

Snohomish County

Snohomish County appreciates the opportunity to provide the attached comments on the draft Pilchuck River Temperature and Dissolved Oxygen TMDL. Questions may be directed to Steve Britsch. s.britsch@snoco.org or 425-327-5930.

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Comment #	Chapter/Section	Page	Staff Member	Comment
1	Ch2/Sources of Impairment/Dissolved Oxygen	23	Campbell	It seems peculiar that the SRP loading from nonpoint source does not factor in the loading from decaying organic material from the forested areas along the river and tributaries. How can the list not include that? And how does that loading compare to the other nonpoint sources that are listed? Over time as shade is provided, even more decaying organic material will create loading. If SRP is a key factor, then the entire source loading needs to be considered, weighed and then factored into the implementation plan.
2	Ch2/Sources of Impairment/Phosphorus	23	Campbell	Add failing sewer systems as a source of phosphorus
3	Ch2/Climate Change – 1 st paragraph	24	Leonetti	Please cite the source for values referenced in the sentence “When compared with the 1980s, the Pacific Northwest is projected to see average summer air temperature increases of 1.7°C by the 2020s, 2.7°C by the 2040s and 4.7°C by the 2080s”.
4	Ch2/Climate Change – 1 st paragraph	24	Leonetti	Why reference Eastern WA? In the following sentence. “For example, in warmer eastern WA, water temperatures of 21°C that typically lasted for 1 to 5 weeks (mid-July to early August) in the 1980s may persist for 10 to 12 weeks (mid-June to early September) by the end of the 21st century”. This isn’t "increased timing" it is "sustained duration"

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5	Ch2/Climate Change – 2 nd paragraph	24	Leonetti	<p>As it relates to the sentence “Streamflow is projected to increase in winter and decrease in spring and summer for all basin types, with the greatest changes occurring in mixed rain and snow watersheds (Mauger et al, 2015)”.</p> <p>Since summer low flows have already been decreasing over the course of data availability, 1992-2020, what does that suggest about the risk of temperature increases due to natural causes. Doesn’t this suggest that increases assigned to human causes are less?</p>
6	Ch2/Climate Change – 2 nd paragraph	24	Leonetti	<p>As it relates to the sentence “A loss of spring-melt may decrease or eliminate spawning opportunities for steelhead, alter egg survival and emergent fry for other salmon species, cause early dewatering of side channel and off-channel habitats, and reduce floodplain connectivity”.</p> <p>Is this true for Pilchuck – wouldn’t it be more rain dominated already since lower elevation and farther west?</p>
7	Ch2/Climate Change – 2 nd paragraph	24	Leonetti	<p>As it relates to highlighted section the sentence below – it seems as though timing of emergence is missing here.</p> <p>“A loss of spring-melt may decrease or eliminate spawning opportunities for steelhead, alter egg survival and emergent fry for other salmon species, cause early dewatering of side channel and off-channel habitats, and reduce floodplain connectivity”.</p>

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8	Ch2/Climate Change – Figure 4 caption	25	Leonetti	Figure caption should be on same page as figure if possible
9	Ch2/Climate Change – 1 st paragraph	25	Leonetti	Does the sentence here belong in section 3? “Actions such as restoring floodplain connectivity, streamflow regimes, and incised channels, as well as removing barriers, are most likely to decrease stream temperatures, increase baseflows, and decrease peak flows, thereby increasing salmon resilience (Beechie, 2013)”.
10	Ch2/Climate Change – 1 st paragraph	25	Leonetti	As it relates to the sentences below – should there be an adaptive management chapter? “An Integrated Pest Management Plan ⁴ (IPM) to monitor trees that are more susceptible to pests (e.g. weeds, insects, disease agents, pathogens). An IPM focuses on pest prevention and using chemicals only when needed to minimize environmental impacts such as destroying a beneficial species that might prey on the pest”. “Climate change should be a consideration during the adaptive management of this TMDL”.
11	Ch2 / Load Allocations – Other Loading Limits and Requirements	30	Britsch	The first and second bullets under other loading limits and requirements contradict one another. Suggest removing the 1 st bullet as BMPs are not expected to be required through municipal stormwater permits.
12	Ch2 / Load Allocations – Other Loading Limits and Requirements	30	Britsch	The third bullet under other loading limits and requirements suggests that municipal stormwater permittees may have mixing zones applied to stormwater discharges. Suggest clarifying that this applies to industrial stormwater permittees.

