South Lynden Watershed Improvement District

Preliminary Management Plan

Version 2 (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 preliminary version. The preliminary version serves as a starting framework for a comprehensive management plan, the detailed content of which will be developed as time and resources allow.

Text in italics in Tables 1 and 2 is suggested text, for discussion by the WID board.

Version	Date	
Version 1	June 2017	Draft for discussion by the WID board.
Version 1a	August 2017	Draft for review by the WID board. Some minor edits and updates from the June 2017 version, inserted by H MacKay
Version 2	October 2017	Updated after review by the board in September 2017. Some additional edits included to improve readability and clarity. (H MacKay)

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APPENDICES

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

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

Appendix B: Agricultural and watershed characterization tables for the South Lynden WID

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

Appendix C: Selected Reference Maps for the South Lynden WID

Contains a selection of reference maps related to the South Lynden 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 South Lynden WID

Appendix E: Sources of available data for South Lynden WID (July 2016).

Reproduced from the South Lynden 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 South Lynden WID Agriculture-Watershed Characterization and Mapping Report (2016: the "WID mapping report")[1] 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 objectives since these 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

The WID planning process is expected to proceed in phases:

- Firstly, preparing a Preliminary Management Plan (this document) to include: an overview of current WID priorities; agreed near-term actions to advance the WID's priorities; a summary of relevant background information. 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.
- Subsequently, 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.

[1] Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. http://www.southlyndenwid.com/ [Alternative download here]

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 provides a Preliminary Management Plan for the South Lynden 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 list is shown in Error! Reference source not found., 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 South Lynden 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 AND DESIRED OUTCOMES

2.1 Process for developing the list of suggested priorities

The project team used the following process to develop the list of suggested priorities in Tables 1 and 2 for discussion by the WID board.

1. We began with the set of priorities that were previously listed on the South Lynden WID website[2] (water quality and water rights).
2. We reviewed all South Lynden WID board meeting minutes back to April 2015[3] to collect relevant statements and decisions made by the WID board and grouped those statements or decisions into priority topics (comprehensive planning; drainage; flood management; habitat; outreach; representation; water quality; water quantity; water rights).
3. We added priorities identified in the January 2016 work session and described in the South Lynden WID Agriculture-Watershed Characterization and Mapping Report[4] (habitats and species; water flow processes; agricultural land protection).
4. The list of priorities and potential priority actions was revised after the WID Work Session held in Lynden on March 20th, 2017.
5. We built a master spreadsheet listing the main priorities that had been identified and discussed by the WID in all of the various processes mentioned above. 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 suggested priorities described in this section.
6. We generated a set of suggested priorities (see Error! Reference source not found. below), and then added desired outcomes and near-term actions using draft wording drawn from previous WID documents, statements and decisions (see Error! Reference source not found. below). The material in these tables serves as a starting point around which the WID board could build their management plan and actions.
7. We also 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)[5] and the WRIA 1 Watershed Management Project's statement of goals (2008).[6] The goal statements in these two planning documents offer additional context for the South Lynden WID's own priorities, and are shown alongside the suggested WID priorities in Appendix D.

2.2 Suggested priorities and desired outcomes for the South Lynden 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, and
- identify actions, an implementation schedule, scope of work and resources needed for implementation.

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[2] See https://www.southlyndenwid.com/projects

[3] See https://www.southlyndenwid.com/minutes

[4] See Appendix A of this document (WID mapping report executive summary)

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

[6] 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
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 the tables, and will develop the detail of planned actions over time, as the board progresses towards a Comprehensive Plan for the WID.

Table 1. Suggested South Lynden WID priorities and desired outcomes, based on previous WID statements and documents. *Updated after the board meeting in September 2017.*

	Priority issue	Desired outcome(s): suggested text.	Near-term priority actions (see Table 2 for more details)
1A	Water quality	*Agricultural activities in the South Lynden WID do not cause water quality standards to be exceeded in surface water and groundwater bodies within the WID area*	· *Done (2017) Initiate DNA tracking pilot program in Scott Ditch* · *(2017) Continue with the water quality testing and response program*
1B	Water quantity: water availability for agricultural use (irrigation, livestock, processing)	*Farmers in the South Lynden WID have secure (legal) access to sufficient water for agricultural uses.*	· *(2017) Work on options for agricultural water supply: Address "use it or lose it"*
3	Agricultural field drainage	*Drainage infrastructure and ditches in the South Lynden WID are actively and effectively maintained.*	· *Done (2017) Complete a 5-year programmatic drainage permit*
4	Flood management & protection	*Agricultural lands in the South Lynden WID are protected from flooding due to surface water runoff at critical times in the growing season.*	· *(2017) Interact with County Flood Mgt. regarding gravel removal & funding concerns*
v	Communication, outreach and education	*Internal: WID members are aware of and understand the WID's priority issues and they participate actively in WID planning and implementation of priority actions.* *External: Non-agricultural residents in the WID area, other external stakeholders and relevant bodies & agencies are aware of, understand and support the South Lynden WID's priority actions.*	
vi	Water flow processes; Habitats & species	*The South Lynden WID's plans and actions help to protect and enhance water flow processes as well as fish and wildlife habitats in the South Lynden watershed.*	
vii	*Agricultural protection (Protecting the agricultural industry)*	*The South Lynden WID's plans and actions contribute to the recognition, protection and strengthening of the agricultural base in the WID area.*	

Notes for WID board

- *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 of the Preliminary Plan: discussion on preliminary scope of work for such tasks).*
- *Ordering: Items numbered 1 through 4 in Table 1 are ordered by priority according to the results of the March WID planning sessions. In June 2017, the board noted that water quality and water quantity are considered of equal importance, and suggested they be numbered 1A & 1B. Items (v) to (vii) are in no particular order of priority.*

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

	Desired outcome(s):	Measurable goals	Actions
1A	*Water quality Reviewed & updated after board meeting September 2017*		
	Agricultural activities in the South Lynden WID do not cause water quality standards to be exceeded in surface water and groundwater bodies within the WID area.	*Goal statement:* *Relevant water quality standards are met for surface and groundwater within agricultural lands* *Progress could be measured by:* *Achievement of required water quality standards*	Recently completed or ongoing: *i. Coordinated with other WIDs in supporting work to test and apply technology for tracking fecal pollution to its origins using DNA markers.* *ii. Continued with the ongoing water quality monitoring program, and developed a consistent approach for responding to water quality concerns (Jan 2016 meeting minutes).* *iii. Contacts with WID landowners to resolve water quality concerns that arose in the monitoring program (as reported at regular WID board meetings)* *iv. Identified reduction of sediment and nutrient export as a priority in Ag-Watershed Characterization and Mapping Report.* *v. (2017) Initiated DNA source tracking pilot program in Scott Ditch.* Priority actions for management plan: *vi. Coordinate with other WIDs on funding for and implementation of source tracking using DNA markers (noted from March 20 work session)** *vii. Continue with the ongoing water quality monitoring & response program (noted from March 20 work session)* *Additional actions that might be considered for inclusion here (from meeting discussions & other WID documents):* *viii. Communicate water quality results to farmers in newsletter or outreach event* *ix. Encourage all agricultural landowners in the WID to implement appropriate BMPs, with assistance from the Conservation District** *x. Coordinate with Ag Water Board and other WIDs on water quality programs and responses, including Portage Bay Partnership, implementation of best management practices.* *xi. Maintain a watching brief on installation of ZAPS technology for real-time monitoring of fecal coliforms/E. Coli in water, as Whatcom Conservation District & County Department of Health plan to install several ZAPS units in the area waterways.* *xii. Consider initiating more intensive local research into sources & factors affecting fecal coliform survival/die-off in the aquatic environment (Nov 2016 meeting minutes)* ** denotes actions that may need additional resources, and more detailed scope & description (see section 5)*

	Desired outcome(s):	Measurable goals	Actions
1B	*Water quantity: Water for agricultural uses (irrigation, livestock, processing)* *Reviewed & updated after board meeting September 2017*		
	Farmers in the South Lynden WID have secure (legal) access to sufficient supplies of water for agricultural uses.	*Goal statements:* *(a) Sufficient supply of water is available for agricultural uses.* *(b) All agricultural water use in the WID is secured through certificate, water lease or water supplier (such as water association or water bank).* *Progress could be measured by:* *(a) Extent of shortfall (if any) between water demand and water availability.* *(b) % of total agricultural water use in the WID that is secured through certificate, water lease or water supplier (such as water association).*	Recently completed or ongoing: *i. Proposed petitioning legislators to change some water laws (Jan 2017 meeting minutes).* *ii. Board has been tracking work by the Whatcom Water Supply Coalition on development of a water bank.* *iii. Explored options for applying water banking concepts in Whatcom County and for possible storage of water for later use (March 20 notes)* *iv. Supported the County's groundwater modeling project* Priority actions for management plan: *v. Support & coordinate with Ag Water Board for actions related to water rights and for participation in the Water Supply Work Group* *vi. Expand hydrological analysis to include surface water, climate, and evapotranspiration, to assess overall water use and water availability and to identify shortfalls – possibly coordinate with other WIDs on the analysis** *vii. 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.** *viii. Support & coordinate with Ag Water Board to communicate water rights concerns with legislators (noted from March 20 work session)* ** denotes actions that may need additional resources, and more detailed scope & description (see section 5 of this Preliminary Plan)*

	Desired outcome(s):	Measurable goals	Actions
3	*Agricultural field drainage Reviewed & updated after board meeting September 2017*		
	Drainage infrastructure and ditches in the South Lynden WID are actively and effectively maintained.	*Goal statement (a):* *Regular, scheduled drainage maintenance in the S. Lynden WID area occurs under programmatic permits, in collaboration with DID#5 & #6 and CDID#20 & #21, with mitigation as required and using approved Best Management Practices.* *Progress could be measured by:* *% of agricultural land requiring field drainage in the South Lynden WID:* *- that is covered by programmatic permits for drainage maintenance;* *- where drainage infrastructure and ditches have been maintained and repaired as needed.*	Recently completed or ongoing: *i. Provided financial support for mitigation associated with drainage maintenance (Feb 2017)* *ii. Identified priority drainage problem areas for Ag-Watershed Characterization and Mapping report (Jan 2016 work session) – see agricultural enhancement tables in Appendix B of this document, also Table 4 and map in Figure 8 of this Preliminary Plan.* *iii. Communicated with DID #21 about maintenance on Scott Ditch* *iv. (2017) Submitted & obtained a programmatic drainage permit application for South Lynden WID* Priority actions for management plan: *v. Proactively identify locations for mitigation sites and mitigation actions to be addressed in a drainage permit, that could also contribute to advancing watershed & habitat priorities (see sections 5.3 and 5.5 of this Preliminary Plan)* *vi. Coordinate with Whatcom County to prioritize sites for ditch cleaning and mowing*
		Goal statement(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#5 & #6, CDID#20 &21 and Whatcom County.* *Progress could be measured by:* *Number of ad hoc emergency repairs/actions that are completed in a year, compared to the number reported as needing attention.*	Recently completed or ongoing: Priority actions for management plan: *i. 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.*

	Desired outcome(s):	Measurable goals	Actions
4	*Flood management & protection Reviewed & updated after board meeting September 2017*		
	Agricultural lands in the South Lynden WID are protected from flooding due to surface water runoff at critical times in the growing season.	*Goal statement (a):* *Regular, scheduled maintenance is completed for flood protection infrastructure in the S. Lynden WID area.* *Progress could be measured by:* *Number of projects, repairs or actions that are completed in a year, compared to the number reported as needing attention.*	Recently completed or ongoing: *i. Identified flood management and dike maintenance priority actions as part of Ag-Watershed Characterization and Mapping work session in January 2016 (see agricultural enhancement tables in Appendix B, also Table 4 and map in Figure 8 of this Preliminary Plan)* Priority actions for management plan: *ii. Interact with County Flood Mgt. regarding gravel removal & funding concerns (9/2017 meeting)* *iii. Review and update priority actions identified at the January 2016 work session (see list in Table 4 and map in Figure 8 of this Preliminary Plan, which include several possible actions to maintain flood infrastructure in specific locations within the South Lynden WID area.)* *iv. Consider requesting study on the costs and benefits of placing a seasonal floodgate on Scott Ditch to address the spring flooding issues (discussed at Dec 2015 meeting).* v. *Consider coordinating with FCZD on levee maintenance particularly the Hampton levee (discussed at April 2016 meeting)*
		Goal statement (b): *Ad hoc or emergency repairs to flood protection infrastructure are completed in a timely manner, in collaboration with Whatcom County.* *Progress could be measured by:* *Number of ad hoc emergency repairs that are completed in a year, compared to the number reported as needing attention.*	Recently completed or ongoing: Priority actions for management plan:

	Desired outcome(s):	Measurable goals	Actions
v	*Communication, outreach, education and reporting Reviewed & updated after board meeting September 2017*		
	Internal: WID members are aware of and understand the priority issues and participate actively in WID planning & implementation of priority actions.	Internal Progress could be measured by: *Number of 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)*	*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.* Recently completed or ongoing: *i. Set up the WID website www.southlyndenwid.com (2015)* *Letter to WID members regarding rates, accomplishments to date (Nov 2015)* *ii. Published Ag Water Board introductory story map with general information about the WIDs* http://www.agwaterboard.com/storymap *iii. Work session in 2016 to map and characterize priorities for the WID (Mapping Report produced with the Ag-Watershed Project team)* *iv. Published story map as part of Ag-Watershed Characterization and Mapping project* http://arcg.is/29qspLX *(Oct 2016)* *v. Distributed newsletter summarizing WID activities (Sep 2016)* *vi. Sponsored Whatcom Conservation District speaker series (Nov 2016)* *vii. Outreach by the AWB (booth) on behalf of the WIDs at the Small Fruit Conference (Nov 30 – Dec 1, 2016)* *viii. Sponsored WSU Water Workshop (Feb 2017)* Priority actions for management plan: *ix. Establish a template for tracking and regular reporting of WID progress on priority issues, based on a set of simple indicators of progress.** *x. Continue to distribute newsletter to WID members summarizing WID progress.* *xi. Seek grant funding to develop and implement a comprehensive management plan* *xii. Coordinate with other WIDs to help members build skills for effective engagement and communication (March 20th work session).*
	External: Non-agricultural residents and other stakeholders outside the WID are aware of, understand and support the South. Lynden WID's priority actions.	External Progress could be measured by: *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)*	*External: While external communication and engagement could be coordinated through the Ag Water Board and Whatcom Family Farmers, South Lynden-specific information and inputs will be needed to support these efforts.* Recently completed or ongoing: *i. Reviewed & submitted comments on County Critical Areas Ordinance Update via the Ag Water Board (April 2016).* *ii. Provided feedback on Whatcom Conservation District's 2017 work plan (Sep 2016).* Priority actions for management plan: *iii. Coordinate with other WIDs to share what farmers are doing to benefit water quality and habitat (March 20th work session notes)* *iv. Coordinate with other WIDs to track legislation, rule-making, agendas and impacts on agriculture at County, State, Federal levels (March 20th 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 (see section 5 of this Preliminary Plan)*

	Desired outcome(s):	Measurable goals	Actions
vi	*Water flow processes; Habitats & species (Version 1 of August 2017)*		
	The South Lynden WID's plans and actions help to protect and enhance water flow processes and fish and wildlife habitats in the S. Lynden watershed	*Goal statement:* *Water flow processes (surface storage, discharge, recharge, delivery) are enhanced or protected as necessary in areas that are important for the watershed (see Figures 14 and 15 in the WID mapping report: contained in Appendix C of this Preliminary Plan).* *Progress could be measured by:* *Some options for measuring progress:* - *Status of water flow process degradation (H, MH, M, L) in assessment units within the South Lynden WID area.* - *% effective shade cover along fish-bearing streams and ditches.* - *Acres of wetland or wildlife habitat enhanced, restored and/or protected*	Recently completed or ongoing: *I. Watershed assessment for the Ag-Watershed Project (Jan 2016) identified priority areas where water flow processes – especially storage and discharge - could be enhanced through wetlands, ground water recharge and planting of riparian vegetation (see watershed characterization tables in Appendix B of this Preliminary Plan).* *II. Habitat assessment by the Conservation District (April 2017) identified multiple opportunities for habitat enhancement projects, including riparian planting and improved fish passage.* Priority actions for management plan: *III. Review possible actions to enhance or protect water flow processes in specific locations within the South Lynden WID area, as listed in the watershed characterization tables prepared during the WID work session in January 2016 (see tables in Appendix B of this Preliminary Plan).** · *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.* *IV. coordinate possible actions with development of programmatic drainage permits, in order to utilize opportunities to "bank" mitigation that might be required for drainage permits. ** ** denotes actions that may need additional resources & more detailed scope & description (see section 5 of this Preliminary Plan)*

	Desired outcome(s):	Measurable goals	Actions
vii	*Agricultural protection (Protecting the agricultural industry) (Version 1 of August 2017)*		
	The South Lynden WID's plans and actions contribute to the recognition, protection and strengthening of the agricultural base in the WID area.	*Goal statement (a):* *Important agricultural land in the WID is protected from conversion through appropriate zoning and/or voluntary agricultural conservation easements.* *Progress could be measured by:* *Acres of land in the South Lynden WID protected by voluntary agricultural conservation easements*	*Note that WID actions could contribute to this priority issue, but there are also external factors influencing it, such as land prices, agricultural markets & policies etc.* *"Preserving the land base" is a stated priority from the mapping report (2016), but the board meeting minutes do not show any detailed discussion of this issue.* Recently completed or ongoing: Priority actions for management plan:
		Goal statement (b) *Land use conflicts with neighboring non-agricultural landowners are reduced.* *Progress could be measured by:* *Number of complaints received from non-agricultural landowners by the WID or by Whatcom County.*	Recently completed or ongoing: Priority actions for management plan: *i. 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 & description (see section 5 of this Preliminary Plan)*
		Goal statement (c): *Suggestions from WID board for goal statements that might apply here to indicate recognition, protection & strength of agriculture?* *Progress could be measured by:* *An example of a measurable achievement might be adoption of the County Council resolution on preserving 100,000 acres for the ag land base, which recognizes the importance of agriculture and associated industries for the local economy.*	Recently completed or ongoing: Priority actions for management plan: *ii. coordinate with Whatcom Family Farmers to address legal challenges and preserve "one voice outreach" on behalf of agriculture (from March 20 work session)*

3 GENERAL OVERVIEW OF THE WID

Explanatory note
The following text describing the South Lynden watershed and WID area is copied from the 2016 characterization & mapping report,[7] 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 South Lynden 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 South Lynden WID can be found online:

- WID website http://www.southlyndenwid.com/
- Agriculture-Watershed Characterization & Mapping Report for the South Lynden WID (2016) www.southlyndenwid.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 South Lynden Watershed Improvement District (see location map in Figure 1) is located in the central lowland area of Whatcom County, adjacent to, and in the floodplain of, the main Nooksack River. The closest city, Lynden (pop. 12,900), borders the WID to the northwest.

The total calculated area within the WID boundary as shown in Figure 3 is 17,367 acres. Within this boundary, the area of land currently on the South Lynden WID assessment roll is 13,080 acres. The assessment roll 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).[8]

The WID area includes portions of significant tributaries to the Nooksack River: Kamm Creek, Scott Ditch, and the northern part of the Wiser Lake/Cougar Creek watershed. These tributaries and other drainages are included in Water Resource Inventory Area 1 (WRIA 1).

The Sumas-Blaine aquifer (the portion of the larger Abbotsford-Sumas aquifer that lies on the US side of the Border), underlies the Kamm Creek portion of the South Lynden watershed (see Figure 2). This aquifer is characterized by its shallow depth to water (less than 10 feet in most areas), limited thickness (mostly

[7] See: South Lynden WID mapping report (2016) Download from http://www.southlyndenwid.com/
[8] Henry Bierlink, Ag Water Board. May, 2017. The total number of acres on the assessment roll can vary somewhat over time as assessed parcels are consolidated or segregated. In addition, some currently enrolled acres are located outside the official WID boundary.

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.[9]

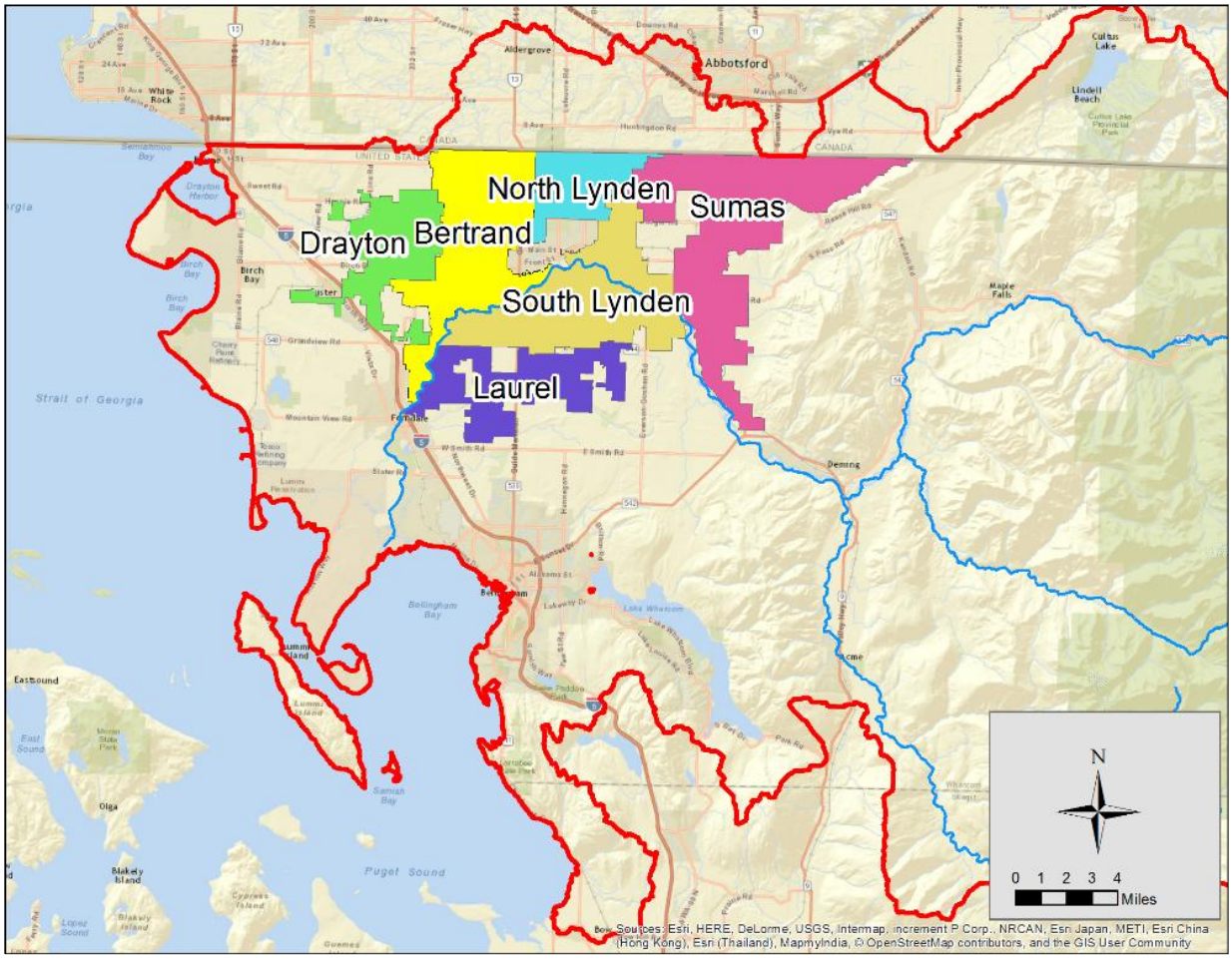

Figure 1. Map showing location of the South Lynden WID, with Water Resource Inventory Area 1 outlined in red. Reproduced from the South Lynden mapping report (2016).

[9] 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 2. Map showing aquifers in the vicinity of the South Lynden WID.

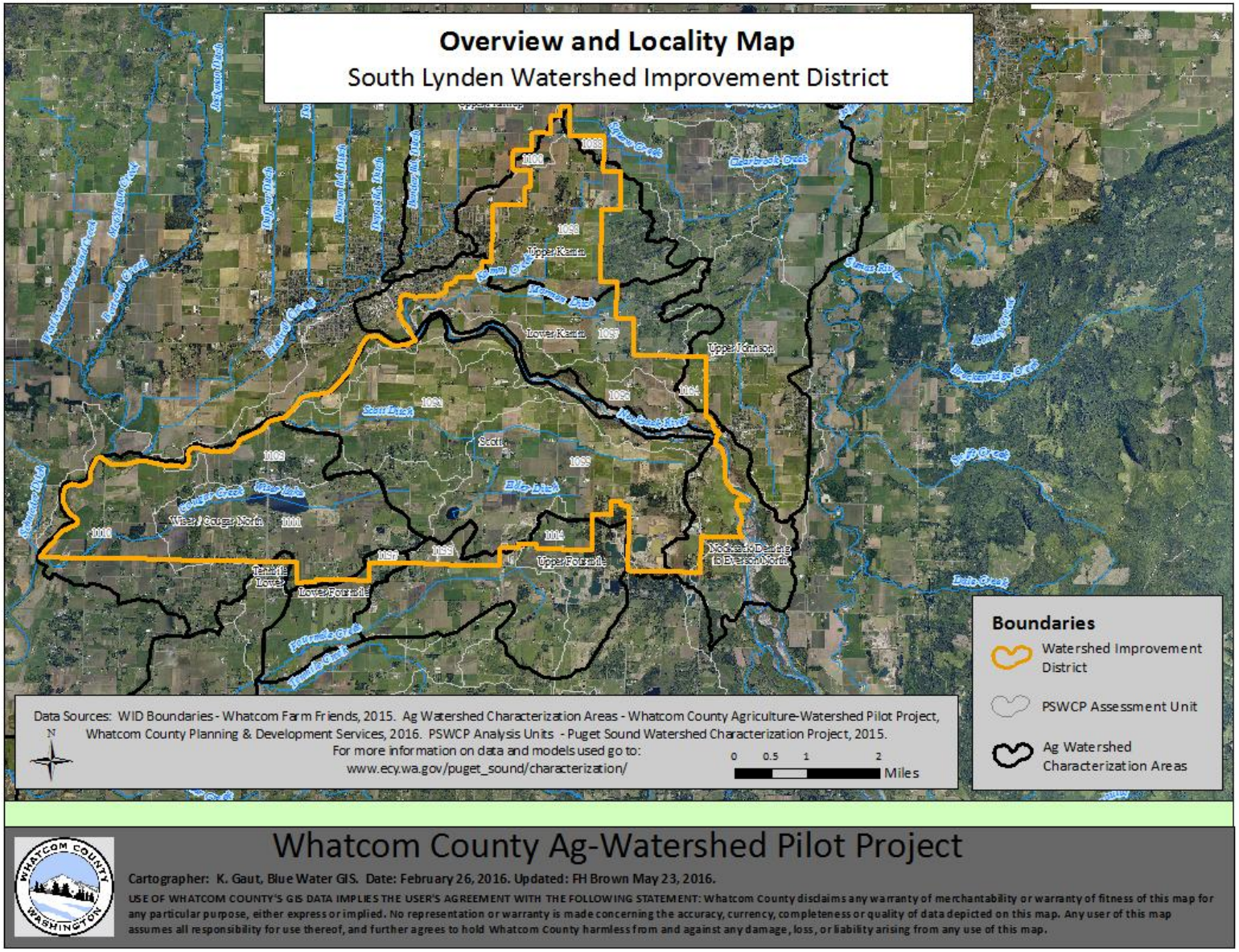

Figure 3. South Lynden WID overview map. Reproduced from the South Lynden WID mapping report (2016).

