<ul style="list-style-type: none"> <li>David – N3, Landon, Kent,</li> </ul>
<ul style="list-style-type: none"> <li>Water quality projects and how it effects our industry...improving and communicating xx</li> </ul>	<ul style="list-style-type: none"> <li>Fred,</li> <li>See above</li> </ul>
<i>Drainage</i>	
<ul style="list-style-type: none"> <li>Get permits faster and eliminate some of the paper work – 5 year Programmatic Permits</li> </ul>	<ul style="list-style-type: none"> <li>Karin, Frank, Joel, Henry, Fred</li> </ul>
<i>Supply/Access</i>	
<ul style="list-style-type: none"> <li>Water quantity projects and ability to have water long term for future generations...mitigation banking</li> </ul>	<ul style="list-style-type: none"> <li>Bill, Marty, Scott, Jeff, Greg, Henry</li> </ul>
<i>Organizational/Administrative</i>	
<ul style="list-style-type: none"> <li>Tracking legislation, rule making, agendas, and impacts at County, State, Federal levels...agriculture representation on committees</li> </ul>	<ul style="list-style-type: none"> <li>Henry, Bill, Fred, partner individuals</li> </ul>
<ul style="list-style-type: none"> <li>Utilize the influence system of collective WIDs including messengers and skills development (training)</li> </ul>	<ul style="list-style-type: none"> <li>Whatcom Family Farmers</li> </ul>
<ul style="list-style-type: none"> <li>Organize the listing of committees and groups to get agriculture representation on</li> </ul>	<ul style="list-style-type: none"> <li>Henry, Fred and members</li> </ul>

## Expert Resources

Chuck Lindsay, AESI - hydrogeology	<ul style="list-style-type: none"> <li>• Hydrologist</li> <li>• 30 years' experience...</li> <li>• Identification, ground water supply</li> <li>• Water right evaluations</li> <li>• Working for County</li> <li>• Stream augmentation work</li> <li>• Surface to ground water transfer information</li> <li>• Development of deep water – Drayton</li> <li>• Water rights guidance manual for farmers</li> </ul>
Jon Hutchings – WCPW Director	<ul style="list-style-type: none"> <li>• Public works director</li> <li>• Drainage, culverts, roads</li> <li>• River and road program</li> <li>• Natural resources and water resources</li> <li>• Expectation and growing number of services that county provides...county council passed water action plan</li> <li>• Work with industry on water quality</li> <li>• No new dollars...fixed revenue from flood control district...action plan developed...correction on revenue side needed</li> </ul>
Joel Ingram – WDFW hydraulics permits	<ul style="list-style-type: none"> <li>• Working with fish and fish habitat for past 12 years...4 years in Whatcom County</li> <li>• Salmon recovery</li> <li>• Permitting for hydraulic</li> <li>• 5 year plans – certainty about what is expected by WDFW...planning and process work beforehand...revisit each five years</li> <li>• Windows of work</li> <li>• Beaver management, trash racks,</li> <li>• Project work, agreements, streamline process</li> </ul>
Aneka Sweeney – WCD Education Specialist	<ul style="list-style-type: none"> <li>• Packet of information...Conservation District</li> <li>• How to best develop programmatic permits</li> <li>• If you need assistance with projects, information</li> <li>• Assist land managers with conservation choices</li> <li>• 5 year planning...preservation of future of farming</li> <li>• Develop educational program to preserve farming in Whatcom County</li> <li>• Farm Speaker series in cooperation with AWB and WCD...different subject matter</li> <li>• Education in schools about natural resources</li> <li>• Communication plan development</li> <li>• Water quality education group</li> <li>• Grant writing support for partnership programs</li> <li>• Insurance for Farm Tours</li> </ul>
Jim Bucknell/Andy Dunn – RH2 Engineering – water right preparation	<ul style="list-style-type: none"> <li>• Civil engineering firm</li> <li>• Water rights expertise</li> <li>• 35 years' experience with Ecology...change applications</li> </ul>



	<ul style="list-style-type: none"> <li>• Understand water law, statutes, regulations, and know the people</li> <li>• Drought contingency plan, water bank, water exchange</li> <li>• Lummi projects...water for in stream and out of stream – how to move water around for projects...resolving issues</li> <li>• Study with PUD on water rights</li> </ul>
Heather MacKay/Cheryl Lovato Niles – FHB Consulting – plan development	<ul style="list-style-type: none"> <li>• Work with Henry for several years</li> <li>• Banking and trading of water</li> <li>• Whatcom County – Ag watershed data...copy for each WIDs</li> <li>• Worked with each WID regarding priorities and restoration of flow and habitat...need for farming and need for habitat</li> <li>• Worked with farmers on planning resources</li> <li>• Detailed priorities, reference maps, species, ag lands cover...available for each WID</li> <li>• Working with Sumas WID on action plan</li> </ul>
Erika Douglas – WCPW – water quality	<ul style="list-style-type: none"> <li>• Water quality monitoring...bacteria driven</li> <li>• Drainage into key areas</li> <li>• Working with Canada</li> <li>• Routine monitoring throughout drainages in Whatcom County</li> <li>• Seeing water quality areas of concern...focused areas...North Lynden, Nooksack,</li> <li>• Seeing what is going on...pollution prevention program...on hot spots, practice application</li> <li>• Not just one source of pollution...talking with folks about various pollution sources</li> <li>• Partners with Whatcom CD</li> <li>• Success in Drayton Harbor...attributed to community coming together...whole combination of community coming together</li> </ul>
Steve Jilk – PUD #1 General Manager	<ul style="list-style-type: none"> <li>• County wide economic development program</li> <li>• County wide water planning</li> <li>• City administrator...Lynden</li> <li>• One of three agencies with authority to operate and manage water resources in Whatcom County</li> <li>• Took on electricity supply...took on water rights...service of water to BP refinery</li> <li>• Have most water rights in county</li> <li>• Separate irrigation water rights</li> <li>• All of Cherry Point, Ferndale – West, I-5 Grandview Industrial Park</li> <li>• Engaged in watershed planning board</li> <li>• Try to play a problem solving role in water quality</li> <li>• Worked with Bellingham and partners on Lower Nooksack strategy...water supply plan...broad 40,000 ft level of water resources tied to planning</li> <li>• Water supply group</li> </ul>

<p>Kent Oostra – Exact Scientific Lab</p>	<ul style="list-style-type: none"> <li>• Resident of Whatcom CD</li> <li>• E.coli as monitoring</li> <li>• DNA sequencing – non targeted</li> <li>• \$20,000 in research regarding DNA testing specific to related</li> <li>• Running fecal Whatcom CD</li> <li>• Looking at Nooksack from mountains to ocean</li> <li>• Bio indicators and what profile is</li> <li>• Tracking sources for \$125 per sample</li> <li>• Needing to build a data set now</li> <li>• FDA requiring this type of testing</li> </ul>
<p>David – N3</p>	<ul style="list-style-type: none"> <li>• Drayton WID Board</li> <li>• Feedback loop is very important and open to suggestions on how to do this better</li> <li>• Water test indicating very good</li> <li>• One item is water nitrates...much better than 10 years ago</li> <li>• On committees...must have agriculture representation...see what is going on</li> </ul>