Version 2 October 2017

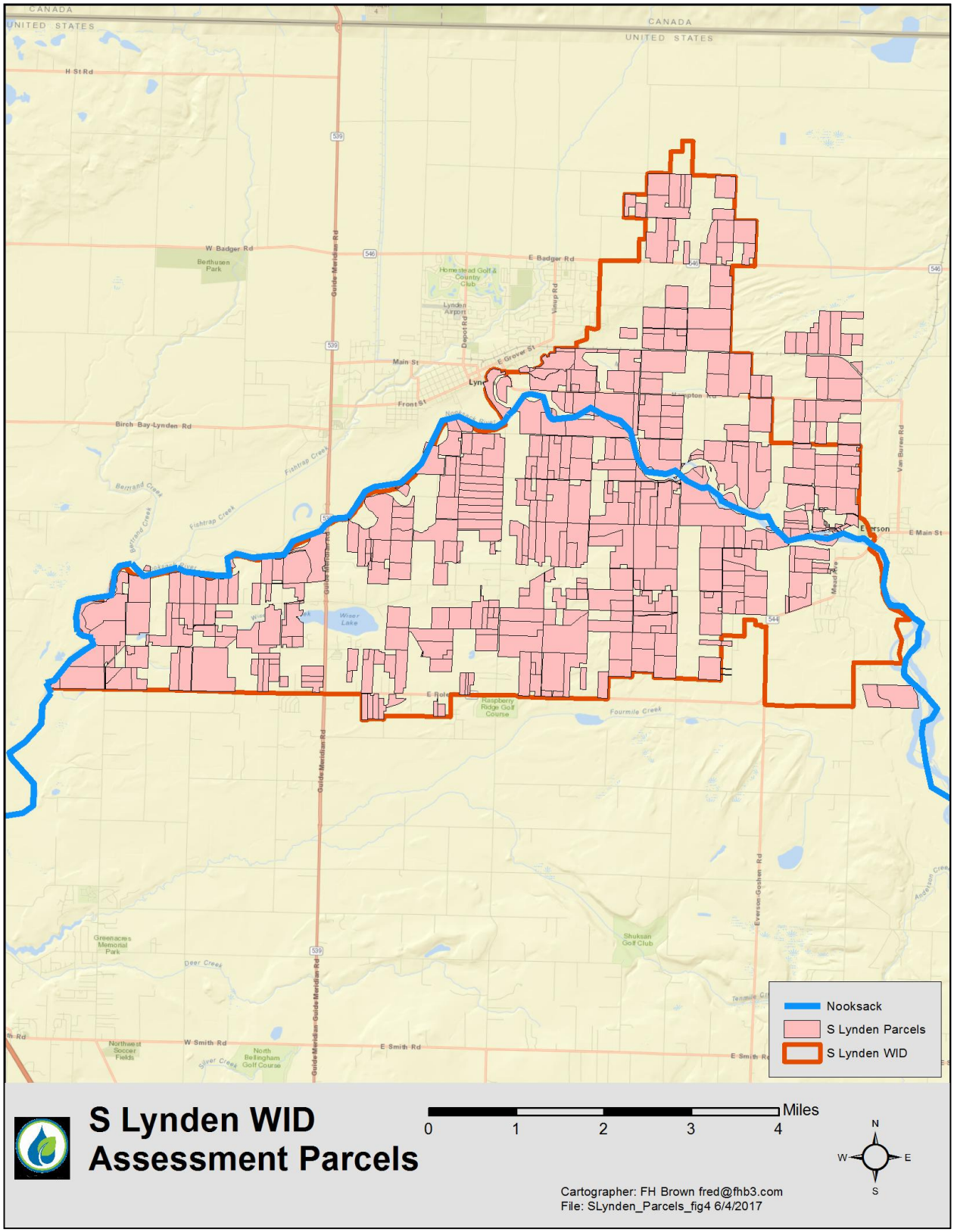

Figure 4. Map of parcels included in the South Lynden WID assessment roll (May 2017). Data provided by Ag Water Board.

3.2 Historic conditions in the South Lynden WID area

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.[10] A trail from Bellingham to present-day Everson known as the Whatcom Trail was used to access clamming areas, and other shellfish grounds, on Bellingham Bay and also to conduct trade between tribal communities on Birch Bay and in Canada.[11] Another trail stretched from Dakota Creek in Semiahmoo territory east to the Kamm Creek watershed and then roughly north to Canada.[12] Native Americans also used the extensive waterways of a huge wetland complex between Fishtrap Creek and the Fraser River to travel.[13]

The map shown in xxx was prepared in 1858 and shows local topography and wildlife "of special interest" to the tribes in the area at the time.[14]

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,[15] and also to harvest fern roots and camas bulbs. After the potato was introduced to the Tribe by the Hudson's Bay Company sometime after the establishment of Fort Langley in 1828, the Nooksack people began cultivating and trading it as well.[16]

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[10] 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

[11] Oakley, J. 2004. "Construction begins on the Whatcom Trail in September 1857" *History Link.org* http://www.historylink.org/File/7112

[12] Richardson, A., B. Galloway, 2011. *Nooksack Place Names. Geography, Culture and Language.* Vancouver, CA: UBC Press

[13] Luginbill, T. 2017 [personal communication February 21, 2017].

[14] 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.

[15] 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.

[16] 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.

Some of the prairie land used by the Nooksack people was located between Lynden and Everson.[17] The General Land Office (GLO) cadastral survey of Township 40N, Range 3E, which covers much of the South Lynden WID area, conducted in November 1872 described grassland areas, or "prairie," on the north valley side, near present-day Lynden.[18] Collins and Sheikh, in their 2004 report *Historical riverine dynamics and habitats of the Nooksack River* state that "indigenous populations may have created and maintained this forest opening (and likely other, small, unmapped openings) as was common in other Pacific Northwest environments …, or they may have been natural openings created by wet soils."[19]

The book *Nooksack Place Names, Geography, Culture, and Language*[20] provides information about numerous named places in the area east of modern-day Lynden, some of which are described as prairie areas. A large prairie east of Lynden named Kw'elástem7ey was important for berry picking and root digging, and there was another village site and prairie area named Pá7atstel near what is now the intersection of Northwood Road and East Badger, north of the Jobe Cemetery.[21]

Nooksack Place Names also provides information about important water resources. In the area east of Lynden, Sa7átsnets was a shallow lake which formerly extended for about ½ mile to ¾ mile west of Northwood Road in an area that is now bisected by train tracks. It was a habitat for beaver, geese, and swans.[22] Smátentsot, now Kamm Creek, was fished for silver salmon into the 20th century. A smokehouse along the creek was called "Ka-nak-na-hi".[23]

In the area of the South Lynden WID south of the Nooksack River, there are just a few Nooksack place names. Two of these describe water features that persist today. Lhelhókw'ey, the Nooksack name for what is now called Wiser Lake, means "many-flying place." The shallow lake had a marshy border that was good for waterfowl.[24] And Kw'íshilwalh, now known as Fountain Lake, was a small lake with a marshy border where Indian potatoes were gathered. Wild cranberries and Labrador (swamp) tea used to grow in a bog off the east side of the lake.[25]

Wetlands were also prevalent in the South Lynden WID area. *Historical riverine dynamics and habitats of the Nooksack River* (Collins, and Sheikh, 2004), describes the pre-European settlement conditions on the Nooksack River floodplain – a band up to approximately 3 km wide on either side of the Nooksack River. The river bed and its meander belt had been built up by post-glacial deposits to about 3-4 feet above the valley bottom and extensive freshwater wetlands (primarily with scrub-shrub vegetation and having numerous beaver dams) occupied the low areas close to the meander belt of the lower Nooksack.[26] GLO field surveyor notes called these areas "hardhack swamp," "willow swamp," and "beaver swamp."[27]

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[17] 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.
[18] Collins, B. D., and A. J. Sheikh, 2004. *Historical riverine dynamics and habitats of the Nooksack River; May 2003 (revised August 2004).* Deming, WA: Nooksack Indian Tribe
[19] Collins, B. D., and A. J. Sheikh, 2004. Ibid.
[20] Richardson, A., B. Galloway, 2011. Ibid.
[21] Richardson, A., B. Galloway, 2011. Ibid.
[22] Richardson, A., B. Galloway, 2011. Ibid.
[23] Richardson, A., B. Galloway, 2011. Ibid.
[24] Richardson, A., B. Galloway, 2011. Ibid.
[25] Richardson, A., B. Galloway, 2011. Ibid.
[26] Collins, B. D., and A. J. Sheikh, 2004. Ibid.
[27] From Collins, B. D., and A. J. Sheikh, 2004. Ibid.

Notes from the survey of Township 40N, Range 3E done in November 1872, which covers much of the South Lynden WID area, include "2-4 feet water" and "swamp water."[28]

A section of GLO survey map from between 1850 and 1890 of the area around Wiser Lake and east to just beyond Hannegan Road (including the area of DID #5) shows extensive wet areas.[29] Another section of the GLO survey map of the area around Scott Ditch, Elder Ditch, and Fountain Lake (including the area of CDID #21) also shows pretty extensive wet areas. [30]

Wetlands intermixed with prairie areas were also described in a letter written by a William Smith and published in the Northern Light on July 2, 1858. Smith, who traveled northeast along the Whatcom Trail which ran through the southeastern portion of the South Lynden WID area, described the land 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."[31] A little further south of the South Lynden WID area, the Whatcom trail crossed Tenmile creek at Nekiyéy, a settlement near the present-day Meridian Middle School and the trail is described as having "wandered through beaver ponds and heavy forests."[32]

Collins and Sheik (2004) report that field notes from the GLO cadastral survey from 1859-1893 describe forests dominated by hardwoods. Red alder was the most common tree and was found at all elevations. Western red cedar was the most common conifer as well as the largest tree. Sitka spruce, Pacific crabapple, willow, and birch were found in the lower elevations, black cottonwood was found at moderate elevations, and western hemlock at the highest elevations. Adjacent to the river, black cottonwood and Sitka spruce were the largest-diameter trees and cottonwood was almost as abundant as alder. Further away from the river, Douglas fir and cedar were the largest trees.[33] Within wetlands, the tree species composition was similar to streamside forest, except cottonwood was absent, few trees were large, and birch and crabapple were more common."[34]

European settlers began to clear the land and convert it to agriculture in the late 1800's. In the Lynden area, as more settlers arrived they began gradually clearing out the heavy forest in the area during the 1870s[35] and they began to drain the land for agriculture at around the same time - in the mid to late

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[28] Collins, B. D., and A. J. Sheikh, 2004. Ibid.

[29] Drainage Irrigation District #5, Whatcom Conservation District, Whatcom County Public Works, 2008. *Whatcom County Drainage Improvement District #5 Drainage Management Plan.* Support provided by Centennial Clean Water Fund under authority of the Washington State Department of Ecology. Available at: http://whatcomcd.org/sites/default/files/ag_drainage/dmps/DID%235_DMP.pdf [last accessed June 9, 2017]

[30] Drainage Irrigation District #21, Whatcom Conservation District, Whatcom County Public Works, 2008? *Whatcom County Drainage Improvement District #5 Drainage Management Plan.* Support provided by Centennial Clean Water Fund under authority of the Washington State Department of Ecology. Available at: http://whatcomcd.org/sites/default/files/ag_drainage/dmps/DID%235_DMP.pdf [last accessed June 9, 2017]

[31] 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.

[32] Oakley, J. 2004. "Construction begins on the Whatcom Trail in September 1857" *History Link.org* http://www.historylink.org/File/7112

[33] From Collins, B. D., and A. J. Sheikh, 2004. Ibid.

[34] From Collins, B. D., and A. J. Sheikh, 2004. Ibid.

[35] Dougherty, P. 2008. "Lynden – Thumbnail History" *History Link.org*. http://www.historylink.org/File/8393 [last accessed June 14, 2017]

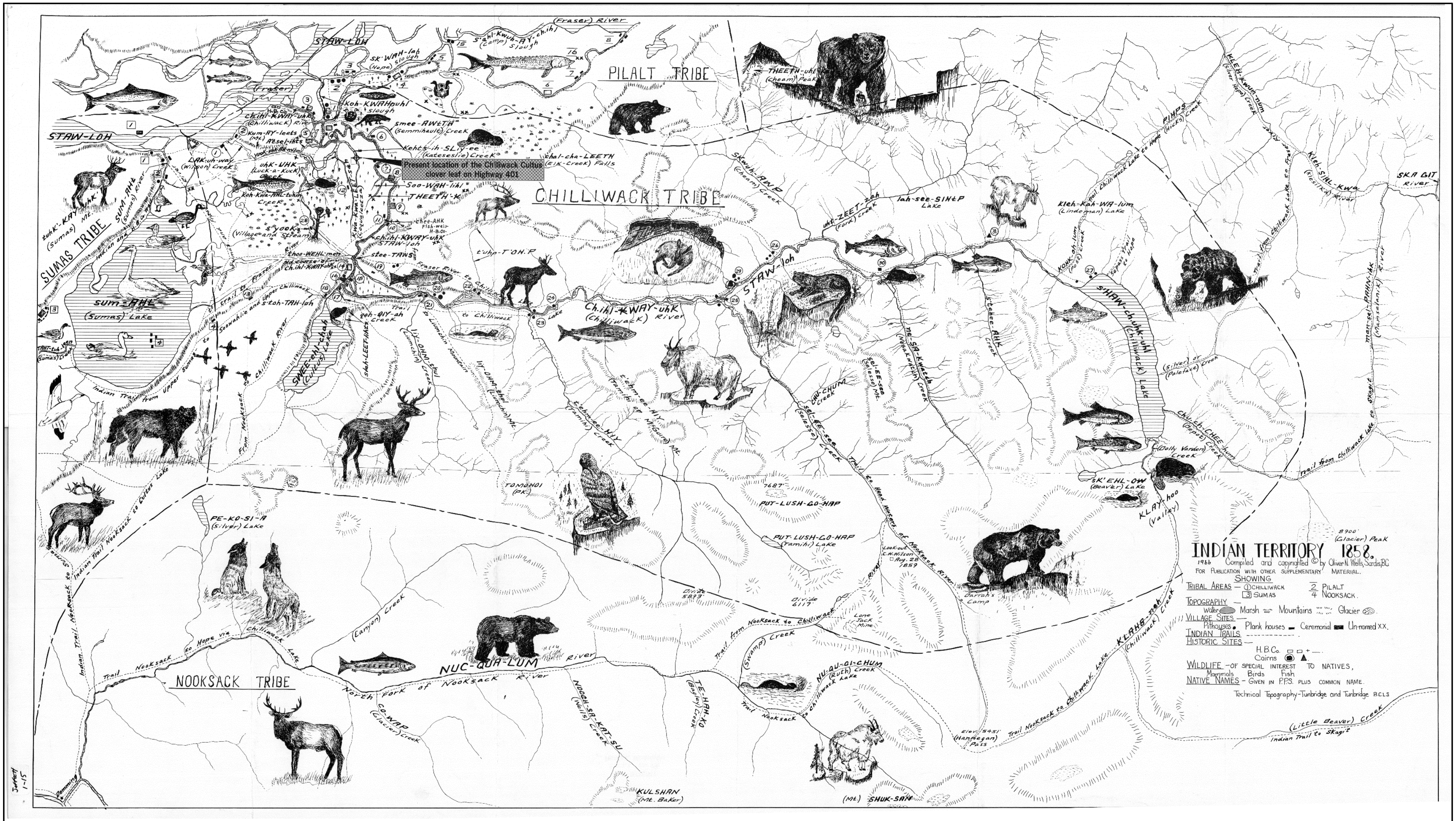
1800s.[36] By 1880 agricultural settlements were distributed throughout the Whatcom County region with a relatively large number of settlers in Ferndale, Lynden, and Everson.[37] The first agricultural efforts were simple subsistence farming, but by 1885 the settlers began large scale clearing of the land to support market agriculture.[38]

Lynden began the 1890s as a logging town. Sawmills continued to clear the abundant forests in the area for the next decade. By 1900, agriculture was on its way to becoming the dominant industry, particularly dairy and berry farms. Vegetables, (beans, carrots, and beets), grains (barley and oats), and hops were also grown by many Lynden farmers. [39]

Dense stands of cedar and fir near Everson and Nooksack also supported lumber and shingle mills in the late 1800s and early 1900s[40] and in *Tales of Ten Mile, 1888 to 1940*,[41] the author describes the process of clearing land for a farm in the Ten Mile area. The land purchased by Marion Meyers and his wife Carrie Meyers in 1888, was adjacent to the Telegraph Road (formerly the Whatcom Trail) near what is now the intersection of Hannegan and E. Hemmi Roads.[42] The author writes, "the farm was covered with huge trees which had to be removed before the land could be put under cultivation. The cedar trees were of value…" and cedar wood was put to many uses, but "The value of the fir tree was so little that huge trees were burned in order to remove them from the land. There were other trees growing on the acreage that Marion Myers purchased, spruce, cottonwood, willow, hemlock, maple, vine maple, alder, birch and cascara. The bark of the cascara was peeled and sold, to be used for medicinal purposes."[43] Marion Meyers became one of the first chicken farmers in Whatcom County. After a fruit cannery opened in 1887, he planted nearly ten acres of fruit trees.[44]

The Nooksack valley's forests and wetlands were transformed within the first few decades of settlement. By the beginning of the 20th century, most of the native forest had been burned or logged, and most wetlands had been diked and ditched. By 1938, the burned or logged lands in the lower mainstem were almost entirely converted to agriculture.[45]

[36] Luginbill, T. 2017 [personal communication February 21, 2017] and Perry, R. 2017 [personal communication February 14, 2017]
[37] 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.
[38] Luginbill, T. 2017 [personal communication February 21, 2017] and Perry, R. 2017 [personal communication February 14, 2017]
[39] Dougherty, P. 2008. Ibid.
[40] Moles, K. 2014. "Everson – Thumbnail History." *HistoryLink.org* http://www.historylink.org/File/10775
[41] Johnson, L. 1981. *Tales of Ten Mile, 1888 to 1940.* Bellingham, Washington: Texttype Publishing
[42] Johnson, L. 1981. *Ibid.*
[43] Johnson, L. 1981. *Ibid.*
[44] Johnson, L. 1981. *Ibid.*
[45] Collins, B. D., and A. J. Sheikh, 2004. Ibid.



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.

3.3 Soils and land use

Based on the soil capability, the majority of the South Lynden WID area has been classified by the USDA Natural Resources Conservation Service as "Prime farmland" or "Prime if managed"[46] 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 South Lynden WID assessment roll as at May 2017. A map of all prime soils in the South Lynden WID is included in Appendix C of this document.

Land use within the WID is predominantly agricultural. The majority of the land within the WID area is designated as Agricultural District of Whatcom County (AG zoning).[47] Dairy farms and fields (corn, hay, and pasture) are the predominant agricultural uses in the WID, followed by berry crops.[48] Maps of agricultural land use inventory and important agricultural land in the South Lynden WID are included in Appendix C.

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

Prime Farmland Category	Description	Acres included in South Lynden WID assessment roll (May 2017)[49]
0	Not prime farmland	240
1	All areas are prime farmland	6092
2	Prime if drained	6448
4	Prime if irrigated	141
7	Prime if irrigated and either protected from flooding or not frequently flooded during the growing season	26
8	Prime if subsoiled	78
30	Farmland of Statewide Importance[50]	55
	Acres in WID assessment roll	*13080*

[46] See definitions in the National Soil Survey Handbook: NSSH Part 622

[47] Whatcom County Title 20 zoning maps http://www.whatcomcounty.us/822/Zoning-Maps [last accessed May 9, 2017]

[48] The story map for the Ag Water Board contains maps and graphs of crop acreages in each WID. See http://www.agwaterboard.com/storymap

[49] Assessment roll data provided by Henry Bierlink in May 2017. The slight difference in total acres assessed is due to changes to the assessment roll as assessed parcels are consolidated or segregated.

[50] 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.

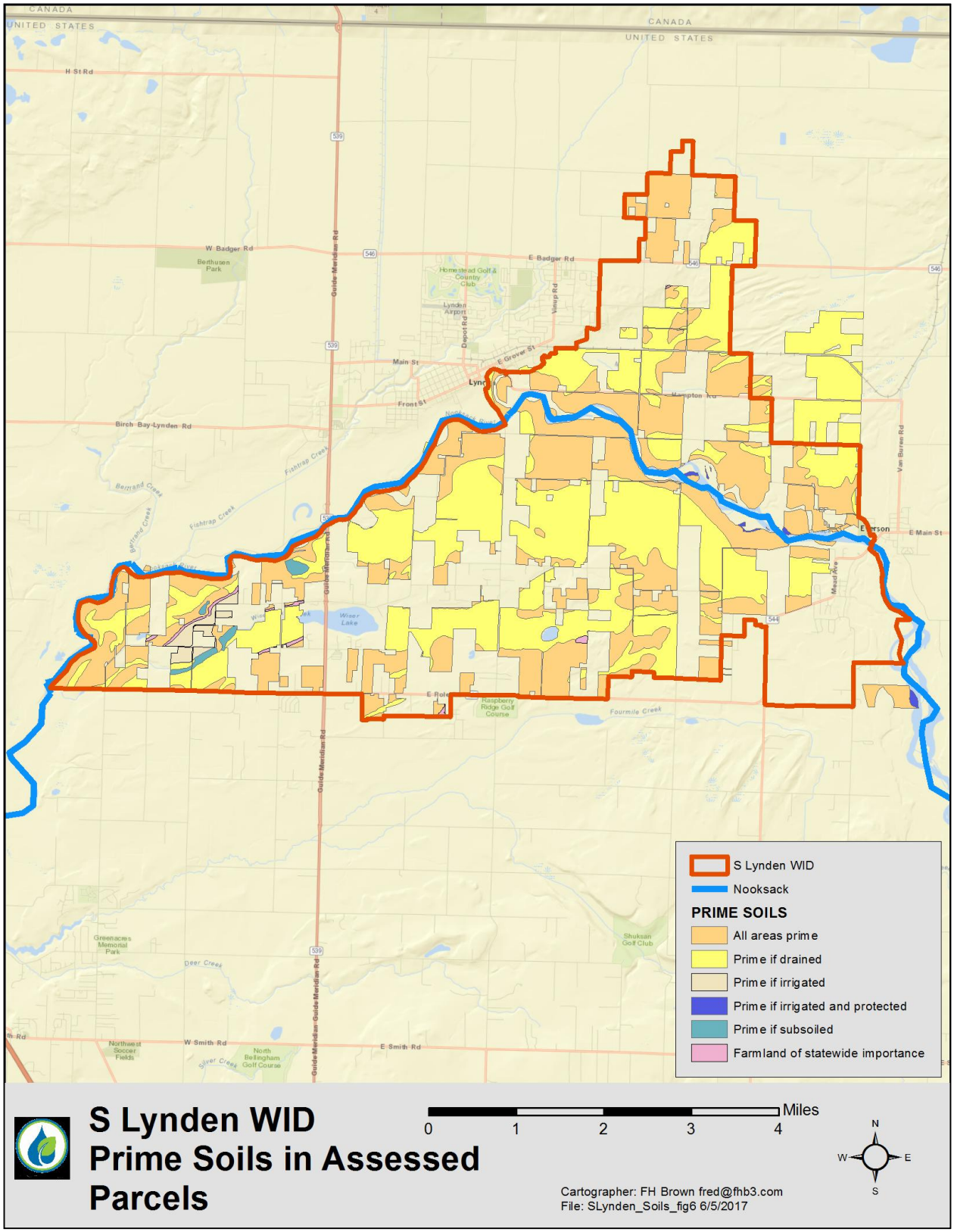


Figure 6. Map showing prime soils in parcels that are currently on the South Lynden WID assessment roll. Soil data from SSURGO (NRCS). Parcel data from Ag Water Board.

3.4 Water quantity, water use and water availability

The location of existing groundwater and surface water rights within the South Lynden WID is shown in the water rights map in Appendix B.[51] Many new applications and change applications are also on record for the South Lynden WID area and are shown in this map.

Two reports are useful to understanding the water use in this area: *Quantification of Agricultural Irrigation Water Use and Water Rights*[52] published in 2016, and the *2010 State of the Watershed Report.*[53] Both of these documents organize water use information by watershed. Kamm Creek and Scott Ditch watersheds lie mostly within the WID boundaries. About half of Wiser Lake/Cougar Creek is within the WID and small sections of the Tenmile, Fourmile, and the Nooksack Deming to Everson watersheds are also included.

The report *Quantification of Agricultural Irrigation Water Use and Water Rights*[54] (2016) estimates water use for agriculture based on crop types, and irrigation methods, and acreage for WRIA 1. Figures for the watersheds relevant to the South Lynden WID are reported below. Please note that in this report the Fourmile and Tenmile watersheds are included in the larger Barrett Lake watershed.

Table 4. Estimated agricultural water use in selected watersheds in the South Lynden area

	Total acres	Agricultural acres	Irrigated acres	Estimated water use in acre-feet per year
Watersheds which lie mostly within the WID				
Kamm Creek	6,467	3,397	2,344	3,404
Scott Ditch	6,900	4,370	2,974	4,214
Watersheds only partly within the WID				
Wiser Lake/Cougar Creek	7,994	3,971	2,425	4,021
Barrett Lake (includes Fourmile, Tenmile, Fazon, and Deer Creeks	22,671	6,436	2,859	4,645
Nooksack Deming to Everson	15,637	1,344	616	980

The *2010 State of the Watershed Report*[55] describes metered and modeled water use in the Lower Nooksack watershed which includes the South Lynden WID area. A small percentage of water use in the area is metered. This metered water use ranges from less than 5% of total water use in the Scott and Fourmile watersheds up to about 20% of total water use in the Kamm watershed. The volume of remaining non-metered water uses, for residential, commercial, and agricultural needs, is estimated from modeled data. Most of the modeled water use is attributed to agriculture in the area, and accounts for

[51] See Appendix C for the reference map on agricultural water rights points of diversion in the South Lynden WID. That map is reproduced from the South Lynden WID mapping report (2016).
[52] 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]
[53] 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]
[54] RH2 Engineering, Inc., 2016. *Quantification of Agricultural Irrigation Water Use and Water Rights,* ibid.
[55] Peterson, B., Gill, P. and J. Fleishmann. 2011. *Ibid.*

approximately 75% to 95% of the total water use in the Tenmile, Kamm, Nooksack Deming to Everson, Fourmile, Wiser Lake/Cougar Creek, and Scott watersheds (in order of lowest to highest). In these same watersheds, modeled residential use ranges from approximately 5% in Kamm up to approximately 15% in Fourmile.

Within the South Lynden WID, 60 new applications for water rights have been filed, which indicates a significant demand. Kamm Ditch/Stickney Slough and Wiser Lake are closed year-round to further appropriations unless mitigated, and Wiser Lake Creek is closed to new withdrawals from May 1 to October 31. Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[56] Some Group A public suppliers in this part of the lower Nooksack watershed do not have adequate water rights in suitable locations to meet projected future demand.[57]

3.5 Water quality

Surface water quality impairments have been reported, related to high levels of fecal coliform bacteria, low dissolved oxygen, pH, or a combination of these. Nitrate contamination is reported in groundwater over large areas of the Sumas-Blaine Aquifer which underlies the entire WID area except the easternmost edge of the upper Kamm and lower Kamm watersheds.[58] Nitrate contamination was identified as an agricultural priority in the South Lynden Agriculture-Watershed Characterization and Mapping work session.[59]

Iron of natural origin is found in most areas of the aquifer in the Lynden-Everson-Nooksack-Sumas study area which underlies all of the South Lynden WID[60] but it was not identified as being of concern for agricultural water users when discussed during the South Lynden Agriculture-Watershed Characterization and Mapping process.[61]

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 South Lynden WID area contains critical habitat for Sandhill crane, trumpeter swan, and shorebird and waterfowl concentrations. Wetland habitat occurs throughout the area. The lower Kamm Creek and Scott Ditch watersheds contain the rare plant soft-leaved willow, and the Wiser Creek/Cougar North

[56] WAC 173-501 (1985). Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.
[57]Whatcom County Coordinated Water System Plan Update (2016), http://www.whatcomcounty.us/1035/Coordinated-Water-System-Plan-Update
[58] Ecology (2012) Sumas-Blaine Aquifer Nitrate Contamination Summary. Pub #12-03-026. https://fortress.wa.gov/ecy/publications/documents/1203026.pdf
[59] Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District*. Whatcom County Planning and Development Services, August 2016.
[60] 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. (last accessed 4/4/2016)
[61] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*

watershed contains the rare plant bristly sedge. Bull trout, char, chum, coho, Chinook, cutthroat, pink, sockeye, and steelhead are present in the tributaries within the WID. Fall Chinook and coho spawning is documented in Stickney Slough.

In the section of the Nooksack River mainstem within the WID, the presence and/or rearing of bull trout, coho, fall Chinook, spring Chinook salmon, fall chum, odd year pink, sockeye, and summer steelhead is documented, and the spawning of fall Chinook salmon, and winter steelhead is also documented.

The watershed tables in Appendix B of this document provide more details on occurrence of specific habitats and species within the WID area. 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 titled *Inland Waterbirds and Shorebird Areas, Nooksack River Corridor, Wiser Lake, and Ten Mile Creek Corridor* contained in the 1994 report on significant wildlife areas in Whatcom County.[62]

[62] Eissinger, A. M. (1994). Significant Wildlife Areas, Whatcom County Washington. Bellingham, WA: Whatcom County Planning & Development Services. https://wawhatcomcounty.civicplus.com/DocumentCenter/View/24178 [Last accessed March 12, 2017]

4 DESCRIPTION OF BASELINE CONDITIONS FOR SUB-WATERSHEDS IN THE SOUTH LYNDEN WID

Explanatory note

This section provides a summary description of baseline conditions in the South Lynden WID. Note that Appendix E of this document (reproduced from the South Lynden 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.

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.

4.1 Upper Kamm Creek

Water quality: The upper Kamm area has generally adequate water quality for agricultural purposes. Iron of natural origin is found in the groundwater within most areas of the Sumas aquifer in the Lynden-Everson- Nooksack-Sumas study area.[63] Sections of Kamm Creek and Unnamed Creek (a tributary to Kamm) in the Upper Kamm area are in category 5[64] for DO and pH, and category 4a for bacteria.

Water quantity: Kamm Ditch/Stickney Slough is closed year-round to further appropriations unless mitigated.[65] Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[66] Thirteen new water rights applications have been filed in Upper Kamm Creek area.[67] The majority of new applications have been filed in the northernmost section of the Upper Kamm area. However, Group A public water suppliers in this area have adequate water rights in proper locations to meet projected future demand.[68]

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[63] 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)

[64] 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. 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. www.ecy.wa.gov/programs/wq/303d/WQAssessmentCats.html (Accessed March 28, 2016)

[65] 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]

[66] WAC 173-501 (1985), Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

[67] See Water Right Points of Diversion map in Appendix C of this document.

[68] http://www.whatcomcounty.us/DocumentCenter/View/24143

Land use and soils: More than 85% of soils in the upper Kamm area are classified as Prime with the majority being Prime if Drained. Most agricultural land is actively drained and lies within CDID #20 (see Figure 7). Most of the land is zoned AG, which indicates that it is considered to be important agricultural land for Whatcom County.[69]

Habitats and species: Critical Habitat for Sandhill crane and trumpeter swan occurs in this area. Sandhill cranes have not been observed by area farmers, however. Wetland habitat also occurs here.[70]

Water flow processes: Water flow processes in this area are of moderate-high importance and are highly degraded. Mainstem is impaired for DO and bacteria which suggests a relationship to degraded storage (wetlands) and sediment (phosphorous & bacteria adsorption) processes.[71]

4.2 Lower Kamm Creek

Water quality: Nitrate contamination is reported in groundwater over large areas of the Sumas-Blaine Aquifer[72] which can potentially be problematic for potable water and livestock watering but is not currently considered to be a priority concern for agricultural water users in this area.[73] Iron of natural origin is found in the groundwater within most areas of the Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area[74] but is not currently considered to be of concern for agricultural water users in this area.[75] Sections of Kamm Creek and Stickney Slough (Mormon Ditch) in Lower Kamm are in category 5 for DO and pH, and category 4a for bacteria.[76]

Water quantity: Kamm Ditch/Stickney Slough is closed year-round to further appropriations unless mitigated.[77] Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[78] Access to legal irrigation water is a key priority. Five new water rights applications have been

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[69] See figure 17 in Appendix C of this document.
[70] See Priority Species and Habitats map, figure 24 in Appendix C of this document.
[70] http://www.whatcomcounty.us/DocumentCenter/View/24143
[71] Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016. Available at: http://www.southlyndenwid.com/
[72] Ecology (2012) Sumas-Blaine Aquifer Nitrate Contamination Summary. Pub #12-03-026. https://fortress.wa.gov/ecy/publications/documents/1203026.pdf
[73] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*
[74] 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)
[75] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*
[76] Ecology (2012), Water Quality Assessment for Washington. http://www.ecy.wa.gov/programs/Wq/303d/index.html
[77] 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]
[78] WAC 173-501 (1985), Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

filed in lower Kamm area.[79] Some Group A public water suppliers do not have adequate water rights in proper locations to meet projected future demand (Everson Water Association).[80]

Land use and soils: More than 85% of the soils in the lower Kamm area are classified as Prime, with 25% to 50% of them being Prime if Drained.[81] Most agricultural land is actively drained and lies within CDID #20.[82] Most of the land is zoned AG, which indicates that it is considered to be important agricultural land for Whatcom County.[83]

Habitats and species: Critical Habitat for Trumpeter swan occurs in this area as well as and wetland[84] and the rare plant soft-leaved willow.[85] Coho[86] as well as chum, Chinook, and cutthroat[87] are present in Kamm Creek in the Lower Kamm area. Bull trout is also reported to forage in the area. [88]

Water flow processes: Water flow processes are moderately important and highly degraded. Kamm Creek mainstem is impaired for DO and bacteria which suggest a relationship to degraded storage processes (wetlands) and sediment processes (phosphorous & bacteria adsorption).[89]

4.3 Scott Ditch

Water quality: Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area.[90] Sections of Scott Ditch in Scott are in category 5 for DO, and category 4a for bacteria.[91] Water quality is acceptable for agricultural purposes in this area.[92]

Water quantity: Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[93] Access to legal irrigation water is a key priority. Six new water right applications

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[79] See Water Quantity map, figure 10 in Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016.
[80] http://www.whatcomcounty.us/DocumentCenter/View/24143
[81] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*
[82] http://www.whatcomcd.org/ag-drainage-districts
[83] See figure 17 in Appendix C of this document.
[84] See Priority Species and Habitats map, Figure 24 in Appendix C of this document.
[84] http://www.whatcomcounty.us/DocumentCenter/View/24143
[85] WA Department of Natural Resources (2015), Washington Natural Heritage Program. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html
[86] WDFW SalmonScape http://apps.wdfw.wa.gov/salmonscape/
[87] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services
[88] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*
[89] Whatcom County Agriculture-Watershed Pilot Project (2016). *Ibid.*
[90] 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)
[91] Ecology (2012), Water Quality Assessment for Washington. http://www.ecy.wa.gov/programs/Wq/303d/index.html
[92] Whatcom County Agriculture-Watershed Pilot Project (2016 *Ibid.*
[93] WAC 173-501 (1985), Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

have been filed in the Scott Ditch area. Most of these are along the Nooksack River and in the south-central area of the Scott Ditch sub-basin close to Elder Ditch.[94] One Group A public water supplier is currently exceeding water right limits (Skookum Chuck Water Association).[95]

Land use and soils: The majority of the soils in the Scott area are classified as Prime, with between 25 and 50% being Prime if Drained.[96] Most agricultural land is actively drained and lies within CDID #21. A small area lies within DID #5.[97] Most of the land is zoned AG, which indicates that it is considered to be important agricultural land for Whatcom County.[98]

Habitats and species: Critical habitat for shorebird concentration, trumpeter swan, waterfowl concentration occurs in this area as well as wetland[99] and the rare plant soft-leaved willow.[100] Cutthroat[101] and Coho[102] presence is documented in Scott Ditch.

Water flow processes: An area of high importance for surface storage and recharge processes, and moderate to moderate-high importance for delivery and discharge processes. Overall water flow processes are highly degraded.

4.4 Wiser Lake/Cougar Creek North

Water quality: Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area.[103] A section of Wiser Creek in Wiser Lake/ Cougar Creek North is in category 5 for DO, and category 4a for bacteria.[104] Water quality is acceptable for agricultural purposes in this area.[105]

Water quantity: Wiser Lake is closed year-round to further appropriations unless mitigated, and Wiser Lake Creek is closed to new withdrawals seasonally (from May 1 to October 31).[106] Restrictions on

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[94] See water right points of diversion map in Appendix C of this document.
[95] http://www.whatcomcounty.us/DocumentCenter/View/24143
[96] Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016.
[97] http://www.whatcomcd.org/ag-drainage-districts
[98] See figure 17 in Appendix C of this document.
[99] See Priority Species and Habitats map, Figure 24 in Appendix C of this document.
[100] WA Department of Natural Resources (2015) Washington Natural Heritage Program. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html
[101] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.
[102] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services and WDFW SalmonScape http://apps.wdfw.wa.gov/salmonscape/
[103] 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)
[104] Ecology (2012), Water Quality Assessment for Washington. http://www.ecy.wa.gov/programs/Wq/303d/index.html
[105] South Lynden WID mapping report
[106] WA Dept. of Ecology, 2012. Focus on Water Availability, Publication 11-11-006

irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[107] Access to legal irrigation water is a key priority. More than 25 new water right applications have been filed in Wiser/Cougar north.[108] These new applications are mostly located along the southern edge of the Wiser/Cougar north area.[109] Group A public water suppliers have adequate water rights in proper locations to meet projected future demand in the Wiser/Cougar area. [110]

Land use and soils: More than 85% of the soils in the Wiser/Cougar area are classified as Prime, with 25% to 50% of them being Prime if Drained. [111] Most agricultural land is actively drained and much of the area lies within DID #5. A small area lies within DID #6.[112] An area along the western boundary lies within Diking District #3. Most of the land is zoned Ag, which indicates that it is important agricultural land and a rural study area lies within this area along the southern boundary of the WID, which indicates potential pressure to convert land out of agriculture. [113]

Habitats and species: Critical habitat for shorebird concentration, trumpeter swan, waterfowl concentration, and wetland occurs in this area.[114] The rare plant bristly sedge[115] can also be found here, and Char, Chinook, chum, coho, cutthroat, pink, sockeye, steelhead are present in Cougar Creek.[116]

Water flow processes: The northern and western parts of this area are of moderately high to high importance for surface storage and delivery processes. Water flow processes are moderately to highly degraded, but overall this is an area of the WID that is of relatively lower importance for water flow processes.[117]

4.5 Upper Fourmile

Note that only a small portion of the Upper Fourmile Creek watershed lies within the South Lynden WID.

Water quality: No current water quality concerns are noted for this area.[118]

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

[107] WAC 173-501 (1985), Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.

[108] South Lynden WID mapping report

[109] South Lynden WID mapping report

[110] http://www.whatcomcounty.us/DocumentCenter/View/24143

[111] Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016.

[112] http://www.whatcomcd.org/ag-drainage-districts

[113] See figure 17 in Appendix C of this document.

[114] See Priority Species and Habitats map, Figure 24 - Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016. Available at: http://www.southlyndenwid.com/

[115] WA Department of Natural Resources (2015), Washington Natural Heritage Program. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html

[116] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

[117] South Lynden WID mapping report

[118] South Lynden WID mapping report

Water quantity: Two new water right applications have been filed in upper Fourmile area within the South Lynden WID. Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[119] Group A public water suppliers have adequate water rights in proper locations to meet projected future demand in the Fourmile area.[120]

Land use and soils: More than 85% of the soils in the Upper Fourmile area within the WID are classified as Prime, with 25% to 50% of them being Prime if Drained. [121] Most agricultural land is actively drained. A small area within the South Lynden WID boundary lies within CDID #21.[122] Most of the land is zoned AG, which indicates that it is considered to be important agricultural land for Whatcom County. [123]

Habitat and species: Critical habitat for Trumpeter swan and wetlands occur in the Upper Fourmile area that lies within the South Lynden WID boundary.[124]

Water flow processes: The overall water flow processes in the small area of the Fourmile Creek that is within the South Lynden WID have been assessed as of moderately high to highly degraded, but these areas are of low to moderate relative importance for water flow (see Appendix B of this document).

[119] WAC 173-501 (1985), Instream Resources Protection Program – Nooksack Water Resource Inventory Area 1.
[120] http://www.whatcomcounty.us/DocumentCenter/View/24143
[121] Whatcom County Agriculture-Watershed Pilot Project (2016). Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District. Whatcom County Planning and Development Services, August 2016.
[122] http://www.whatcomcd.org/ag-drainage-districts
[123] See figure 17 in Appendix C of this document.
[124] See Priority Species and Habitats map, Figure 24 in Appendix C of this document.

5 SUPPORTING INFORMATION FOR PLANNING OF SPECIFIC ACTIONS

Explanatory notes

In the comprehensive 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.

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,
  - estimated current water use for agricultural purposes and potential future demand;
- 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 actions related to water rights and for participation in the Water Supply Work Group*
ii. *Expand hydrological analysis to include surface water, climate, and evapotranspiration, to assess overall water use and water availability and to 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.**
iv. *Support & coordinate with Ag Water Board to communicate water rights concerns with legislators (noted from March 20 work session)*

** 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:

- 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
- Summary and references for work done on water banking (Water Supply Coalition)
- Summary and references for work done on storage of water for later use in the South Lynden WID
- 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

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. *Coordinate with other WIDs on funding for and implementation of source tracking using DNA markers (noted from March 20 work session)**
ii. *Continue with the ongoing water quality monitoring & response program (noted from March 20 work session)*

Additional actions that might be considered for inclusion here (from meeting discussions & other WID documents):

i. *Communicate water quality results to farmers in newsletter or outreach event*
ii. *Encourage all agricultural landowners in the WID to implement appropriate BMPs, with assistance from the Conservation District**
iii. *Coordinate with Ag Water Board and other WIDs on water quality programs and responses, including Portage Bay Partnership, implementation of best management practices.*
iv. *Maintain a watching brief on installation of ZAPS technology for real-time monitoring of fecal coliforms/E. Coli in water, as Whatcom Conservation District & County Department of Health plan to install several ZAPS units in the area waterways.*
v. *Consider initiating more intensive local research into sources & factors affecting fecal coliform survival/die-off in the aquatic environment (Nov 2016 meeting minutes)*

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 DIDs #5 and #6 and CDIDs #20 & #21;
- 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:

i. *Proactively identify locations for mitigation sites and mitigation actions to be addressed in a drainage permit, that could also contribute to advancing watershed & habitat priorities.*
ii. *Coordinate with Whatcom County to prioritize sites for ditch cleaning and mowing*
iii. *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.*

5.3.2 Supporting information related to field drainage

The following supporting 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:

- Agricultural and Watershed Enhancement Plan for the South Lynden WID (prepared with assistance from the Whatcom Conservation District, April 2017)
- Floodplain Habitat Assessment Report for the South Lynden Watershed Improvement District (prepared with assistance from the Whatcom Conservation District, April 2017)
- Map of the WID boundary (Figure 7 below), 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 below). These actions are almost all related to drainage and flooding. The actions are listed in Table 5 below.
- Agricultural reference map (Appendix C of this document) indicating where soils are Prime if drained.
- Detailed agricultural and watershed enhancement 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.
- Link to online version of DID#5 Drainage Management Plan http://www.whatcomcd.org/did5
- Link to online version of DID#6 Drainage Management Plan http://www.whatcomcd.org/did6
- Link to information on CDID#20 http://www.whatcomcd.org/cdid20
- Link to information on CDID#21 http://www.whatcomcd.org/cdid21
- Information on the programmatic permitting process for stream projects involving drainage and/or habitat (see Table 6)
- Data sources listed in Appendix E of this preliminary plan.

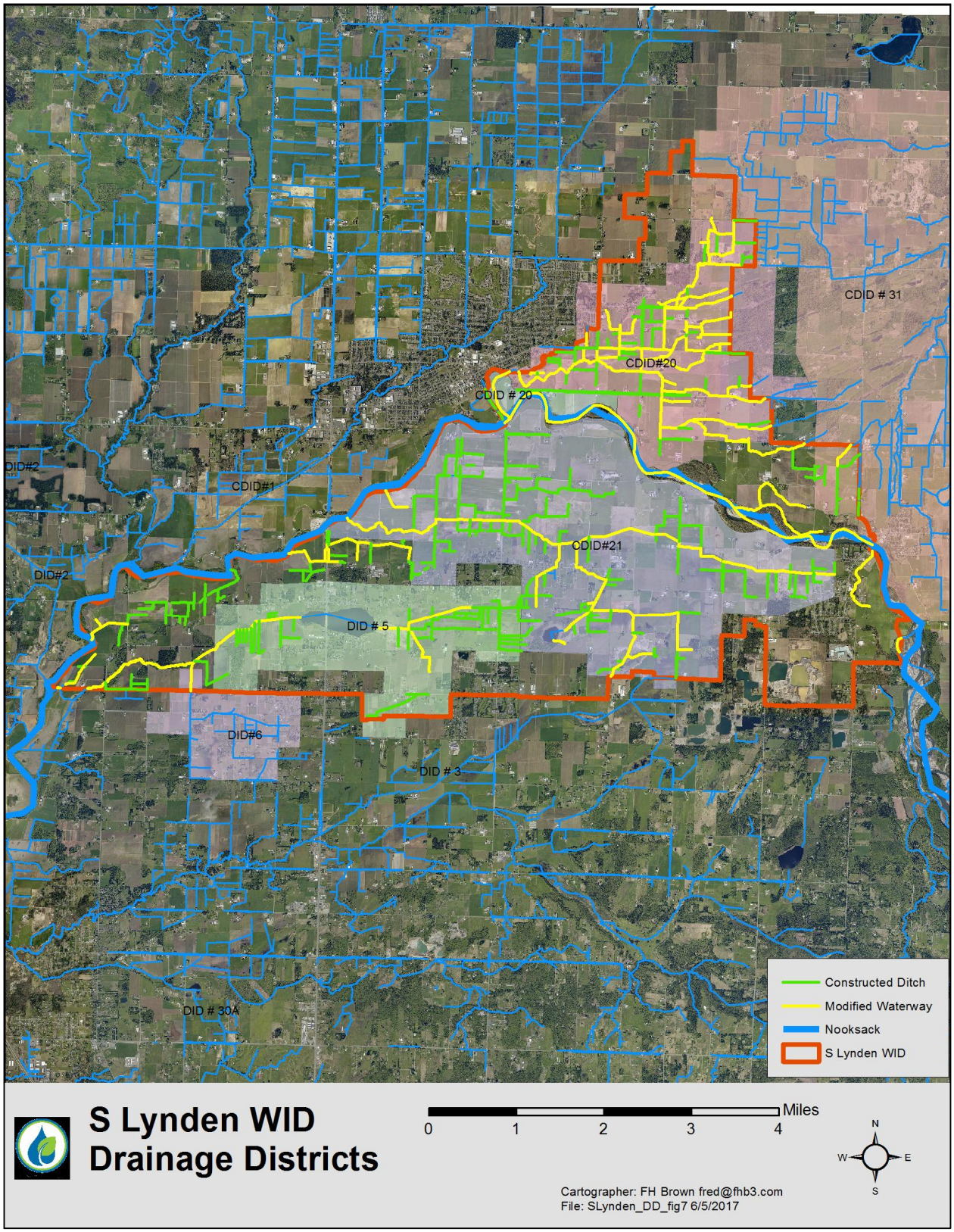

Figure 7. Map showing the South Lynden WID and drainage districts. Map layers: Whatcom Conservation District.

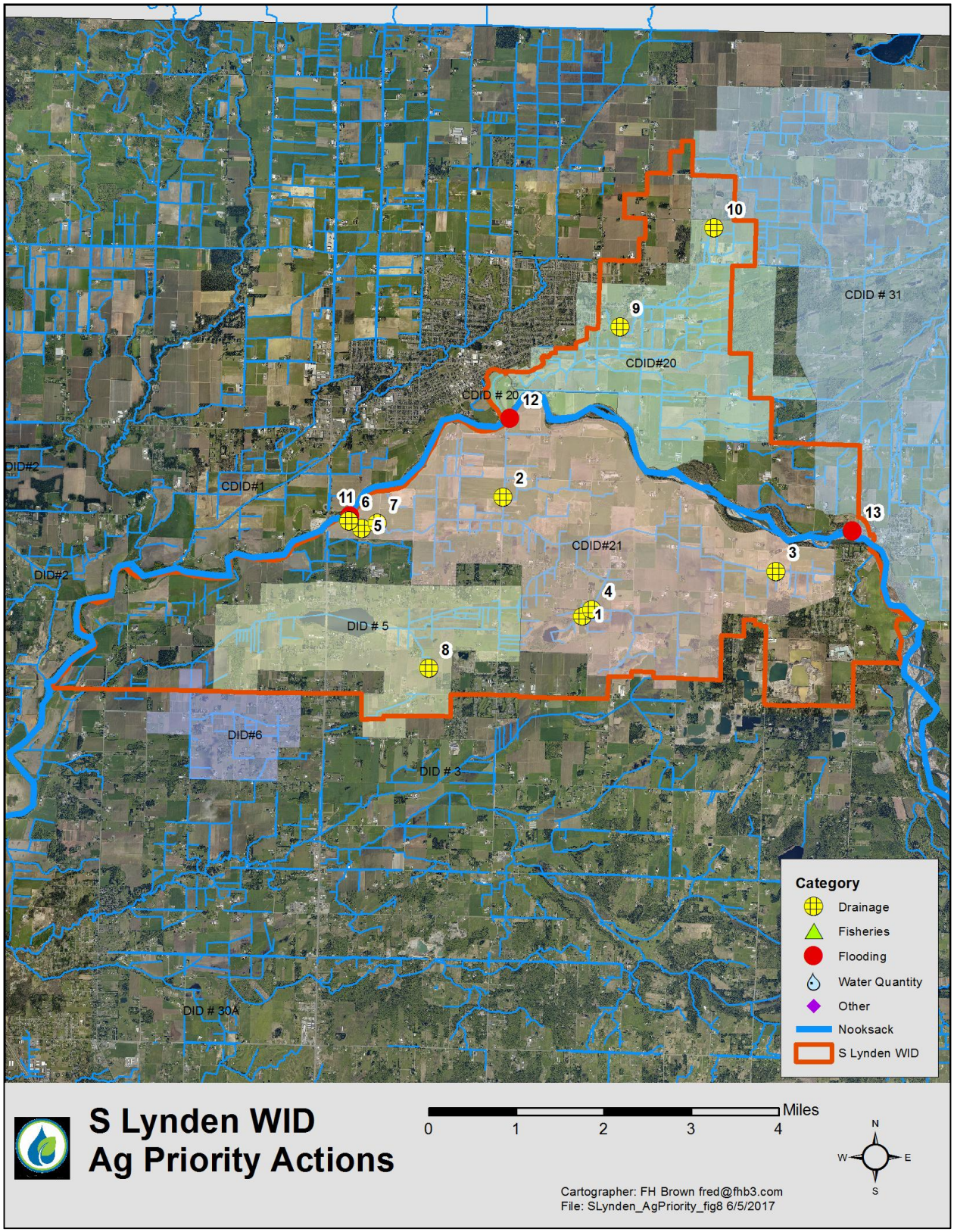

Figure 8. South Lynden WID map of specific agricultural priority actions (from WID work session in January 2016). See table below for map key.

Table 5. Key for actions on agricultural priority actions map in Figure 8 (from mapping work session in January 2016).

Action number on map	Assessment unit #	Agricultural priority	Notes
1	1099	Drainage	Gradient is too low. There is poor drainage north from Elder Ditch. Perhaps the culvert needs to be lowered?
2	1092	Drainage	County ditch maintenance needed. Road ditches blocked and noxious weeds in ditch.
3	1099	Drainage	Beaver activity in Scott Ditch needs management.
4	1099	Drainage	Drainage issues due to zero elevation change in Elder Ditch along with beaver activity and planting of riparian areas.
5	1092	Drainage	Survey channel profile on lower Scott Ditch from Bylsma Rd to mouth to assess grade.
6	1092	Drainage	Flood gate at mouth of Scott Ditch would prevent Nooksack backing up.
7	1092	Drainage	Remove noxious weeds (blackberries, nightshade and knot weed).
8	1111	Drainage	Maintenance needed on drainage tile line north of Pole Rd.
9	1098	Drainage	Drainage not working in this area. Drainage going the wrong way.
10	1098	Drainage	Ditch needs cleaning every few years. Remove trees falling into ditch.
11	1103	Flooding	Consider gravel removal to reduce back up in Scott Ditch.
12	1096	Flooding	Dike on north side of Nooksack River needs replacement.
13	1096	Flooding	Consider removing portions of gravel bars in Nooksack River to reduce backup of water.
14	1097	Drainage	Trees along the ditch at the east end of Timon Rd are falling in, impeding drainage at times.

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

(Information provided by Frank Corey, Whatcom Conservation District)

Washington Department of Fish & Wildlife (WDFW) can issue a 5-year permit (Hydraulic Project Approval) based upon a Drainage Maintenance and Habitat Improvement Plan.
Whatcom County Planning & Development Services (PDS) can concurrently issue a programmatic Land Disturbance Permit or Shorelines Exemption.

Basic Plan Components:

- General description of District and important natural and structural features
- Watercourse classification map
- General list of 5-year drainage maintenance needs
- General list of habitat projects to offset impacts of drainage maintenance and voluntary habitat improvement projects
- Annual reporting forms
- Mitigation sequencing process
- Typical cross-section for maintenance dredging
- Best management practices
- ESA Habitat Assessment and mitigation plan for floodplain areas
- WDFW notification requirements individual projects (includes discussion of mitigation)
- PDS Natural Resource Notification of Activity ($35.00) for individual projects
- SEPA
- LDP or shorelines

Permitting pathway:

1. Complete Drainage Maintenance and Habitat Improvement Plan
2. Complete non-project SEPA checklist
3. Complete Shorelines Exemption or Land Disturbance Permit (LDP) applications
4. Complete on-line Joint Aquatic Resource Permit Application (JARPA)
5. Submit Plan, SEPA, Shorelines (or LDP), and supporting information to PDS
6. Submit JARPA to WDFW
7. Notify WDFW (call or email) and PDS (Notification form) for each project prior to implementation.
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.
9. Submit annual reports to WDFW and PDS

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 South Lynden 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.

Specialists:

From Table 2, the suggested priority actions are:

i. *Interact with County Flood Mgt. regarding gravel removal & funding concerns (9/2017 meeting)*
ii. *Review and update priority actions identified at the January 2016 work session (see list in Table 4 and map in Figure 8 of this Preliminary Plan, which include several possible actions to maintain flood infrastructure in specific locations within the South Lynden WID area.)*
iii. *Consider requesting study on the costs and benefits of placing a seasonal floodgate on Scott Ditch to address the spring flooding issues (discussed at Dec 2015 meeting).*
iv. *Consider coordinating with FCZD on levee maintenance particularly the Hampton levee (discussed at April 2016 meeting)*

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:

- Map in Figure 9 showing flood infrastructure along the Nooksack River adjacent to the South Lynden WID.
- 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.

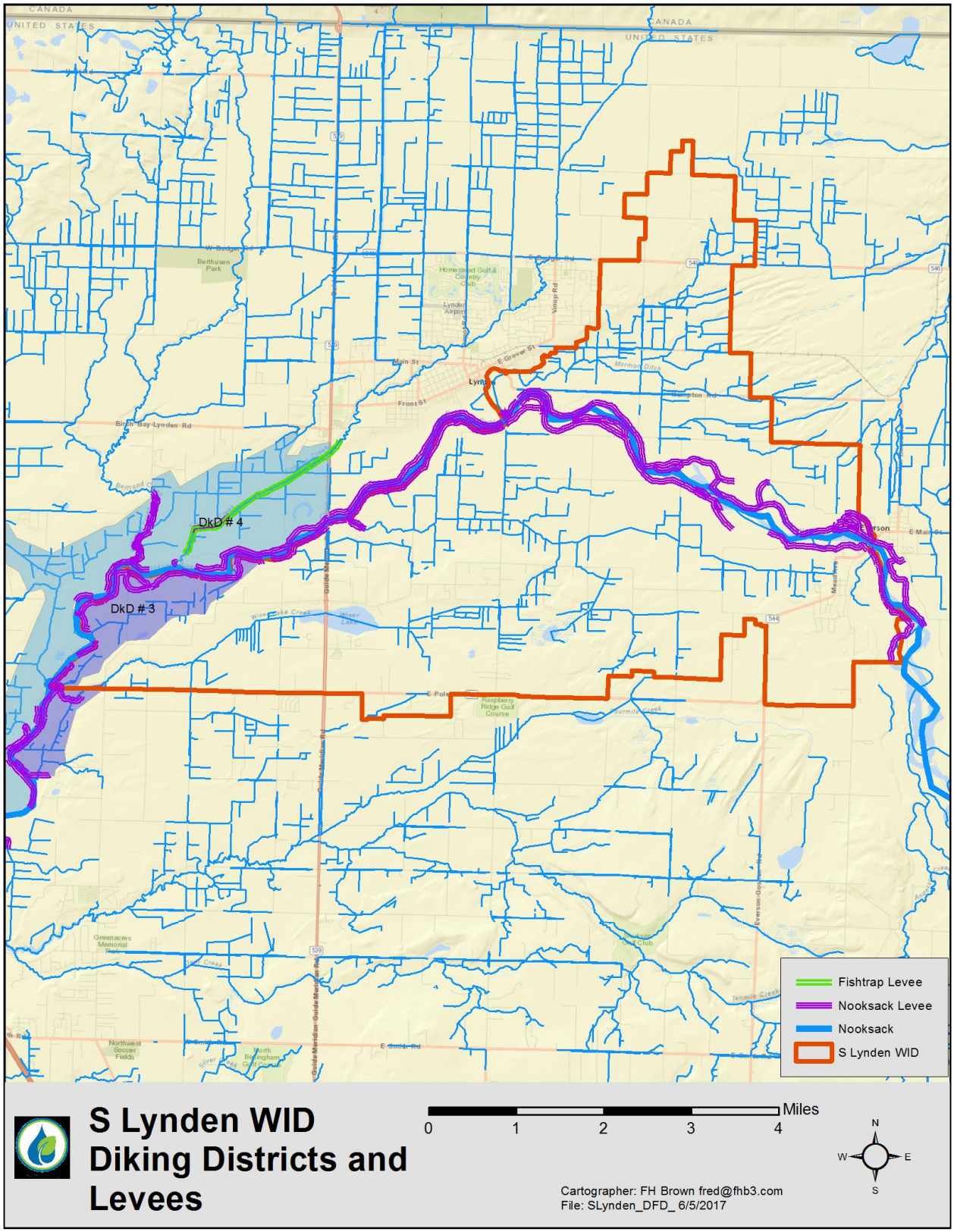

Figure 9. Map showing Diking Districts and Nooksack River levees associated with the South Lynden WID area. Map layers: Whatcom County Public Works.

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 South Lynden WID. The results of these discussions and the supporting analyses are contained in the South Lynden 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":

> "Lower Kamm Creek: Water flow processes are moderately important and highly degraded. Mainstem is impaired, DO and bacteria which suggest a relationship to degraded storage (wetlands) and sediment (phosphorous & bacteria adsorption) processes.
> Investigate measures to restore storage and discharge. Improve sinks (wetlands, hydric soils) to mitigate nutrient export and retain sediment, and enhance riparian areas to reduce export into surface waters. "

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.

Specialists:

From Table 2, the suggested priority actions are:

i. *Review possible actions to enhance or protect water flow processes in specific locations within the South Lynden WID area, as listed in the watershed characterization tables prepared during the WID work session in January 2016 (see tables in Appendix B of this document)**
   - *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, in order to utilize opportunities to "bank" mitigation that might be required for 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 document.
- Reference maps contained in Appendix C of this document.
- Data sources listed in Appendix E of this preliminary plan.
- Agricultural and Watershed Enhancement Plan for the South Lynden WID (prepared with assistance from the Whatcom Conservation District, April 2017)
- Floodplain Habitat Assessment Report for the South Lynden Watershed Improvement District (prepared with assistance from the Whatcom Conservation District, April 2017)

5.6 Agricultural protection (protection of the agricultural industry)

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 the preliminary version 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.

5.6.1 Desired outcomes, goals and possible actions

From Table 2, the suggested priority actions are:

i. *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)**
ii. *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

Available supporting information includes:

- Agricultural and watershed characterization tables contained in Appendix B of this preliminary plan
- Reference maps contained in Appendix C of this preliminary plan

5.7 Communication, outreach, education and reporting strategy

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, South Lynden-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;
- priority actions, responsibilities and timelines.

Specialists:

From Table 2, the suggested priority actions are:

i. *Internal: Establish a template for tracking and regular reporting of WID progress on priority issues, based on a set of simple indicators of progress.**
ii. *Internal: Continue to distribute newsletter to WID members summarizing WID progress.*
iii. *Internal: Seek grant funding to develop and implement a comprehensive management plan*
iv. *Internal: Coordinate with other WIDs to help members build skills for effective engagement and communication (March 20th work session).*
v. *External: Coordinate with other WIDs to share what farmers are doing to benefit water quality and habitat (March 20th work session notes)*
vi. *External: Coordinate with other WIDs to track legislation, rule-making, agendas and impacts on agriculture at County, State, Federal levels (March 20th 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*

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

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

Source:
Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. https://www.southlyndenwid.com/ [Alternative download here]

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

Whatcom County Ag-Watershed Project

PROJECT PARTNERS

Whatcom Conservation District

Washington Department of Fish and Wildlife

Whatcom Farmfriends

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: John Gillies, Mary Dumas

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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 South Lynden WID[1] 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 [2]

A customized report has been prepared for each of the six Watershed Improvement Districts in Whatcom County. Full reports for other Watershed Improvement Districts can be accessed through the WID websites[3] or through the Ag-Watershed Project page.[4]

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.

[1] Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. Download from http://www.southlyndenwid.com/

[2] Whatcom County Agriculture-Watershed 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

[3] Links to each WID website can be found at http://www.agwaterboard.com/

[4] See http://www.co.whatcom.wa.us/2260/Agricultural-Watershed-Pilot-Project

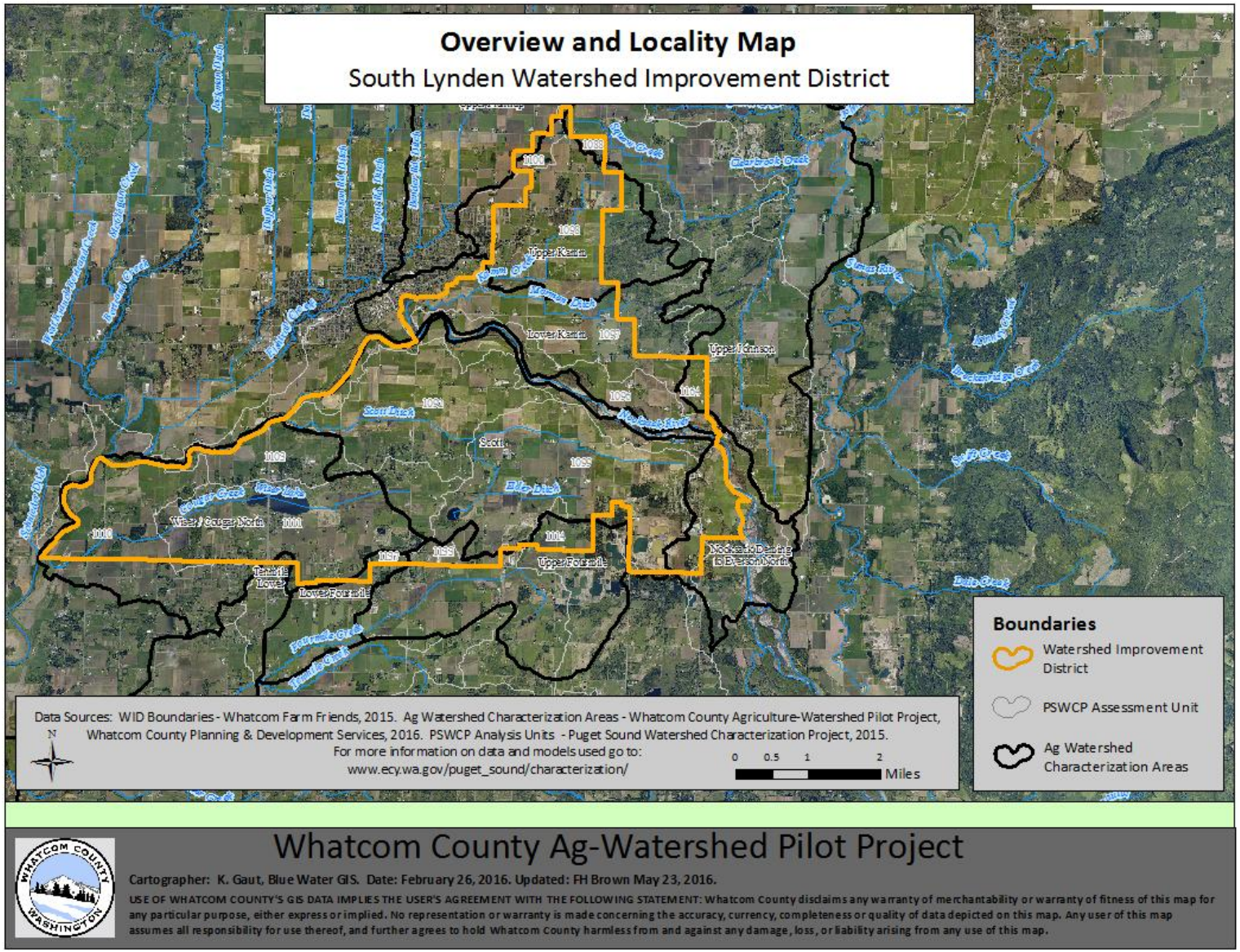


Figure 1. South Lynden WID overview and locality map

Appendix A

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).[5] Project Fact Sheet 2 provides additional background information on the agriculture-watershed characterization and mapping process.[6]

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.

Brief description: Methodology used for the 2016 WID characterization and mapping

Areas within the South Lynden 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.

A work session was held with South Lynden 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 South Lynden 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 South Lynden WID, the information contained in the watershed reference maps (see section 6 of the main report) was combined with the results of watershed characterization[7] (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.

[5] 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

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

[7] "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

Agricultural analysis

The results of the agricultural characterization and mapping for the South Lynden 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 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 agricultural characterization 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, which is included as Appendix D of the main report.

Summarized results for the South Lynden 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 South Lynden WID area. Check marks in Table 1 below indicate where a specific enhancement priority was identified during the characterization and mapping process. Detailed descriptions of each priority and the opportunities for enhancement through specific actions can be found in Tables 3 and 5 in the main report.

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

	Upper Kamm	Lower Kamm	Scott	Wiser Lake/Cougar Creek (north portion)	Upper Fourmile Creek (small northern portion)
Agricultural Enhancement Priority (See Table 3 in the main report for details)					
Prime agricultural soils	√	√	√	√	√
Water quality for crops and livestock	-	√ (nitrate)	-	-	-
Water quantity for agricultural activities	√	√	√	√	-
Agricultural drainage	√	-	-	-	-
Flood protection	√	√	√	-	-
Agricultural land base:					
Important agricultural land	√	√	√	√	√
Protection from development pressure	√	-	-	√	-
Other:					
Pollination for berry crops	√	-	-	-	-
Watershed Enhancement Priority (See Table 5 in the main report for details)					
Water Quality					
Nutrients, Ammonia-N	-	-	-	-	-
Bacteria	√	√	√	√	-
Temperature	-	-	-	-	-
Dissolved oxygen	√	√	√	√	-
Other:	√ (pH)	√ (pH)	-	-	-
Habitat					
Salmon spawning (documented, current)	√	-	-	-	-
Anadromous fish	√	√	√	√	√
Wildlife	√	√	√	√	√
Wetland	√	√	√	√	√
Water Flow Processes[8]					
Delivery	√	√	√	-	√
Discharge	√	√	-	-	-
Recharge	√	√	√	-	√
Storage	√	√	√	√	-
Other	-	-	-	-	-

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

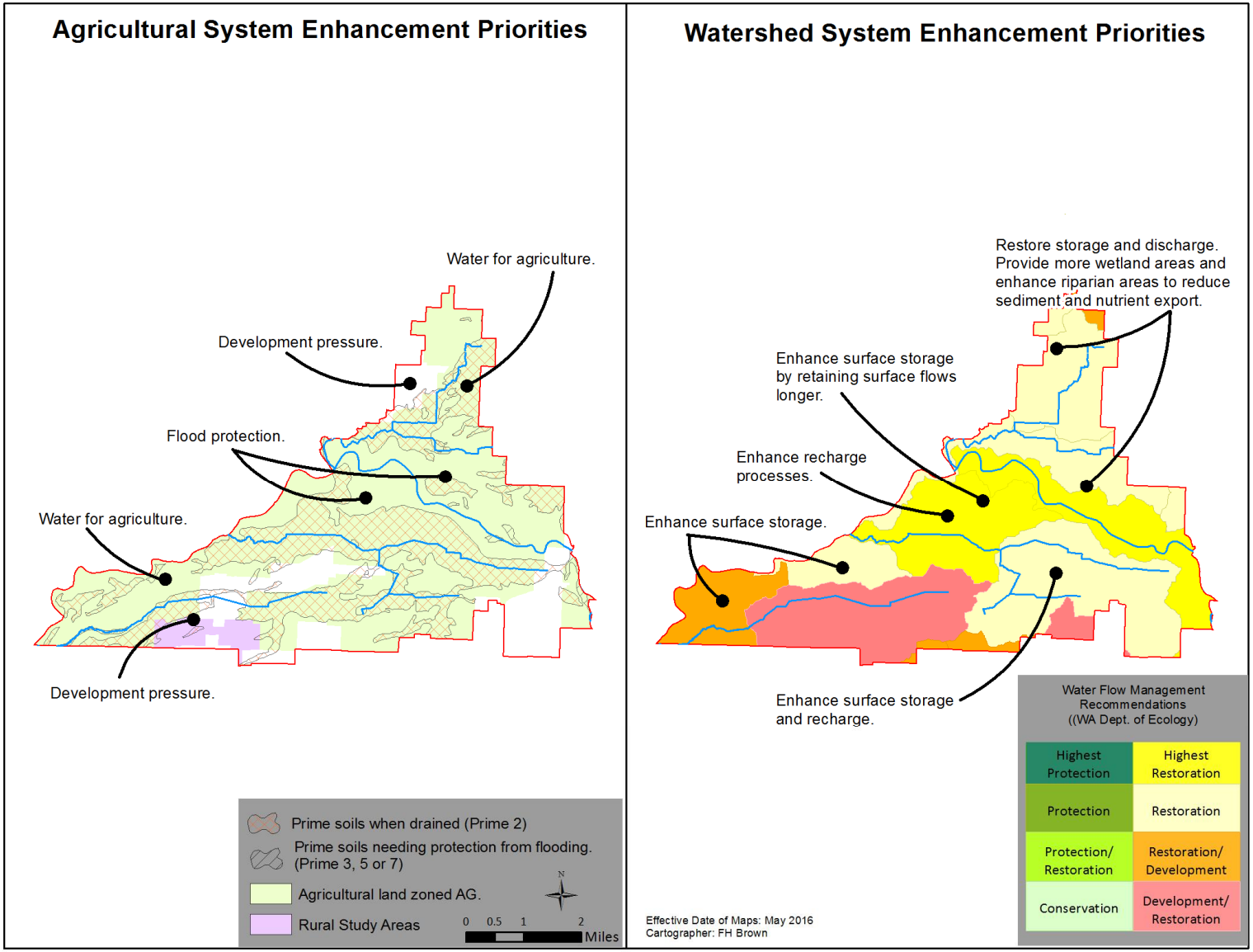


Figure 2. South Lynden WID: Summary maps of agricultural and watershed enhancement priorities

Appendix A

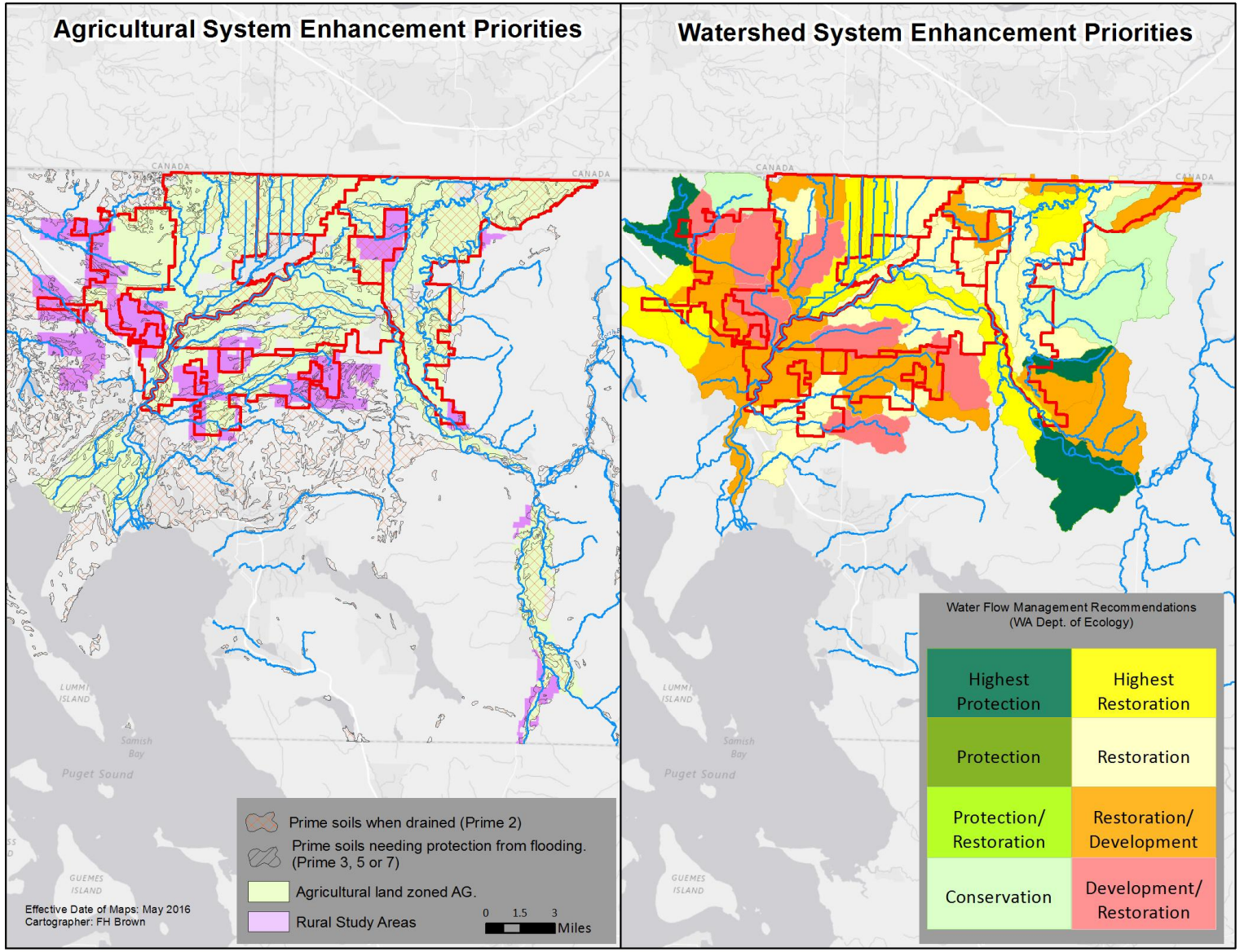


Figure 3. General agricultural and watershed enhancement priorities for the lowland areas of Whatcom County.

Possible future challenges and priorities

Future challenges (1-10 years) may include issues listed below.[9] See Table 1 for the full summary results of agriculture-watershed characterization and mapping for the South Lynden WID.

- Water Quality: Creeks and ditches are actively monitored for water quality parameters (dissolved oxygen, bacteria, nitrate, and fecal coliform) in this WID area. Groundwater quality (nitrates) is also a concern in large areas of the Sumas-Blaine Aquifer located within the WID area. Better understanding is needed on the connections between water quality and agricultural drainage.

- Drainage: The South Lynden WID area includes a high percentage of prime agricultural soils, some of which have been improved with drainage infrastructure. Improved understanding of best practices for regular drainage maintenance and cost-sharing is needed by co-managers: landowners, WIDs, local Drainage Districts, as well as local, state and federal public agencies.

- Water Quantity: Access to legal irrigation water is a key priority (60 new applications for water rights have been filed in the WID area). Kamm Ditch/Stickney Slough and Wiser Lake are closed year-round to further appropriations unless mitigated, and Wiser Lake Creek is closed to new withdrawals seasonally (from May 1 to October 31). Irrigation is needed to optimize forage production and to recover nutrient applications. Restrictions on irrigation from creeks, tributaries, and other surface water sources are in place until instream flow levels are met during critical periods for fish per the existing Nooksack Instream Flow Rule.[10] There is limited access to water rights in some areas of the WID, and major Group A public suppliers do not have adequate water rights in suitable locations to meet projected future demand.[11]

- Flood Management: Parts of the WID area are within the 1:100-year flood zone and designated floodway for the Nooksack River. Diking infrastructure is in place to protect lands and transportation corridors from flood impacts. Improvements should address beaver management to reduce localized flooding. Flood management priorities in the South Lynden WID should be considered within ongoing larger local and regional river management and flood advisory strategies.

[9] This section includes priorities identified by the South Lynden WID on their website http://www.southlyndenwid.com/#!projects/c10d6 (last accessed 23 May 2016)

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

[11] *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 South Lynden WID

Contains the detailed tables listing and describing agricultural and watershed enhancement priorities as discussed at the January 2016 work session of the South Lynden 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 South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. https://www.southlyndenwid.com/ [Alternative download here]

Agriculture characterization tables for South Lynden WID

NOTE: Possible actions include: Specific actions identified by WID Actions Map # location (e.g. SL9) and Assessment Units (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 Kamm Creek

	Water quantity: Irrig., stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Upper Kamm (AU 1098) Notes from reference maps and other documents	10-25 new water rights applications in Upper Kamm – See Ag Priorities maps: Water Quantity. Water quantity priority	Sections of Kamm Creek and Unnamed Creek (trib to Kamm) in Upper Kamm are in category 5[1] for DO and pH, and category 4a for bacteria. Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson- Nooksack-Sumas study area.[2]	>50% of soils in Upper Kamm are Prime if Drained – see Ag Priorities maps: Drainage. Ag drainage priority CDID #20 is located within the Kamm Creek subbasin.[3]	The southern part of Upper Kamm is in designated floodway and the 1:100-year flood zone. <5% of the soils are prime if protected from flooding. – See Ag Priorities maps: Flooding. Ag flood protection priority	100% of soils are Prime. See Ag Priorities maps: Prime Soils. Ag prime soils priority >80% of land is in AG Zoning, RSA or PDR. See Ag Priorities maps: Ag Land Base. Ag land base priority Recent urban expansion in the west of this area (Lynden).[4] Potential residential development in the RSA to the east. See Ref. map: Potential development rights. Development pressure		
Upper Kamm (AU 1098) Combination of notes from work sessions in October 2012 and January 2016	Berry fields in north portion of watershed need water for irrigation. Water is not generally taken from ditches for agriculture. Groundwater sufficient but many new apps for water rights. Summer 2015: still had water but sand in well filters suggesting they were near bottom. Farmers on main Nooksack can find pumps dry when channels shift.	Iron in water is of natural origin. Water quality generally not an issue for crops & livestock use. DOE is sampling in the area around Kamm Rd where water pools and gets stagnant. Blueberry farmers often use sawdust for mulch rather than fully composted manure (too expensive & hard to obtain). Question: how much of the high fecal counts are caused by non-farm animals.	Generally no major drainage problems. Need to do ditch cleaning every few years. Some trees are falling in, especially on peat soils where ditch banks slough readily. TeVelde's road ditch (east end of Kamm Rd) flows in wrong direction. Blackberries are a problem upstream from the railroad. CREP and riparian plantings can make ditch maintenance difficult. Ice and windstorms break branches & clog ditches.	High water levels were lower this year (2016) but overtopping did occur in Nov-Dec 2015. This is a hazard for traffic and buses in the area. Issues around Kamm Rd: pooling of water as dike is sloped the wrong way. Question about possible runoff from new school construction in east Lynden, with reference to potential for increasing flooding problems on ag land. Beavers are not generally considered a problem in this area.	Pressure for development as Lynden expands eastwards into the City's new residential areas.	Rocky soils in upper area. Pollination needed for berry crops. Pest control needed (birds, bats & insects could provide some pest control).	-Opportunities for controlled drainage in the upper Kamm. -Investigate aquifer recharge potential here.(i) Kamm Springs provide good summer low flows. Specific (see ag actions map): -(SL9/27) AU1098: Drainage: Drainage not working (wrong gradient). -(SL13/28) AU 1096: Evaluate gravel removal on Nooksack R bars to reduce overtopping & Nov-Dec floods. -(SL10/29) Drainage: Ditches need cleaning every few years, trees falling in.

[1] 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. 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)

[2] 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)

[3] WCD (2014), *Agricultural Drainage for Drainage Districts.* http://www.whatcomcd.org/ag-drainage-districts

[4] *Whatcom County Title 20 Zoning map* (2016) http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15461

3B. Agricultural Enhancement Priorities: Lower Kamm Creek							
	Water quantity: Irrig., stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Lower Kamm AU 1097 Notes from reference maps and other documents	1-10 new water rights applications in Lower Kamm. See Ag Priorities maps: Water Quantity and Reference map: Water rights points of diversion (map shows 4-5 applications). Water quantity priority	Sections of Kamm Creek and Stickney Slough (Mormon Ditch) in Lower Kamm are in category 5 for DO and pH, and category 4a for bacteria.[5] Nitrate contamination is reported in groundwater over large areas of the Sumas-Blaine Aquifer.[6] Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson- Nooksack-Sumas study area.[7]	25-50% of the soils are Prime if drained. See Ag Priorities map: Drainage. CDID #20 is located within the Kamm Creek subbasin.[8]	Areas of Lower Kamm are in designated floodway and much of the land is in the 1:100-year flood zone. <5% of the soils are prime if protected from flooding. See Ag Priorities maps: Flooding Ag flood protection priority	93% of soils in Lower Kamm are Prime. See Ag Priorities maps: Prime Soils. Ag prime soils priority >80% of land in Lower Kamm is in Ag Zoning and RSA. See Ag Priorities maps: Ag Land Base. Ag land base priority.		
Lower Kamm AU 1097 Combination of notes from work sessions in October 2012 and January 2016	Generally no water quantity problems, but some new water right applications in south-east portion of Lower Kamm watershed.	AU1099: Iron in water is of natural origin. Doesn't impact farming generally. High nitrates could be a problem for potable water quality and possibly for livestock watering (not a general concern for farmers though). AU1098: Clay soils: potential for rapid runoff from forested areas containing fecal coliforms of wildlife origin. AU1097: Ditches not fenced, few hedgerows and filter strips in area. Ag water quality priority (nitrate)	Mostly dairy farming here. Most drainage issues in lower area all along Northwood Road to the hill. AU 1098: Drainage is fine for current farming, but would need better drainage if planted to blueberries. Where drainage is slow, sediment accumulates in ditches. AU 1097: Nooksack River backs up into Kamm Creek and reduces drainage Nov-Dec. Question about whether stormwater outlets from east Lynden affect drainage and flooding?	Flooding limits crop planting and harvesting. Flooding occurs regularly Nov-Dec. Flooding across Northwood Rd when Nooksack River floods. Water spills out of the Nooksack R by Everson in Nov-Dec. Flooding has increased lately: smaller floods now lead to overtopping of dikes. Flooding toward Noon Rd is a problem for milk truck access. AU1096: Flooding not too severe, but hazard for traffic & safety & can cause damage to dikes. AU1097: sediment buildup around Mormon Ditch causing flooding. AU1096: when Nooksack R overtops, sediment settles on fields, gets into ditches, can kill off pasture grass. Having grass wet for 1 day is ok; standing water for 3 days is not.	AU 1096, 1097: good for corn, pasture, berries. Most non-farming neighbors are from old farming families so there are not many complaints. Sometimes there are smell complaints.	Dike manage-ment opport-unities. Habitat pressure vs fisheries seems no better after 10+ years of work.	Both upper and lower Kamm: (i) Could provide opportunities for aquifer recharge in this area, depending on net infiltration vs withdrawal. Area provides open space, but needs buffers from development. Provides cultural identity (farming). Get more hobby farmers involved in process of watershed management. Opportunities for culvert removal to improve fish habitat.(i) Specific: -Lower & set back levee, and deal with inundation? (i) -Control flood flow at Kale St to take pressure off milk truck crossings. (iv)

[5] Ecology (2012), *Water Quality Assessment for Washington.* http://www.ecy.wa.gov/programs/Wq/303d/index.html

[6] Ecology (2012) *Sumas-Blaine Aquifer Nitrate Contamination Summary. Pub #12-03-026.* https://fortress.wa.gov/ecy/publications/documents/1203026.pdf

[7] 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)

[8] WCD (2014), *Agricultural Drainage for Drainage Districts.* http://www.whatcomcd.org/ag-drainage-districts

3C. Agricultural Enhancement Priorities: Scott Ditch							
	Water quantity: Irrig., stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Scott Ditch Notes from reference maps and other documents	10-25 new water rights applications in Scott. See Ag Priorities maps: Water Quantity, and Reference map: Water rights points of diversion Water quantity priority	Sections of Scott Ditch in Scott are in category 5 for DO, and category 4a for bacteria.[9] Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area.[10]	25-50% of the soils are Prime if drained. See Ag Priorities map: Drainage. CDID #21 is located within the Scott Ditch sub-basin.[11]	The northern part of Scott Ditch area is in designated floodway and about half of the area is within the 1:100-year flood zone. Ag flood protection priority <5% of the soils are prime if protected from flooding, except for a small portion in the far south-east of this area. See Ag Priorities maps: Flooding	99% of soils in Scott Ditch are Prime. See Ag Priorities maps: Prime Soils. Ag prime soils priority >80% of land in Scott is in Ag Zoning or Rural Study Area. See Ag Priorities maps: Ag Land Base. Ag land base priority.		
Scott Ditch AU 1092 AU 1096 AU 1099 AU1095 (small portion) Notes from work session January 2016	Inadequate water supply in wells. Plenty of water in Nooksack River but some participants noted that actual water rights are an issue. Several active gravel pits in the WID area at southern border - question about how these affect water availability.	Iron in groundwater. Bacteria in surface water varies by season (high in winter).	Generally, the drainage is acceptable. Some areas have stormwater entering from neighboring developed land (not good if stormwater is sent into drainage ditches April to Nov as this competes with ag drainage functions. AU1096: Drainage at Theil Rd (Fountain Lake?) is lower than culvert by 4". Riparian planting along Scott Ditch and Elder Ditch impedes flow, but no other significant ditch district needs to be taken care of. Overtoppng of the levee at Polinder Road.	Diking District supervises dike maintenance, which is acceptable. Nooksack River backs up into Scott Ditch, which floods fields for longer time periods now: fields stay wet from Bylsma to Hannegan Rds. Need to check Scott channel grade from Bylsma Rd downstream. Evaluate need for floodgate or control structure at confluence of Scott Ditch & Nooksack. Sediment/gravel buildup in Nooksack River. Some CREP planting projects are creating flow issues west of Hannegan Rd/ (not specified). Significant 2015 flood overtopping along Nooksack R, water lies at corner of Nolte Rd. High floods now mean more water south of the Nooksack River at Noon Rd.	No general pressure for land conversion out of ag, but in AU1099, land development pressure along Mead Rd and Everson South, includes potential stormwater impacts on ag land.	Bank erosion at mouth of Scott Ditch.	Specific: (SL1/17) AU1099: Drainage - Gradient too low and poor drainage north of Elder Ditch. (SL2/18) AU1092: Drainage: County Ditch Maintenance needed. Road ditches blocked. Noxious weeds. (SL3/19) AU1099: Beaver activity in Scott Ditch needs management. (SL11/20) AU1099: Evaluate gravel removal /mining on Nooksack River bars to reduce back up in Scott Ditch. (SL4/21) AU1090 Drainage issues due to 0 elevation change in Elder Ditch along with beaver activity and planted riparian. (22) AU1092: Survey channel profile on lower Scott Ditch from Bylsma Rd downstream to mouth to assess potential reverse grade. (SL6/23) AU1092 Flood gate at mouth of Scott Ditch would prevent Nooksack River from backing up. (SL7/24) AU1090 Drainage - Remove noxious weeds (blackberry, nightshade and knot) in Scott Ditch at Bylsma Rd. (SL12/25) AU1096 Flood Protection - Dike on north side of Nooksack River needs replacement.

[9] Ecology (2012), *Water Quality Assessment for Washington.* http://www.ecy.wa.gov/programs/Wq/303d/index.html

[10] 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)

[11] WCD (2014), *Agricultural Drainage for Drainage Districts.* http://www.whatcomcd.org/ag-drainage-districts

3D. Agricultural Enhancement Priorities: Wiser Lake/Cougar Creek (North)							
	Water quantity: Irrig., stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Wiser Lake/ Cougar Creek North (northern part within the South Lynden WID) AU 1099 AU 1110 AU1111 Notes from reference maps and other documents	>25 new water rights applications in this area (includes portion outside the WID). See Ag Priorities maps: Water Quantity and Reference map: Water rights points of diversion Water quantity priority	A section of Wiser Creek in Wiser Lake/ Cougar Creek North is in category 5 for DO, and category 4a for bacteria.[12] Iron (natural origin) found in most areas of Sumas aquifer in the Lynden-Everson-Nooksack-Sumas study area.[13]	25-50% of the soils are Prime if drained. See Ag Priorities map: Drainage. DID #5 is located within the Cougar Creek sub-basin.[14]	A small area in the northern part of Wiser/Cougar North is in designated floodway and the 1:100-year flood zone. <5% of the soils are prime if protected from flooding. See Ag Priorities maps: Flooding	94% of soils in Wiser Lake/Cougar Creek are Prime. See Ag Priorities maps: Prime Soils. Ag prime soils priority >80% of land in Wiser Lake/Cougar North is in Ag Zoning or Rural Study Area. See Ag Priorities maps: Ag Land Base. Ag land base priority. Rural Study Area present, and parcels with >2 potential dwelling units. See Reference map: Potential development rights. Development pressure		
Wiser Lake/ Cougar Creek North Notes from work session January 2016	Good irrigation water availability.	Iron in some groundwater, but localized.	Outlet to Nooksack controlled by floodgate. Wet ground through the west end, east and west of Ritter Rd. Major drainage down Ritter Rd ditch for this area.	Adequate at present. Some concern about sediment build up in Nooksack River.	Development on Wiser Ridge, but not considered a problem at present.		Specific: (SL8/26) AU1111 Drainage: Maintenance needed on drainage line north of Pole Rd.

[12] Ecology (2012), *Water Quality Assessment for Washington.* http://www.ecy.wa.gov/programs/Wq/303d/index.html

[13] 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)

[14] WCD (2014), *Agricultural Drainage for Drainage Districts.* http://www.whatcomcd.org/ag-drainage-districts

3E. Agricultural Enhancement Priorities: Upper Fourmile Creek (north portion within South Lynden WID)							
	Water quantity: Irrig., stock, processing	Water quality	Drainage	Flood protection	Land	Other	Possible actions
Fourmile (northern part within S. Lynden WID: small portions of AU1114 and AU1133) Notes from reference maps and other documents	<10 new water rights applications in Upper Fourmile (map shows 2 new applications in this area). See Ag Priorities maps: Water Quantity, and Reference map: Water rights points of diversion	None listed	25-50% of the soils are Prime if drained. See Ag Priorities map: Drainage. DD #3 is located within the Fourmile Creek sub-basin.[15]	<5% of the soils in Upper Fourmile Creek are prime if protected from flooding. – Whatcom Ag-Watershed Pilot Project, Ag Priorities: Flooding map	92% of soils in Upper Fourmile Creek are Prime. See Ag Priorities maps: Prime Soils. Ag prime soils priority >80% of land in Upper Fourmile Creek is in Ag Zoning or RSA. See Ag Priorities maps: Ag Land Base. Ag land base priority. No Rural Study Area in this part of the WID.		
Fourmile (northern part within South Lynden WID)			Peat soils in the area mean that trees planted along ditches are more likely to fall in over time.	River is probably higher than ditch on Nolte Rd. Flood flow overtops, drains to the Nolte Rd and is held back in the corner.		Lower levee would be unacceptable if flood flows in spring linger on fields as happened in 1990.	

[15] WCD (2014), *Agricultural Drainage for Drainage Districts.* http://www.whatcomcd.org/ag-drainage-districts

Watershed characterization tables for the South Lynden WID

NOTE: Possible actions include: Specific actions identified by WID Actions Map # location and Assessment Units (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 Kamm Creek				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Upper Kamm Creek AU1098 (October 2012 results + 2016 updates)	Critical Habitat: Sandhill crane, trumpeter swan (1) and wetland (1) (see Watershed Reference map: Priority Species and Habitat)	Known presence of chum, coho, Chinook, and cutthroat.[16] Current known and current presumed salmonid distribution in Kamm Creek in Upper Kamm – see Watershed Reference map: Fish Distribution and Fish Barriers.	Sections of Kamm Creek and Unnamed Creek (trib to Kamm) in Upper Kamm are in category 5[17] for dissolved oxygen (DO) and pH, and category 4a[18] for bacteria.	Results of PSWC water flow assessment: An area of moderately high importance for recharge, delivery, discharge and surface storage processes. Overall water flow processes are highly degraded. Summary: Water flow processes are moderate-high importance and highly degraded. Mainstem is impaired for DO and bacteria which suggests a relationship to degraded storage (wetlands) and sediment (phosphorous & bacteria adsorption) processes. Potential for Enhancement: Investigate measures to restore storage and discharge. Improve sinks (wetlands, hydric soils) to mitigate nutrient export and retain sediment, and enhance riparian areas to reduce export into surface waters. Consider actions to improve riparian habitat and associated connectivity.
Upper Kamm Creek AU1098 (January 2016 work session notes)	Geese are present but no sandhill cranes have been observed in this area[19] (comment by work session participant). WDFW staff will advise on the validity of this record – it is a migratory spot so cranes might not stay long in the area.[20]	Chinook and bull trout will forage in Kamm Creek. Not a lot of flow in the stream for fish in the Upper Kamm – more water below Badger Road.	Livestock farming is very limited north of Badger Road. Many waterbirds in this area - could potentially be contributing to high fecal bacteria concentrations in standing water.	Transfer of water rights in the watershed is being considered (location not indicated), intended to improve instream flows.

[16] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

[17] 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)

[18] 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)

[19] Work session participant comment, 2016.

[20] Ingram, Joel (2016), WDFW. Pers. comm.

5B. Watershed Enhancement Priorities: Lower Kamm Creek				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Lower Kamm Creek AU1097 (October 2012 results + 2016 updates)	Critical Habitat: Trumpeter swan (1) and wetland (1) Rare Plant: Soft-leaved willow[21] (see Watershed Reference map: Priority Species and Habitat)	Known presence of chum, coho, Chinook, and cutthroat.[22] Documented coho presence.[23] Current known and current presumed salmonid distribution in Kamm Creek in Upper Kamm – see Watershed Reference map: Fish Distribution and Fish Barriers.	Sections of Kamm Creek and Stickney Slough in Lower Kamm are in category 5 for DO and pH, and category 4a for bacteria.[24]	Results of PSWC water flow assessment: An area of high importance for recharge and moderate high importance for delivery, discharge and surface storage processes. Overall water flow processes are highly degraded. Summary: Water flow processes are moderately important and highly degraded. Mainstem is impaired, DO and bacteria which suggest a relationship to degraded storage (wetlands) and sediment (phosphorous & bacteria adsorption) processes. Potential for Enhancement: Investigate measures to restore storage and discharge. Improve sinks (wetlands, hydric soils) to mitigate nutrient export and retain sediment, and enhance riparian areas to reduce export into surface waters.
Lower Kamm Creek AU1097 (January 2016 work session notes)	Geese are present but no Sandhill Cranes have been observed in this area[25] (comment by work session participant). WDFW staff will advise on the validity of this record – it is a migratory spot so cranes might not stay long in the area.[26] Beaver are active in the river (take corn from the fields).	Chinook and bull trout will forage in Kamm Creek. Kamm Creek has some good gravels (marked on map). Areas of higher gradient are better habitat. Mormon Ditch area is flat, not ideal for fish spawning habitat. – Participant comments from WID work session.		Opportunities for culvert removal to improve fish habitat. (i)

[21] WA Department of Natural Resources (2015), *Washington Natural Heritage Program*. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html

[22] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

[23] WDFW *SalmonScape* http://apps.wdfw.wa.gov/salmonscape/

[24] Ecology (2012), *Water Quality Assessment for Washington*. http://www.ecy.wa.gov/programs/wq/303d/index.html)

[25] Work session participant comment (2016).

[26] Ingram, Joel (2016), WDFW. Pers. comm.

5C. Watershed Enhancement Priorities: Scott Ditch				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Scott Ditch AU 1092 AU 1096 AU 1099 AU1095 (small portion) Notes from reference maps and other documents	Critical Habitat: Shorebird concentration, trumpeter swan, waterfowl concentrations and wetland. Rare Plant: soft-leaved willow[27] (see Watershed Reference map: Priority Species and Habitat)	Coho and cutthroat.[28] Documented coho presence.[29] Tributaries to Scott Ditch have historic salmonid distribution and mainstem has current known salmonid distribution. (See Watershed Reference map: Fish Distribution and Fish Barriers.)	Sections of Scott Ditch are in category 5 for DO, and category 4a for bacteria.[30]	Summary of PSWC water flow assessment: An area of high importance for surface storage and recharge processes, and moderate to moderate-high importance for delivery and discharge processes. Overall water flow processes are highly degraded. Potential for Enhancement: Water quality listings for dissolved oxygen and bacteria. Investigate opportunities to increase surface storage and retain surface flows for longer in this area. Restoring some wetland habitat would help to increase surface storage. Protection and restoration of forest cover and riparian vegetation in this area would help to improve delivery processes.
Scott Ditch AU 1092 AU 1096 AU 1099 AU1095 (small portion) Notes from January 2016 work session	Noxious weeds are plugging the area where Hannegan Road crosses Scott Ditch.	Question was raised at the work session about whether Scott & Elder ditches were artificially constructed, leading to creation of fish habitat that was not historically present there. [31]		

[27] WA Department of Natural Resources (2015) *Washington Natural Heritage Program*. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html

[28] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

[29] WDFW *SalmonScape* http://apps.wdfw.wa.gov/salmonscape/

[30] Ecology (2012), *Water Quality Assessment for Washington*. http://www.ecy.wa.gov/programs/wq/303d/index.html

[31] Older USGS maps and the historic map at the Ag Water Board website (ca. 1900) show a stream where Scott Ditch now enters the Nooksack River. See http://www.agwaterboard.com/#!storymap/c1jc6

5D. Watershed Enhancement Priorities: Wiser Lake / Cougar Creek (North portion)				
	Wildlife habitat	Salmonid habitat	Water quality	Summary & potential for enhancement
Wiser/ Cougar (north) AU1110, AU1111 and small portion of AU1103 Notes from reference maps and other documents	Critical Habitat: Shorebird concentrations, trumpeter swan, waterfowl concentration and wetland. Rare Plant: Bristly sedge[32] (see Watershed Reference map: Priority Species and Habitat)	Char, Chinook, chum, coho, cutthroat, pink, sockeye, steelhead[33]	Sections of Wiser Creek are in category 5 for DO, and category 4a for bacteria. [34] A section of the main Nooksack River in AU1103 (west of Hannegan Rd) is in category 4a for bacteria and Unnamed Creek (trib to Nooksack River) in AU1103 is in category 5 for DO.[35]	<u>Summary of PSWC water flow assessment</u>: The areas in AU1110 and AU1103 are of moderately high to high importance for surface storage and delivery processes. Water flow processes are moderately to highly degraded, but overall this is an area of the WID that is of relatively lower importance for water flow processes. <u>Potential for Enhancement</u>: Water quality listings for bacteria and dissolved oxygen. Investigate opportunities to increase surface storage and retain surface flows for longer in this area. Restoring some wetland habitat would help to increase surface storage. Protection and restoration of forest cover and riparian vegetation in this area would help to improve delivery processes.
Wiser/ Cougar (north) AU1110, AU1111 and small portion of AU1103 Notes from January 2016 work session			Manure solids applied on berry fields with sawdust accumulate in runoff and are also moved by floodwater.	

[32] WA Department of Natural Resources (2015), *Washington Natural Heritage Program*. http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html

[33] Fish Habitat Technical Team (2004), WRIA 1 Watershed Management Project. Data provided by Sarah Watts, Whatcom County Planning & Development Services.

[34] Ecology (2012), *Water Quality Assessment for Washington*. http://www.ecy.wa.gov/programs/wq/303d/index.html

[35] Ecology (2012), *Water Quality Assessment for Washington*. http://www.ecy.wa.gov/programs/wq/303d/index.html

Appendix C: Selected Reference Maps for the South Lynden WID

Contains a selection of reference maps related to the South Lynden 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 South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. https://www.southlyndenwid.com/ [Alternative download here]

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

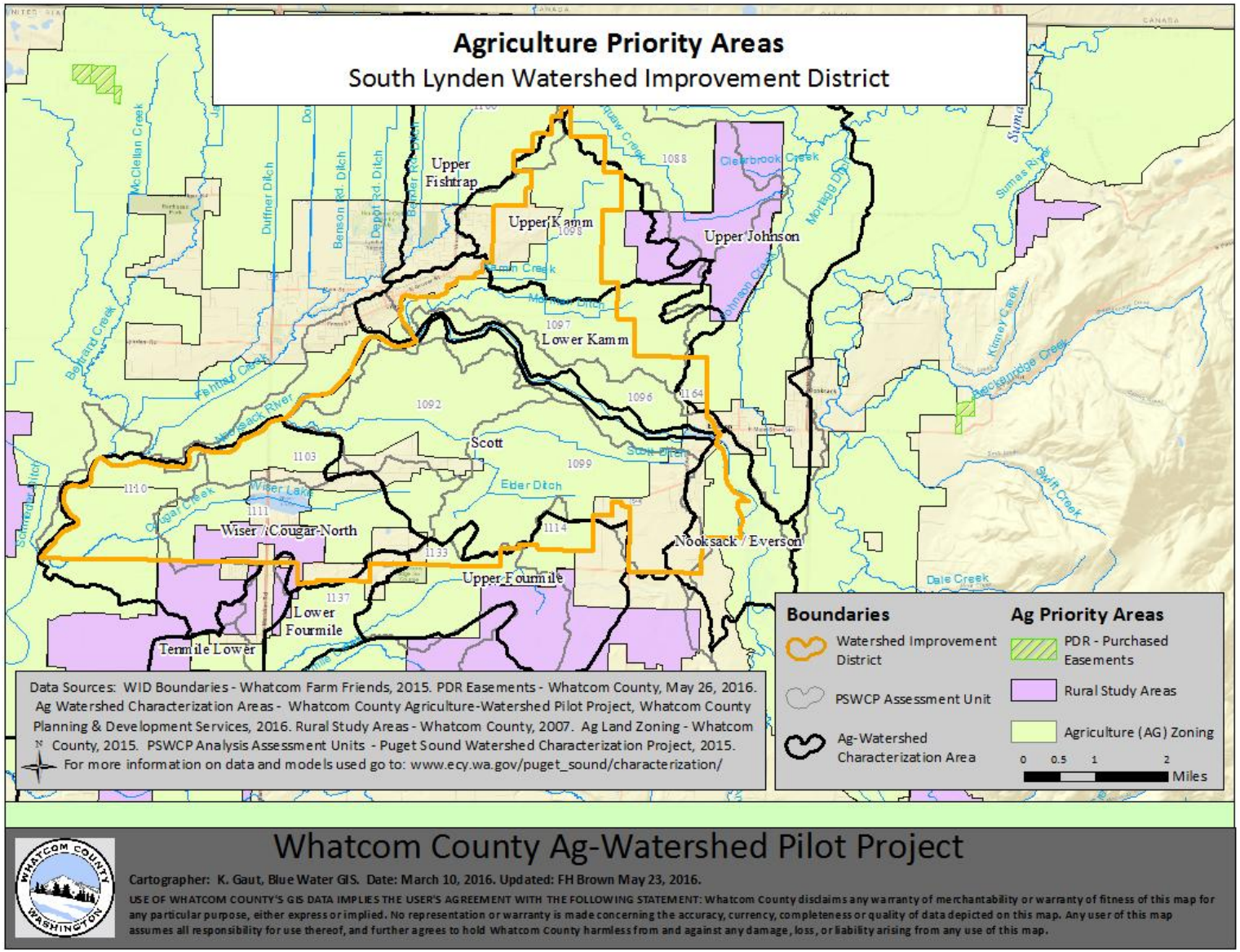


Figure 17. South Lynden WID Reference map: Agriculture priority areas

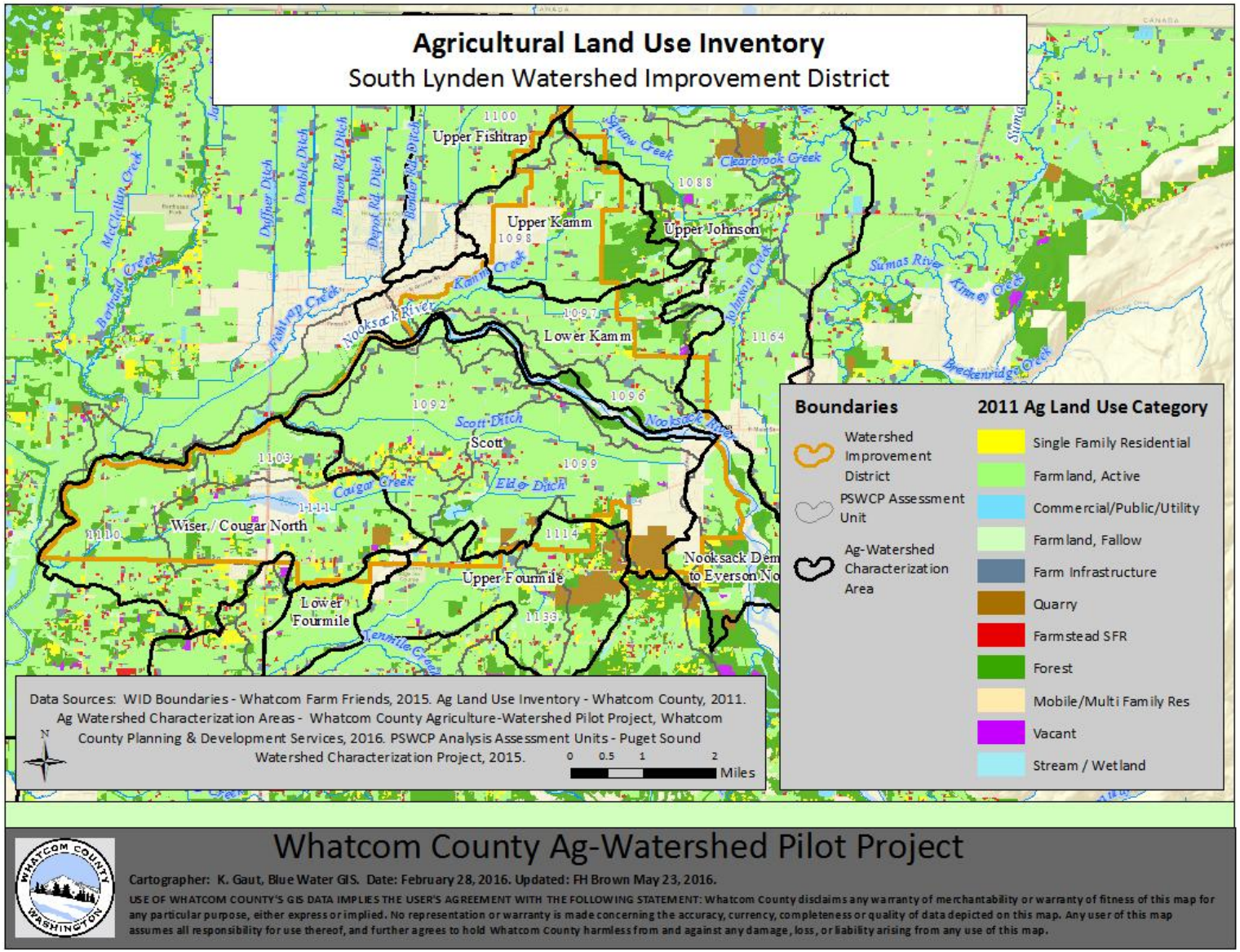


Figure 18. South Lynden WID Reference map: Agricultural land use inventory

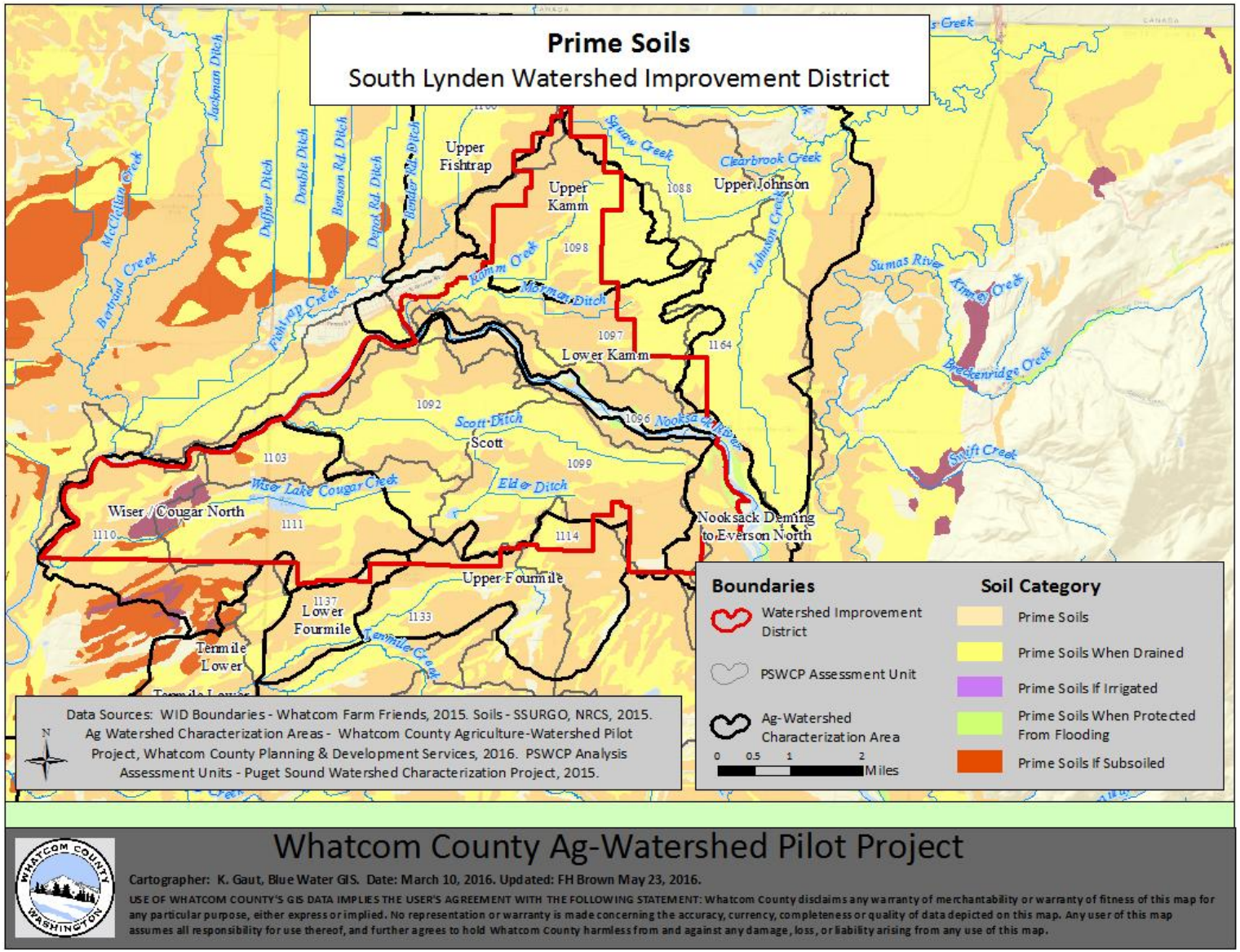


Figure 19. South Lynden WID Reference map: Prime soils

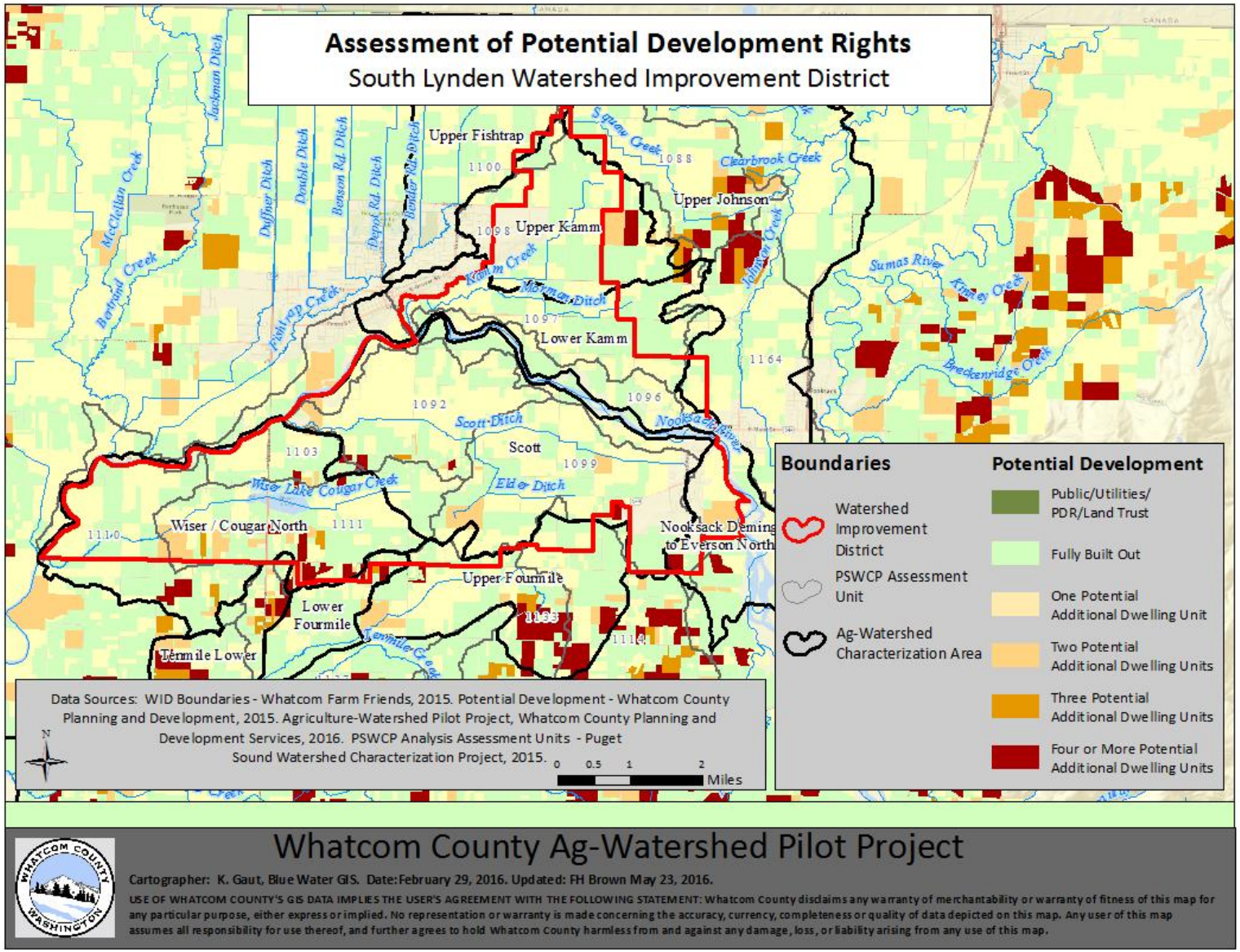


Figure 20. South Lynden WID Reference map: Assessment of potential development rights

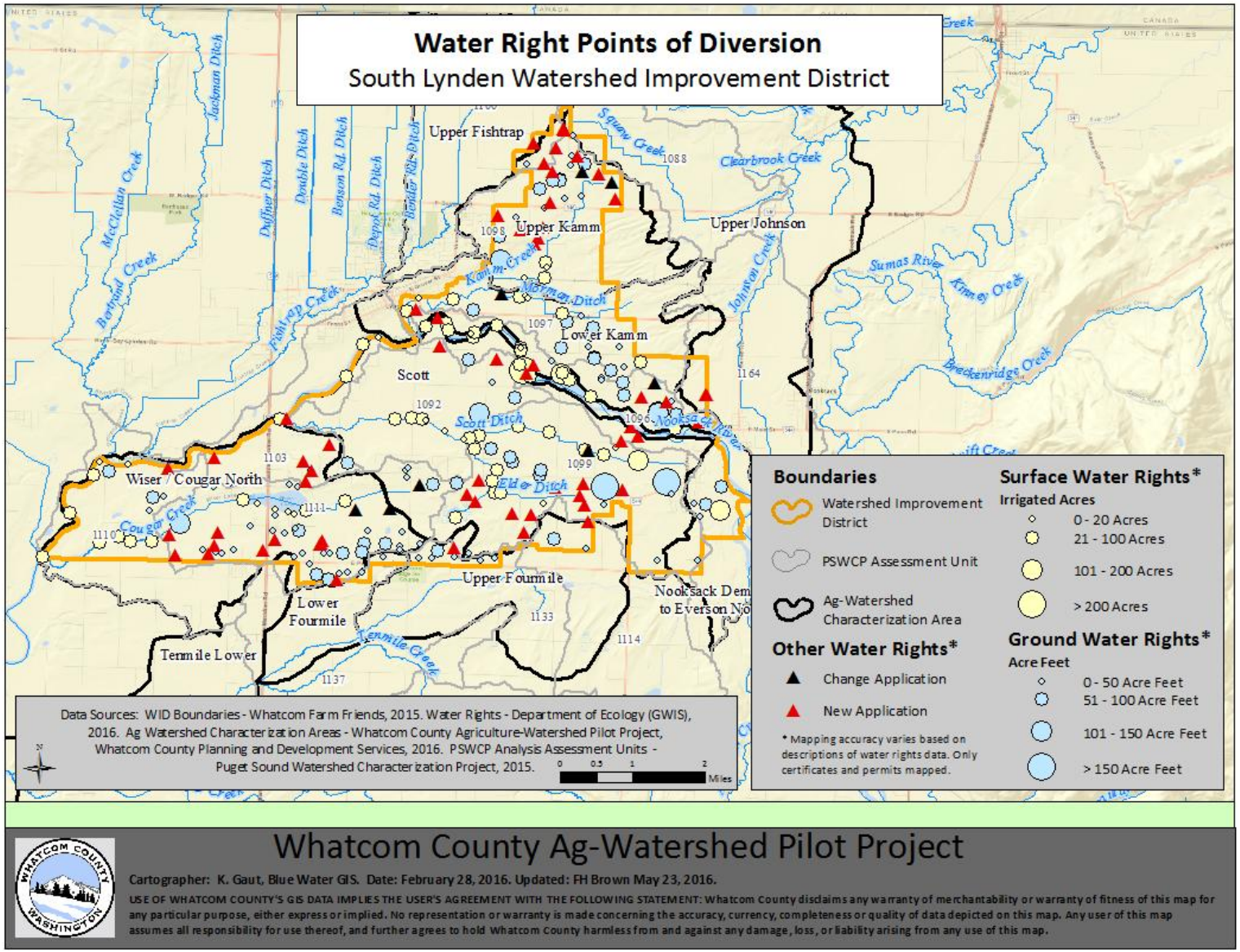


Figure 21. South Lynden WID Reference map: Water right points of diversion

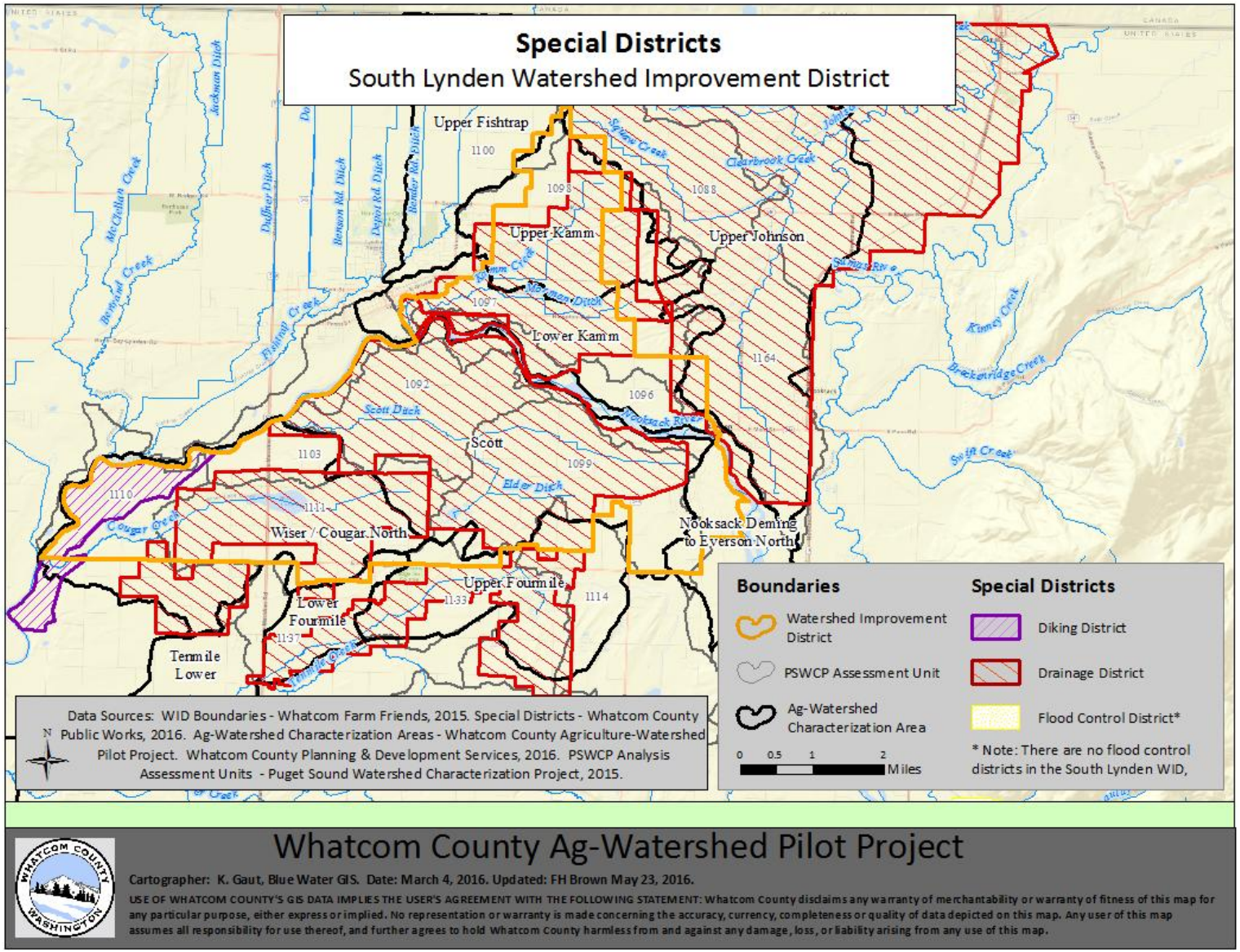


Figure 22. South Lynden WID Reference map: Special districts

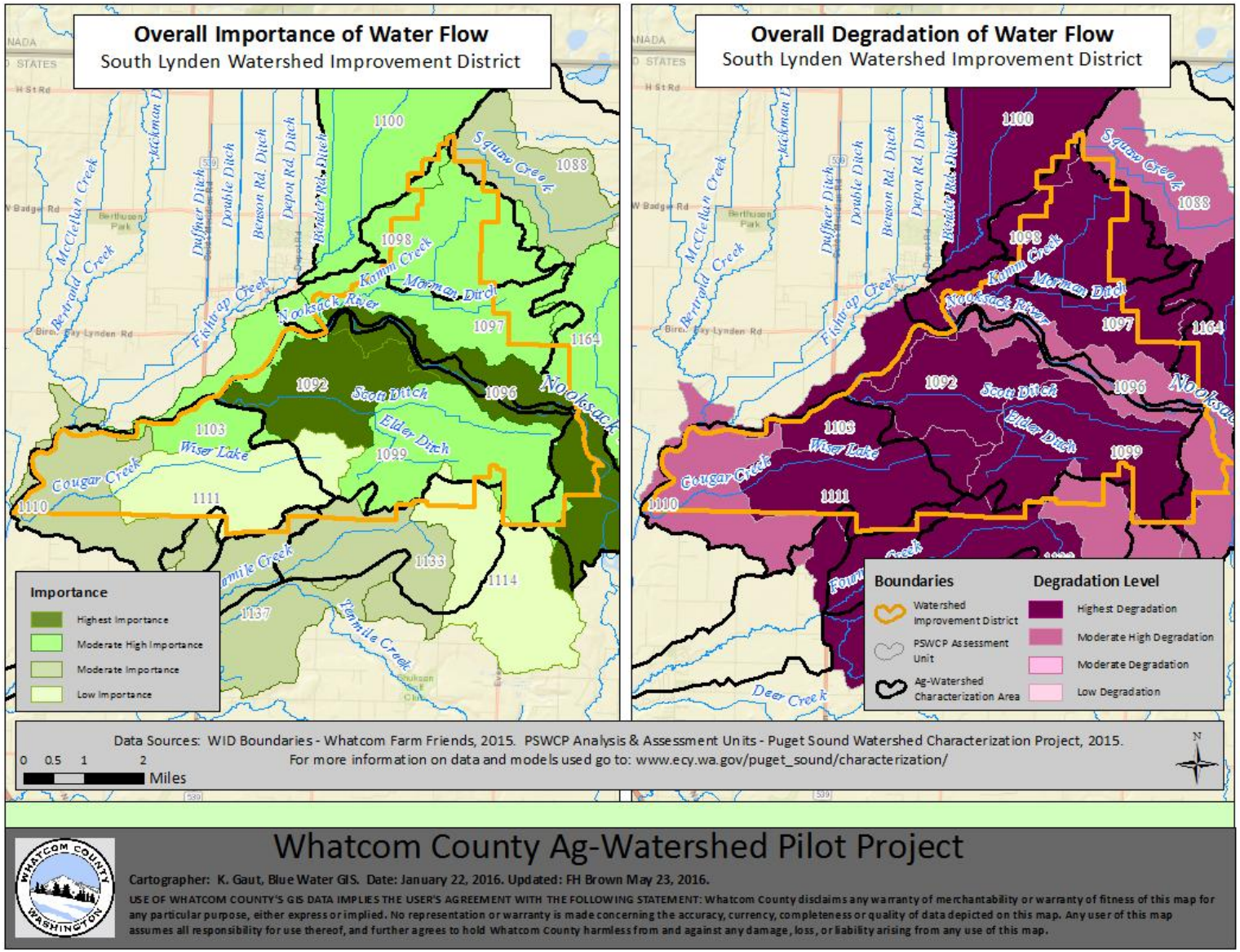


Figure 14. South Lynden WID: Overall importance and degradation of water flow processes

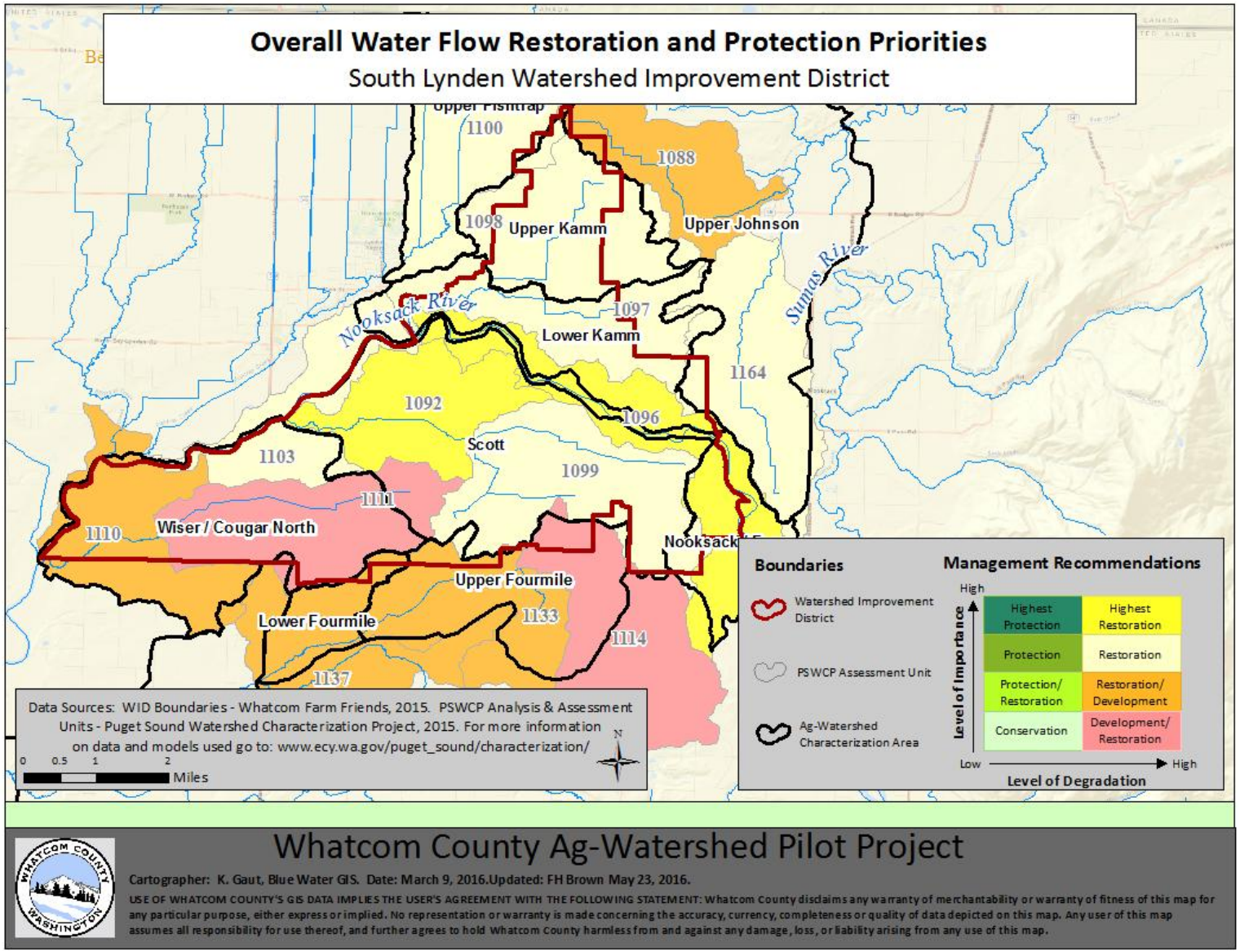


Figure 15. South Lynden WID: Overall water flow restoration and protection priorities

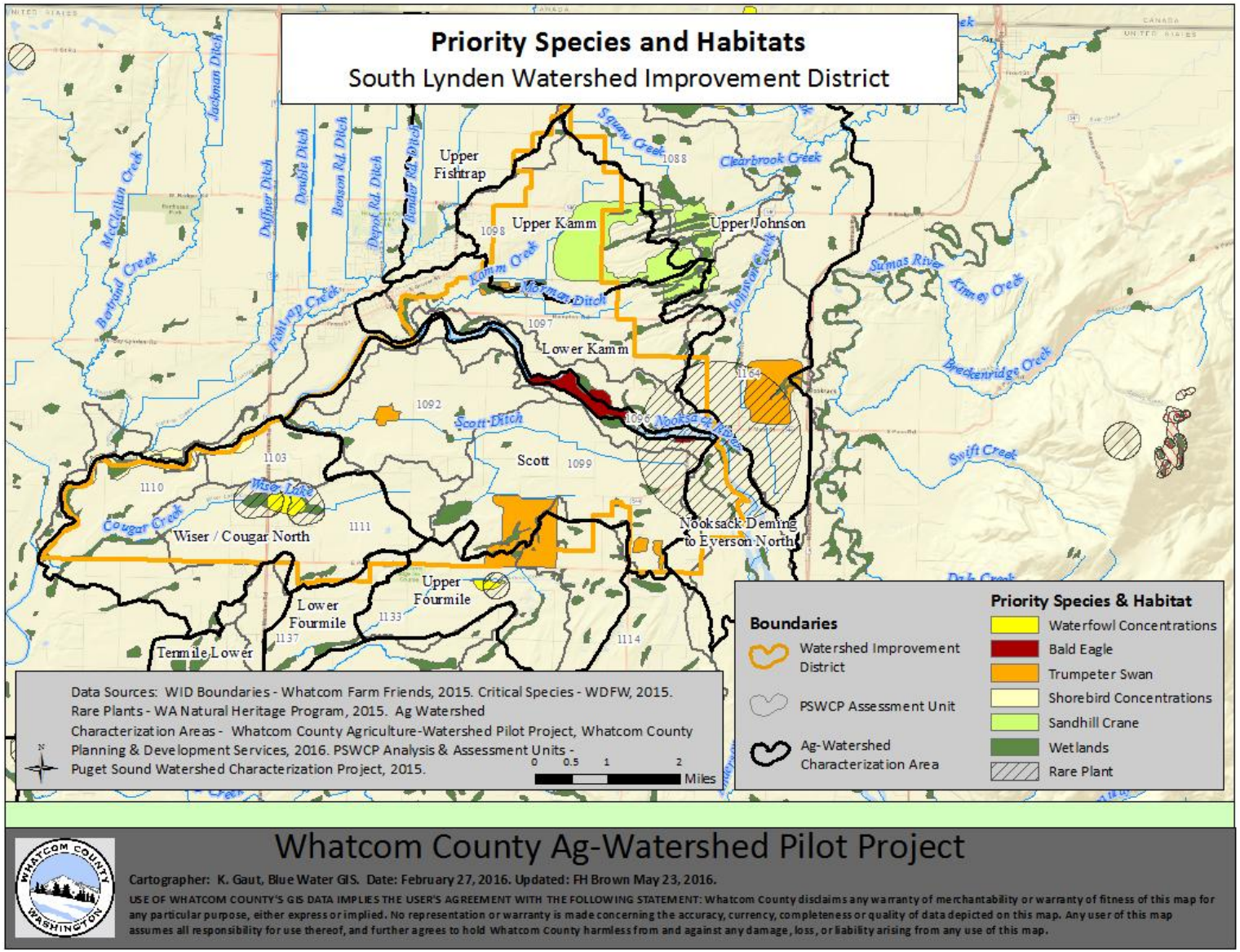


Figure 24. South Lynden WID Reference map: Priority species and habitat

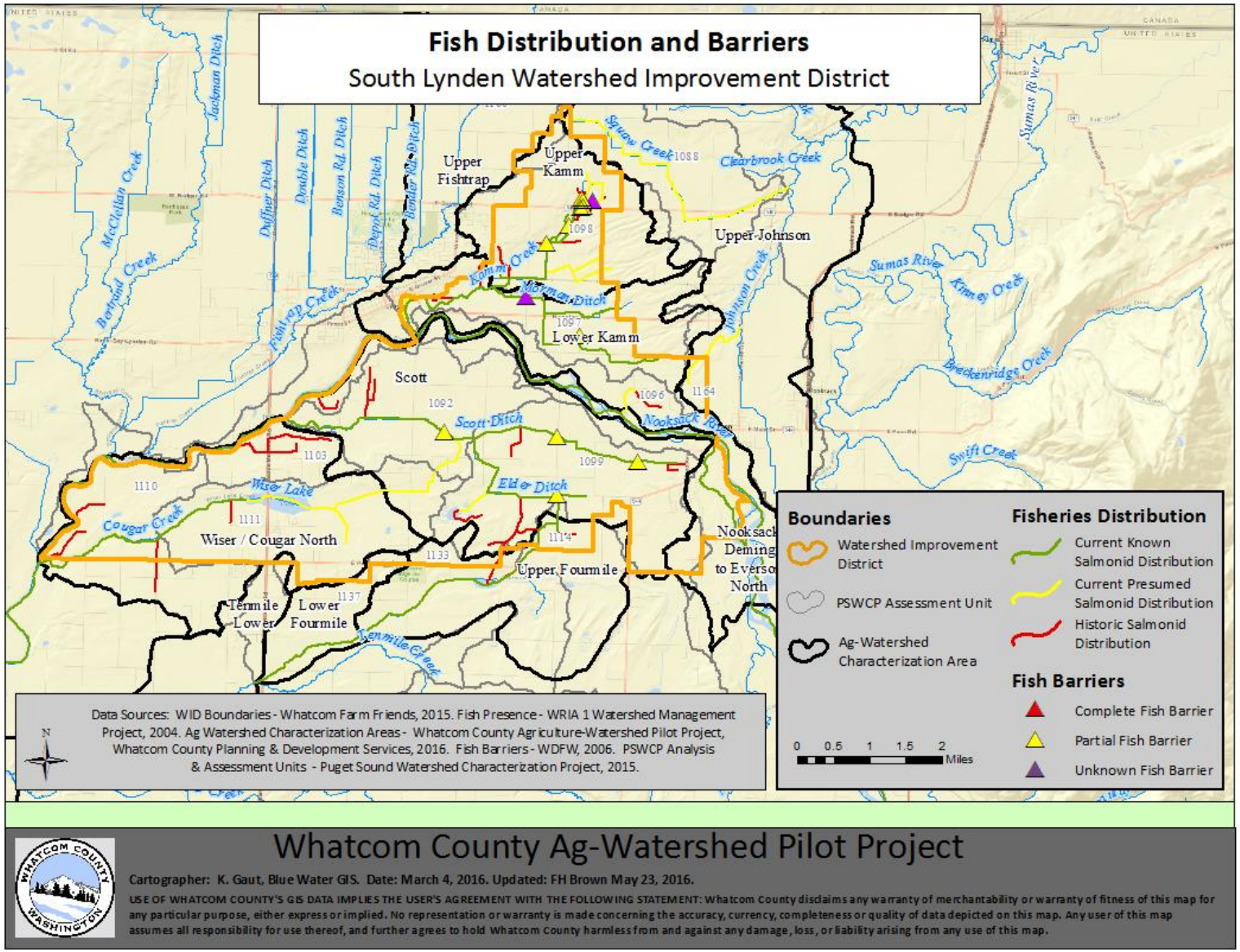


Figure 25. South Lynden WID Reference map: Fish distribution and fish barriers

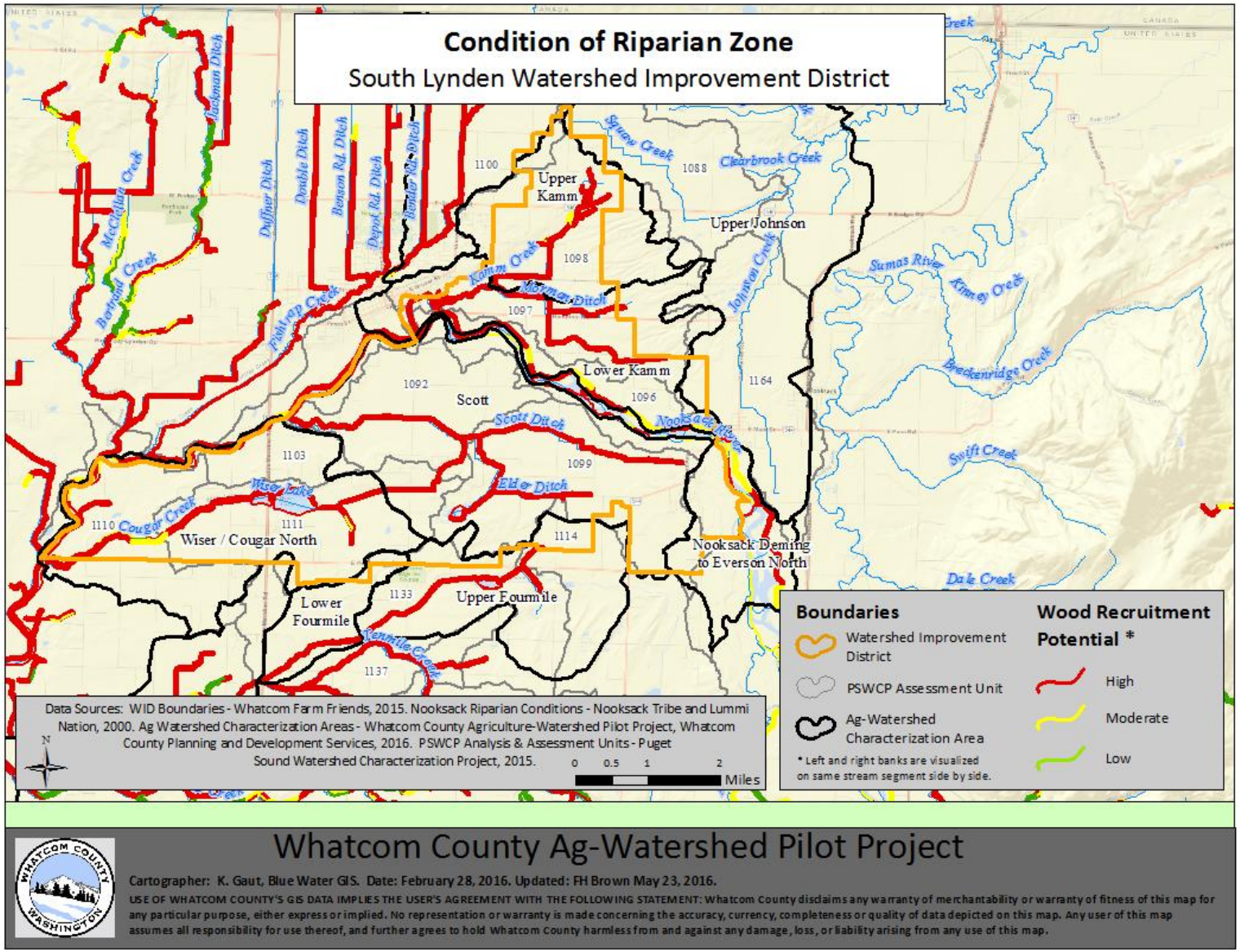


Figure 26. South Lynden WID Reference map: Condition of riparian zone

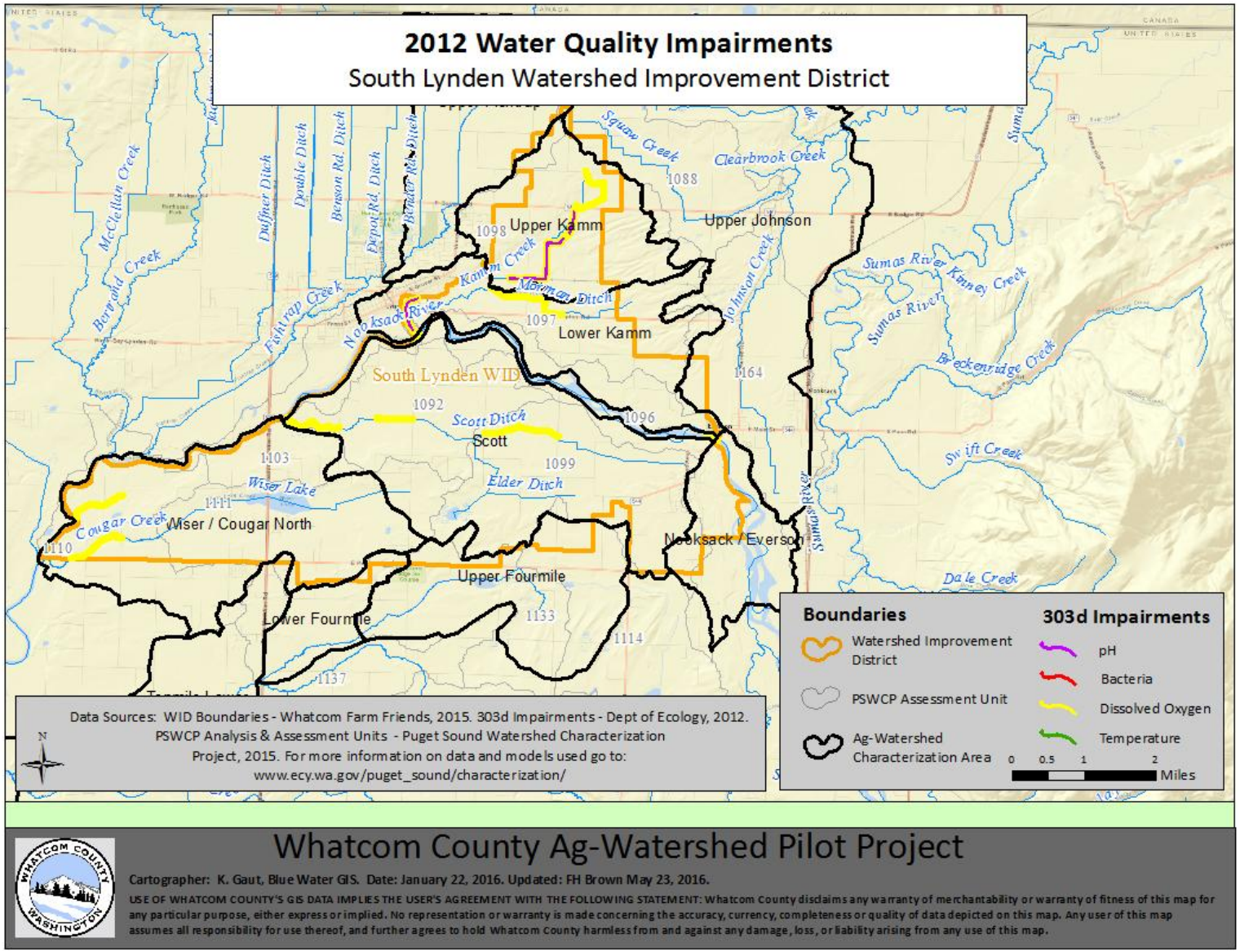
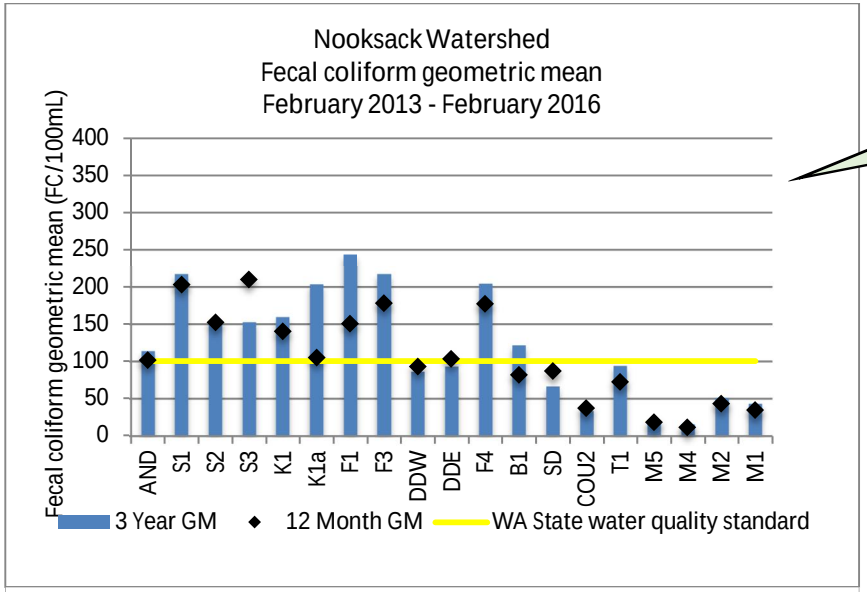
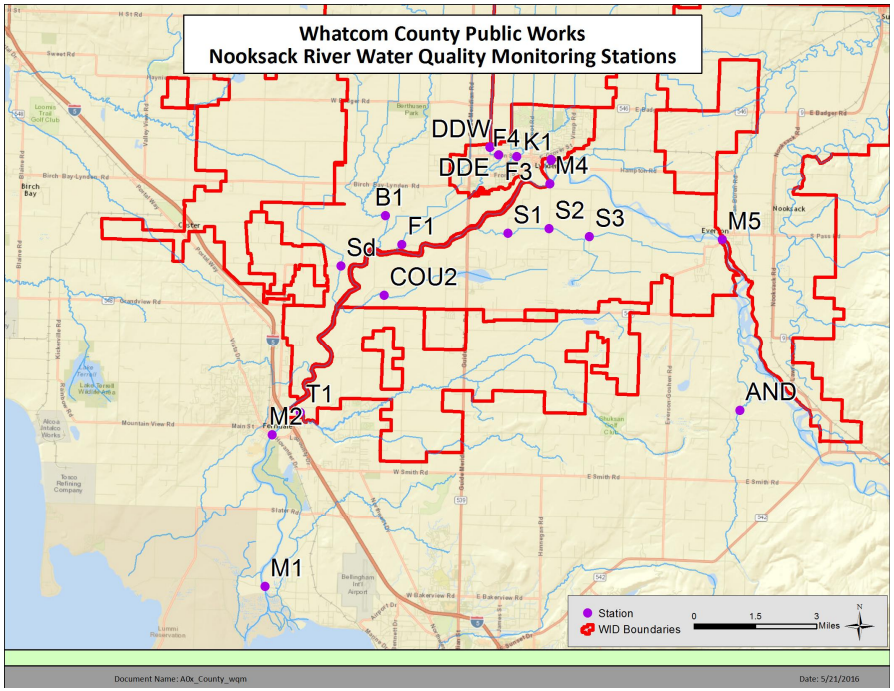
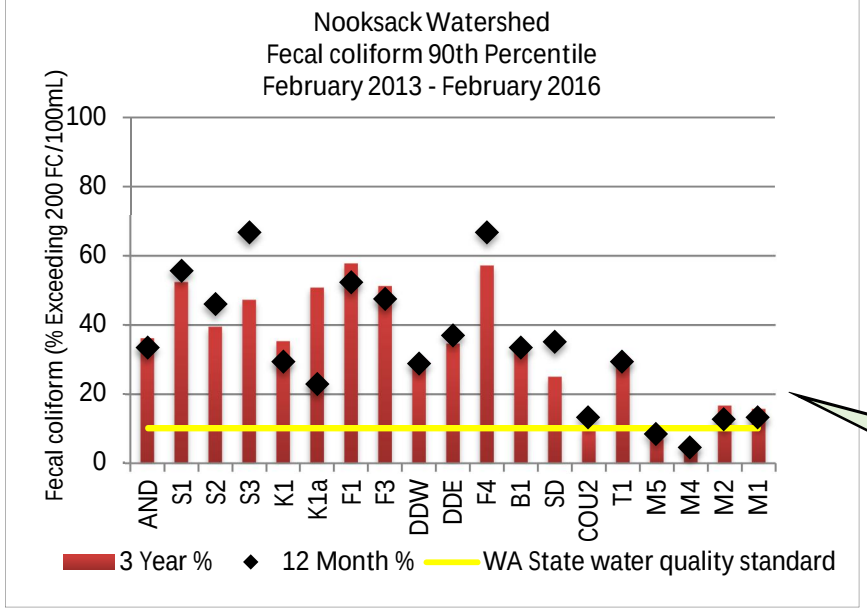


Figure 27. South Lynden WID Reference map: Water quality impairments (2012)



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.





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.

Figure 28. South Lynden WID Reference map: 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 South Lynden WID

Priority	WRIA1 watershed management project	Whatcom County Comprehensive Plan (Aug 2016)
	WRIA1 Watershed Management Project (2008). *Goals of the WMP.* http://wria1project.whatcomcounty.org/About-The-Project/Goals-Of-WMP/17.aspx	Whatcom County Comprehensive Plan, adopted August 2016. http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/21056[1]
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, 8EChapter 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 Envrironment, 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, 2MChapter 7 Economics, goal 7HChapter 8 Resource lands, goal 8B (habitat and reg.s), 8D, 8EChapter 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 South Lynden WID (July 2016).

Reproduced from the South Lynden WID mapping report.

Source for this material:
Whatcom County Agriculture-Watershed Pilot Project (2016). *Agriculture-Watershed Characterization and Mapping Report for the South Lynden Watershed Improvement District*. Whatcom County Planning & Development Services. http://www.southlyndenwid.com/ [Alternative download here]

Sources of Available Data for South Lynden WID

Updated August 2017

Prepared by Cheryl Lovato Niles & Heather MacKay

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 South Lynden Watershed Improvement District (WID).

Sources for the following data types have been collated for the Kamm, Scott, Wiser/Cougar Creek, and Nooksack-Everson 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,
- Ground water measurements from 2000 to the present,
- Erosion and avulsion hazard in the Nooksack River channel migration zone,
- 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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Figure 1: Routine water quality monitoring stations located within the South Lynden WID area 4

Table 1: Fecal coliform monitoring maps and reports

Watershed/Area	Parameter	Source	Description	URL
Lower Kamm, Wiser/Cougar Lake, Scott, Nooksack Everson	Fecal coliform	Whatcom County	Map of routine monitoring sites and reports of sampling results updated monthly	http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results [last accessed February 1, 2016] (see note below for information on how to download FC data)
Upper Kamm, Lower Kamm, Scott, Wiser Cougar North,	Fecal coliform	Conservation District	Watershed Health Assessment (November 2015)	http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results [last accessed February 1, 2016]
All (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 (only WSDA results shown as of 2/9/16). Data is available upon request from WSDA Dairy Nutrient Management group - Michael Isensee 360-961-7412	Map of preliminary source tracking results	http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results [last accessed February 1, 2016]

Accessing water quality data from routine monitoring sites: Figure 1 shows the locations of routine water quality monitoring sites that are within the S. Lynden 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 the table below.

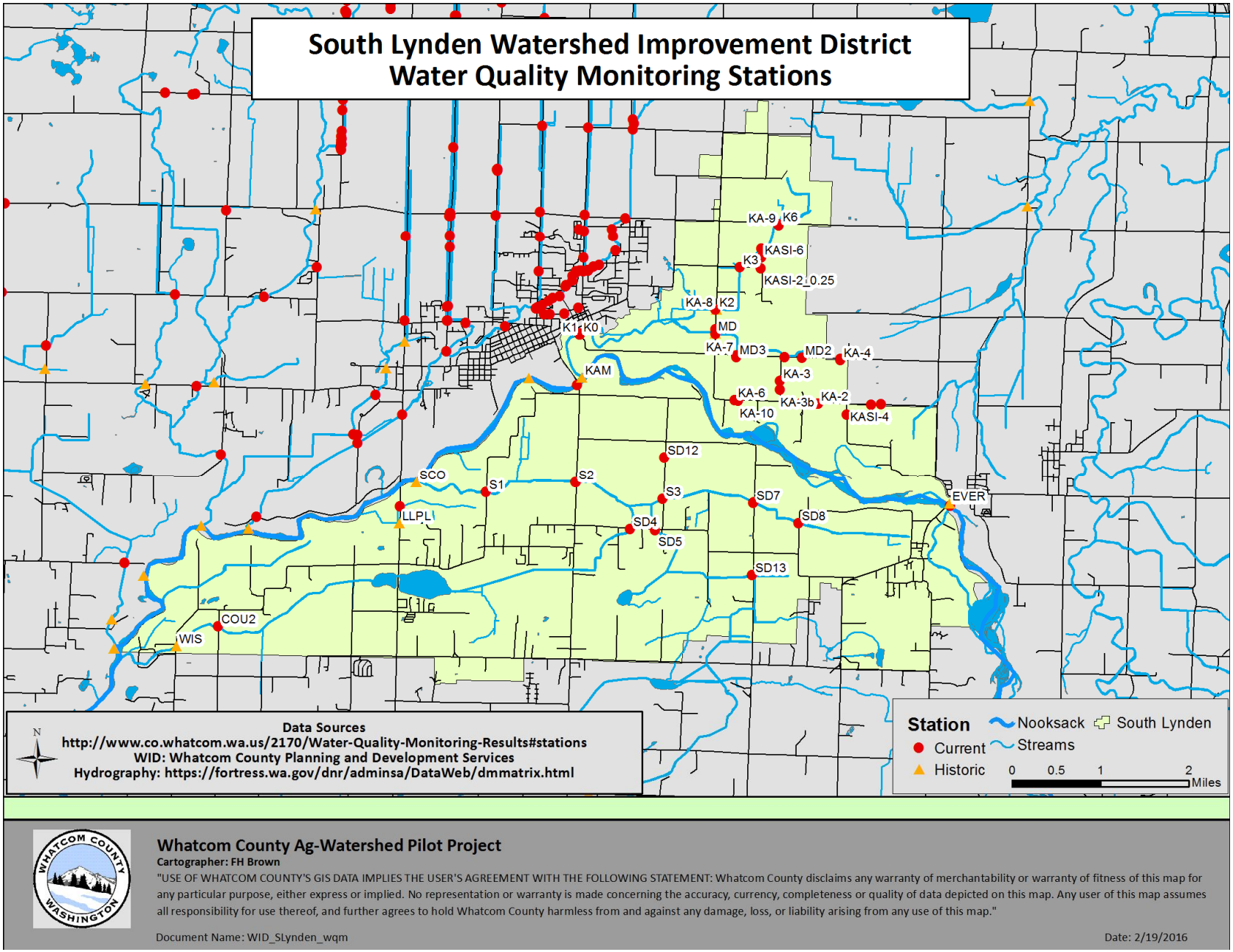

Figure 1: South Lynden WID: Routine water quality monitoring stations. See Tables 1 and 2 for more information.

Table 2: Where to find earlier water quality data from monitoring stations on Whatcom County Water Quality Monitoring Results for S. Lynden WID area. Data for the County Health Department are 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	Washington State Department of Agriculture	Nooksack Tribe
What	Data generally includes FC, pH, T, Conductivity, and DO. Occasionally flow and wetted width are recorded.	Focused on fecal coliform	Focused on fecal coliform	Fecal coliform, E.coli, T, pH, DO, Conductivity, Turbidity,
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.	Data is available upon request from WSDA Dairy Nutrient Management group - Michael Isensee 360-961-7412	Available by request
Details	You may request data for a watershed sub basin from Jessica Kirkpatrick, Steve Hood, or Chris Luerkens at 360-715-5200.	<http://www.co.whatcom.wa.us/2172/Resource-Library>	Station locations are shown on Whatcom County's map of routine monitoring sites but results are available on the Preliminary Source ID Results map (both maps at <http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results>) and by request – contact information above.	Jezra Belieau, Water Resources Specialist Nooksack Indian Tribe jbeaulieu@nooksack-nsn.gov
Station Names	IC147Lake LNSKWQ_S2 NWIC-K1 NWIC-K1* NWIC-K2 K3 KF LLPL NWIC-M4 NWIC-M4* NWIC-M5 NWIC-M5*	M4 S1 S2 S3 COU2	KA-1 KA-10 KA-2 KA-2.5 KA-2UP KA-3 KA-3b KA-4 KA-4.1 KA-5 KA-6 KA-7	SW09 SW15

Who	Department of Ecology	Whatcom County Public Works	Washington State Department of Agriculture	Nooksack Tribe
	NWIC-MD MD2 MD3 NWIC-PNG NWIC-S1 NWIC-S1* NWIC-S2 NWIC-S3 SD3 SD4 SD5 SD7 SD8 NWIC-WIS NWIC-WIS*		KA-8 KA-9 KA-H1 KASI-1 KASI-2_0.25 KASI-3 KASI-4 KASI-5 KASI-6 LLPL1 SD11 SD12 SD13	

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	http://www.ecy.wa.gov/programs/wq/303d/

Table 4: Streamflow

WID/Area	Watershed	Ongoing/ Completed	Station ID	Description	Lat	Long	Collected by	Source	URL
South Lynden	Wiser/Cougar North	Ongoing	12211500	Nooksack River near Lynden	485514	1222904	USGS	USGS "Summary Information for Continuous Streamflow Gages in and near the WRIA 1 Study Area"	http://wa.water.usgs.gov/projects/wria01/sw.htm [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	notes
South of South Lynden	Mainstem	FC, T, NH3, NO2 NO3, TPN, TPP, OP, DO, pH,	01A050	Nooksack River @Brennan	ongoing	Ecology	River & Stream Water Quality Monitoring	https://fortress.wa.gov/ecy/eap/riverwq/regions/state.asp [last accessed October 1, 2015]	Oxygen is monitored "continuously" - 15 to 30 minute intervals

Table 6: Additional streamflow reports

WID/Area	Title	Published	URL
Bertrand, N. Lynden, S. Lynden, Laurel	USGS Estimating low-flow frequency statistics and hydrologic analysis of selected stream-flow gaging stations, Nooksack River basin, report 2009-5170	USGS Scientific Investigations Report, 2009.	http://wria1project.whatcomcounty.org/uploads/PDF/WaterQN/2009_USGS%20Report%20for%20Selected%20WRIA%201%20Gage%20Stations.pdf

Table 7: Hydrography

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

Table 8: 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	http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15492 [last accessed February 29, 2016]

Table 9: 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	http://wa.water.usgs.gov/projects/wria01/data/well_info.htm via http://wa.water.usgs.gov/projects/wria01/gw.htm [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	http://wa.water.usgs.gov/projects/wria01/data/tableGW2.htm [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	http://wa.water.usgs.gov/projects/wria01/data/tableGW4.htm [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	http://wa.water.usgs.gov/projects/wria01/data/water_levels.htm [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.
S. Lynden	Upper Kamm, Lower Kamm,	Hydraulic conductivity	Summary Information for Aquifer Tests in the WRIA 1 Study Area	Lynden, Everson, Pole Road	USGS, Ecology, Cascades Env. Services and Water Resources Cons. Team	http://wa.water.usgs.gov/projects/wria01/gw.htm [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 10: Additional reports on groundwater

Area	Title	Published	Authors	URL
all	Nitrate Contamination in the Sumas-Blaine Aquifer, Whatcom County, Washington	Publication No. 11-03-027, May 2011	Melanie Redding L. Hg., Barbara Carey L. Hg., and Kirk Sinclair L. Hg., Washington State Department of Ecology	https://fortress.wa.gov/ecy/publications/documents/1103027.pdf [last accessed February 1, 2016]
all	Sumas-Blaine Aquifer Nitrate Contamination Summary	Department of Ecology Pub. No. 12-03-026, June 2012	Carey, B and R. Cummings	www.ecy.wa.gov/biblio/1203026.html [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	http://kula.geol.wwu.edu/rjmitch/Report_2005.pdf [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,	http://wria1project.whatcomcounty.org/ [last accessed 2/1/16]

Table 11: 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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW2.pdf [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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW4.pdf [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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW3.pdf [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 Report98-4195, 5 plates, 251 p.
all	Aquifer tests	Approximate Locations of Aquifer Tests in the WRIA 1 Study Area	2000	USGS	http://wa.water.usgs.gov/projects/wria01/maps/mapGW5.pdf [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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW6.pdf [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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW7.pdf [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

WID/ Area	Parameter	Title	Last modified	Source	URL	Notes
all	Soil types	Distribution of Soil Map Units in the WRIA 1 Study Area	2000	USGS	http://wa.water.usgs.gov/projects/wria01/maps/mapGW8.pdf [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 http://www.ftw.nrcs.usda.gov/stat_data.html. 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	http://wa.water.usgs.gov/projects/wria01/maps/mapGW9.pdf [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 12: 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	http://www.ecy.wa.gov/programs/wr/info/webmap.html [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	http://wria1project.whatcomcounty.org/Resource-Library/Studies-And-Reports/Water-Rights/65.aspx [last accessed February 1, 2016]	

Table 13: 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	http://www.whatcomcounty.us/DocumentCenter/View/24143 [last accessed August 28, 2017]

Table 14: 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	http://wria1project.whatcomcounty.org/

Table 15: 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	http://www.ecy.wa.gov/puget_sound/characterization/index.html

Table 16: Land use/Land cover

WID/Area	Watershed	Parameter	Document	URL	Notes
Whatcom County		Agricultural Land Cover Analysis	Whatcom County Agricultural Land Cover Analysis version 2.3. 2013. Whatcom County Planning and Development Services	http://www.whatcomcounty.us/documentcenter/view/3989 [last accessed October 1, 2015]	
S.	Kamm	Ag land use classes	Land Uses and Vegetative Cover in focus area (figure 10) from Agriculture-Watershed Characterization and Mapping Report. 2013. Whatcom County Ag-Watershed Project report.	https://sites.google.com/site/wcwatershedag/ [last accessed March 1, 2016]	Source: WC-Planning and Development Services, 2013
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.	http://www.whatcomcounty.us/811/County-Wide-Critical-Area-Ordinance-Maps	
Whatcom County		Land Cover Change	WDFW High Resolution Change Detection Project; Whatcom County: Land Cover Change by Sub-Basin	http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15805 [last accessed February 26, 2016]	

Table 17: Land use/Land cover map and charts from Lower Nooksack Water Budget Overview Report includes Kamm, Scott, Wiser Lake/Cougar Creek

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 http://wria1project.whatcomcounty.org/ [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 18: Land use/Land cover electronic data from Lower Nooksack Water Budget Overview Report includes Kamm, Scott, Wiser Lake/Cougar Creek

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 http://wria1project.whatcomcounty.org/ [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 19: 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
Lower Kamm or Upper Kamm?	Kamm	RM 2.2-3.2	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. http://www.n-sea.org/archived-publications [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.
Lower Fishtrap and/or Lower Kamm	Fishtrap Creek Lower	RM 3.0-4.1	trained NSEA staff and volunteers	Nooksack Salmon Enhancement Spawning Grounds data and reports. http://www.n-sea.org/archived-publications [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 20: WDFW spawner surveys

Watershed/ WID	Parameter	Creek	Station location	Frequency	Date	Collected by	Source
Upper or lower Kamm? (South Lynden)	salmon (coho pink, chinook, chum): live, dead, and redds	Kamm Cr	RM 0	once each year		WDFW and NSEA field crews	WDFW Tasha Geiger Nooksack River Stock Assessment 360-305-2023 Natasha.geiger@dfw.wa.gov
Upper or lower Kamm? (South Lynden)	Steelhead: live, dead, and redds	Kamm Cr	several sites		2009 - 2010	WDFW and NSEA field crews	WDFW Tasha Geiger Nooksack River Stock Assessment 360-305-2023 Natasha.geiger@dfw.wa.gov
Scott, Wiser Lake/Cougar Creek	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 21: 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		http://wdfw.wa.gov/ais [last accessed October 1, 2015]	WDFW
Washington State	Washington Herp Atlas		unknown	Maps updated 2013	http://www1.dnr.wa.gov/nhp/refdesk/herp/herpmain.html [last accessed October 1, 2015]	DNR
Washington State	Washington Nature Mapping Program – wildlife distribution maps		unknown	unknown	http://naturemappingfoundation.org/natmap/maps/ [last accessed October 1, 2015]	NatureMapping Program

Area	Title - Parameter	Notes	Frequency	Date		Source
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	http://nas.er.usgs.gov/queries/default.aspx [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	http://www.ecy.wa.gov/programs/wq/plants/weeds/index.html [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.	http://www.whatcomcounty.us/DocumentCenter/View/2506 [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	http://www.reo.gov/monitoring/reports/watershed/AREMP%20Aquatic%20Invasive%20Species%20Report%202010.pdf [last accessed October 1, 2015]	UW Forest Service and Bureau of Land Management

Table 22: Additional habitat/wildlife documents

Watershed/area	Parameter	Document
Does not include Dakota, California, or Sumas River watersheds	Riparian function	Coe, T. 2001. Nooksack River Watershed Riparian Function Assessment. Nooksack Indian Tribe Natural Resources Department. <http://salmon.wria1.org/resources/documents> [last accessed January 4, 2016]
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. <http://salmon.wria1.org/resources/documents> [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.
Kamm Creek watersheds	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 http://wria1project.whatcomcounty.org/ [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. <http://wa-whatcomcounty.civicplus.com/DocumentCenter/View/15493> [last accessed February 29, 2016}
Whatcom County	Wildlife	Eissinger, A., 1994. Significant Wildlife Areas. (Available through the public library)
Whatcom County	Fish and wildlife	Watts, S. 1994. Fish and Wildlife Habitat Atlas of Whatcom County. Whatcom County Planning & Development Services.

Table 23: 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	http://www.co.whatcom.wa.us/811/County-Wide-Critical-Area-Ordinance-Maps [last accessed February 24, 2016]	Whatcom County
Kamm	Fish Presence	Fish Presence map (figure 7) from Agriculture Watershed Characterization and Mapping Report	<https://sites.google.com/site/wcwatershedag/> [last accessed February 24, 2016]	Data source listed as Fish Habitat Technical Team, 2003
Kamm	Salmonid Streams	Fish presence in the Lynden North Watershed management unit (figure 14) from Agriculture Watershed Characterization and Mapping Report	<https://sites.google.com/site/wcwatershedag/> [last accessed February 24, 2016]	Source: WRIA 1, NWIFC, WCD, WCC
Kamm	Riparian wood recruitment potential	Condition of Riparian zone in the Study Area (figure 15) from Agriculture Watershed Characterization and Mapping Report	<https://sites.google.com/site/wcwatershedag/> [last accessed February 24, 2016]	Source: Whatcom County Shoreline Characterization and Inventory Report 2006
Kamm	Priority Habitat and Species	Priority Habitat and Species (figure 9) from Agriculture Watershed Characterization and Mapping Report	<https://sites.google.com/site/wcwatershedag/> [last accessed February 24, 2016]	Source listed as Whatcom County Critical Areas maps
Kamm	Wildlife Habitat	Western Whatcom County Wildlife Habitat Assessment and Significant Biological Areas Map (figure 6) from Agriculture Watershed Characterization and Mapping Report	<https://sites.google.com/site/wcwatershedag/> [last accessed February 24, 2016]	Washington Department of Fish and Wildlife
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.	http://wdfw.wa.gov/conservation/habitat/planning/lha/whatcom.html [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.	http://wdfw.wa.gov/mapping/phs/ [last accessed October 1, 2015]	Washington Department of Fish and Wildlife

Watershed/Area	Parameter	Document/Website	URL	Source
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.	<http://apps.wdfw.wa.gov/salmonscape/> [last accessed October 1, 2015]	Washington Department of Fish and Wildlife
West Coast	Salmon	Maps of salmon and steelhead population boundaries	<http://www.westcoast.fisheries.noaa.gov/maps_data/maps_and_gis_data.html> [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	http://www.mrc.whatcomcounty.org/library [last accessed October 1, 2015]	Whatcom County Marine Resources Committee Library
US	Critical habitat maps for marine and anadromous fishes	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 associated *Federal Register* notices (see links below), are the definitive sources for determining critical habitat boundaries. Map and *Federal Register* notice links are PDF files.	http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm [last accessed January 21, 2016]	NMFS NOAA
US	Threatened and Endangered Species	Environmental Conservation Online System, data and maps.	http://ecos.fws.gov/ecp/ [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	http://www1.dnr.wa.gov/nhp/refdesk/gis/index.html [last accessed October 1, 2015]	Washington State Department of Natural Resources
Puget Sound Region	Wetlands	National Wetlands Inventory, data and maps	http://www.fws.gov/wetlands/ [last accessed February 1, 2016]	US FWS
Nooksack River	Historical conditions	Collins, B. D., and A. J. Sheikh, 2004. *Historical riverine dynamics and habitats of the Nooksack River; May 2003 (revised August 2004).*		Nooksack Indian Tribe

Table 24: Soils

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

Table 25: WRIA 1 materials online

In addition to the WRIA 1 materials included in this memo, there are many additional resources available on the WRIA1 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 2016 version is available at http://www.whatcomcounty.us/1035/Coordinated-Water-System-Plan-Update), and 2005 Numerical Groundwater Flow Model of the Abbotsford-Sumas Aquifer	<http://wria1project.whatcomcounty.org/Resource-Library/8.aspx> [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.	<http://wria1project.whatcomcounty.org/Resource-Library/Maps/38.aspx> [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	· Raised assessment to have revenue for technical and legal assistance · Surface to ground water · New tide gate on Schell Creek · Active on Lummi negotiations · Streamflow augmentation project · Funding for ground water model · Guide Meridian ditch work · Water quality sampling · Worked with Heather on resource inventory · Culvert replacements
North Lynden WID	· Smallest WID · Water quality testing with county…PIC program…very intense · Farmers in area substantiated by monitoring indicating Canada issues · City of Lynden working on getting septic systems connected and/or addressed · Ditch maintenance on local ditches…difference in water quality sampling improvement · Contacts with neighbors regarding practices · Spray ditches annually for Reed Canary Grass
Laurel WID	· Have discussions on problem areas, identify areas with issues…go out and talk with land owners · Water quality reporting…challenge in bracketing…showing where the problems were noted · Workshop on horse management · Developing a 5 year plan · Developing relationships with other groups · Supporting the bigger water board · Working with 10 mile group

South Lynden WID	· Water quality testing…some things did not make sense · Worked on known problems · Worked on water banking concept, storage of water for later use, deep well possibilities, · Protecting water rights · Comprehensive plan development · Talking with fellow farmers regarding water quality · Drainage issues and river running through our area · Ditch spraying · Possibilities of improving drainage of the river · Supporting AWB
Sumas WID	· Thorough water testing…added sites · Interesting monitoring information · Share water quality data with farmers · Mapping project with help from Heather · Looking at the various areas to do work · Looking at a management plan for the WID with available funding · Outreach lunch in Sumas to take our work to the people in the WID…shared results of water testing · Tour scheduled cancelled because of snow…when Keith is available to see which potential projects are out there · Did drainage work with local drainage district · Looking at prioritizing projects · Met with RESources to work on quality monitoring - elephants in room
Drayton WID	· Work with Birch Bay Sewer and Water and other partner organizations and specialists · Deep water aquifer project and water resource data · Looking at water resource potential, water rights, supply issues · Water quality monitoring · Drayton Harbor shellfish beds opened up…credit due…goal · Conservation workshop · WIDS do more than just the projects we are talking about · AWB work (coordination) with the tribes · Work on legal and political issues…Whatcom Family Farmers…important that we formed WIDs when we did · Disappointed in another organization with a recent assertion that we have not done anything · Entering a most critical phase of negotiation with the tribes · Water conservation, water quality projects completed · Work with Whatcom Family Farmers regarding most serious issues, influence
Resource Specialists	· Got our pollution prevention program going in county · PUD and RH2 worked on water quality report · First 3 phase of ground water data collection · Whatcom Water Supply working group · PUD on drought contingency planning effort · Lummi infrastructure study

	· Integrate water supply efforts…merging boards…system wide improvement of levies · Comprehensive plan update · Purchase development rights program (issue) · Threshold on impervious surfaces (issue that could damage agriculture)…meeting this Thursday

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	1. Water augmentation project finished 2. Surface to groundwater transfers…support legislation and legal effort 3. Continue water quality testing to bring quality back 4. Update Comprehensive plan
Drayton WID	1. Continue to work on deep water aquifer…move beyond just the exploration…to supply or mitigation of new water rights 2. Continue to monitor water quality and find hot spots 3. Working with farmers on legal avenues to move water around…spreading, piping, water bank, transfers 4. Public relations…family farmers to dispute misinformation
North Lynden WID	1. 5 year permit for drainage maintenance…Find the funding for development of the 5 year plan…chase paperwork 2. Continue our water quality work with Whatcom County Public Works, and Lynden 3. Work on culvert repair/replacement
Laurel WID	1. Support the AWB for efforts in legal negotiation and lobbying 2. Develop a 5 year plan for drainage 3. Set up the DNA testing for water quality
South Lynden WID	1. Work with resources on DNA sequencing 2. Continue water quality testing 3. Work on water rights…obtain, distribute water rights…lobby to get it done

Sumas WID	1. Ditch cleaning project 2. Continued water quality testing 3. Outreach and education with our land owners

Strategies for Working Together

Strategy	Lead
Communication/Outreach	
· Preserving the "one voice" outreach...continue work with key partners...work together to defend agriculture and get the word out	· Whatcom Family Farmers – Fred, specific partners – eg public affairs people in organizations · Story specific for information · Brad & Rich
· Communication and community outreach...message in positive way	· See above
· Habitat for species...telling people what farmers are doing to benefit habitat	·
Legal	
· Continue to identify legal access to water supply...acquiring, getting water where it needs to go	· Bill, Marty, Henry, Chuck, Greg
· Work together on tribal negotiations on water quality and supply	· Negotiation Team, Fred, Greg · Needs expanded and probably a different team as supply is addressed
· Legal challenges, and holding them off	· Bill, Marty, Scott, Jeff, Greg, Henry
Quality	
· Work together on funding for and implementation of DNA testing	· David – N3, Landon, Kent,
· Water quality projects and how it effects our industry...improving and communicating xx	· Fred, · See above
Drainage	
· Get permits faster and eliminate some of the paper work – 5 year Programmatic Permits	· Karin, Frank, Joel, Henry, Fred
Supply/Access	
· Water quantity projects and ability to have water long term for future generations...mitigation banking	· Bill, Marty, Scott, Jeff, Greg, Henry
Organizational/Administrative	
· Tracking legislation, rule making, agendas, and impacts at County, State, Federal levels...agriculture representation on committees	· Henry, Bill, Fred, partner individuals
· Utilize the influence system of collective WIDs including messengers and skills development (training)	· Whatcom Family Farmers
· Organize the listing of committees and groups to get agriculture representation on	· Henry, Fred and members

Expert Resources

Chuck Lindsay, AESI - hydrogeology	· Hydrologist · 30 years' experience… · Identification, ground water supply · Water right evaluations · Working for County · Stream augmentation work · Surface to ground water transfer information · Development of deep water – Drayton · Water rights guidance manual for farmers
Jon Hutchings – WCPW Director	· Public works director · Drainage, culverts, roads · River and road program · Natural resources and water resources · Expectation and growing number of services that county provides…county council passed water action plan · Work with industry on water quality · No new dollars…fixed revenue from flood control district…action plan developed…correction on revenue side needed
Joel Ingram – WDFW hydraulics permits	· Working with fish and fsh habitat for past 12 years…4 years in Whatcom County · Salmon recovery · Permitting for hydraulic · 5 year plans – certainty about what is expected by WDFW…planning and process work beforehand…revisit each five years · Windows of work · Beaver management, trash racks, · Project work, agreements, streamline process
Aneka Sweeney – WCD Education Specialist	· Packet of information…Conservation District · How to best develop programmatic permits · If you need assistance with projects, information · Assist land managers with conservation choices · 5 year planning…preservation of future of farming · Develop educational program to preserve farming in Whatcom County · Farm Speaker series in cooperation with AWB and WCD…different subject matter · Education in schools about natural resources · Communication plan development · Water quality education group · Grant writing support for partnership programs · Insurance for Farm Tours
Jim Bucknell/Andy Dunn – RH2 Engineering – water right preparation	· Civil engineering firm · Water rights expertise · 35 years' experience with Ecology…change applications

	· Understand water law, statutes, regulations, and know the people · Drought contingency plan, water bank, water exchange · Lummi projects…water for in stream and out of stream – how to move water around for projects…resolving issues · Study with PUD on water rights
Heather MacKay/Cheryl Lovato Niles – FHB Consulting – plan development	· Work with Henry for several years · Banking and trading of water · Whatcom County – Ag watershed data…copy for each WIDs · Worked with each WID regarding priorities and restoration of flow and habitat…need for farming and need for habitat · Worked with farmers on planning resources · Detailed priorities, reference maps, species, ag lands cover…available for each WID · Working with Sumas WID on action plan
Erika Douglas – WCPW – water quality	· Water quality monitoring…bacteria driven · Drainage into key areas · Working with Canada · Routine monitoring throughout drainages in Whatcom County · Seeing water quality areas of concern…focused areas…North Lynden, Nooksack, · Seeing what is going on…pollution prevention program…on hot spots, practice application · Not just one source of pollution…talking with folks about various pollution sources · Partners with Whatcom CD · Success in Drayton Harbor…attributed to community coming together…whole combination of community coming together
Steve Jilk – PUD #1 General Manager	· County wide economic development program · County wide water planning · City administrator…Lynden · One of three agencies with authority to operate and manage water resources in Whatcom County · Took on electricity supply…took on water rights…service of water to BP refinery · Have most water rights in county · Separate irrigation water rights · All of Cherry Point, Ferndale – West, I-5 Grandview Industrial Park · Engaged in watershed planning board · Try to play a problem solving role in water quality · Worked with Bellingham and partners on Lower Nooksack strategy…water supply plan…broad 40,000 ft level of water resources tied to planning · Water supply group

Kent Oostra – Exact Scientific Lab	· Resident of Whatcom CD · E.coli as monitoring · DNA sequencing – non targeted · $20,000 in research regarding DNA testing specific to related · Running fecal Whatcom CD · Looking at Nooksack from mountains to ocean · Bio indicators and what profile is · Tracking sources for $125 per sample · Needing to build a data set now · FDA requiring this type of testing
David – N3	· Drayton WID Board · Feedback loop is very important and open to suggestions on how to do this better · Water test indicating very good · One item is water nitrates…much better than 10 years ago · On committees…must have agriculture representation…see what is going on