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13	Ch2 / Load Allocations	40	Leonetti	<p>As it relates to the last sentence below - What is the proportion of the load allocation to Catherine Creek which drains Lake Stevens? No mention of warmwater discharge off of surface of stratified lake in summer?</p> <p>Is the diffuse load allocation solely assigned or due to Connor Lake?</p> <p>The load allocation for Little Pilchuck Creek includes Catherine Creek, its temperature impaired tributary (Listing IDs 7394 and 7395). In a similar fashion the diffuse load allocation for the Pilchuck River includes the unnamed creek (tributary to the Pilchuck river), also known as Connor Lake tributary (Listing ID 47441).</p>
14	Ch2/Margin of Safety – 8 th bullet	42	Leonetti	<p>Is the statement below because 100% shading will not achieve temperature targets?</p> <p>“Implementation will include additional measures beyond riparian shade that should contribute to lower stream temperatures, such as instream structures creating pools that connect with hyporheic flow, and wetland restoration creating improved groundwater connection”.</p>
15	Ch2/TMDL Calculation – Table 21	43	Leonetti	<p>Is there a comparison between these WLA values and current actual loading estimates?</p>

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16	Ch3/Land Distribution	44	Leonetti	<p>Suggest changing Land Cover to Land Use in the following sentence.</p> <p>“We consolidated the 183 land cover types into 13 categories for analysis purposes (Figure 5)”.</p>
17	Ch3/Point Sources of Pollution	46	Leonetti	Suggest moving “Point sources of pollution” to the beginning of section 3.
18	Ch3/Nonpoint Sources of Pollution	46	Britsch	<p>Suggest the following edits to the sentence below.</p> <p>Those actions and activities, which we describe below, are essential to decreasing temperature and improving dissolved oxygen levels". required to return the Pilchuck River to good health in each of these areas.</p>
19	Ch3/Nonpoint Sources of Pollution/Table 24 – 1 st Riparian Restoration Strategy	46	Leonetti	180ft is greater than County code for protection of buffers when developing. The added benefit of 30 feet from 150 to 180 feet away from a stream channel must have marginal/asymptotic improvement. Is it feasible to show what the differences are in terms of allocation between these?
20	Ch3/Nonpoint Sources of Pollution/Table 24 – 1 st Riparian Restoration Strategy	46	Bylin	<p>As it relates to the sentence below - These widths are commonly not an option or reality. Need sliding scale for buffer widths, some is better than none.</p> <p>“Restore riparian shading to 180’ on mainstem and to Ecology Riparian Buffer Map widths on tributaries”.</p>

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21	Ch3/Nonpoint Sources of Pollution/Table 24 – 2nd Riparian Restoration Strategy	46	Campbell	Community-based social marketing (CBSM) is a proprietary method. Revise to say "Use a social marketing process to determine most effective outreach and education efforts to landowners." Funding needed for this process and inclusion of all key stakeholders needed. Priority audience should be inclusive of all residents, not just landowners.
22	Ch3/Nonpoint Sources of Pollution/Table 24 – 1st restoring and enhancing natural river process strategy	46	Jackson	Feedback from the Salmon Recovery Funding Board review of the Middle Pilchuck project was that boulders were not a preferred element. This type of element might be difficult to fund.
23	Ch3/Nonpoint Sources of Pollution/Table 24 – 2 nd restoring and enhancing natural river process strategy	46	Leonetti	How does installing LWM to create edge habitat improve temperature or DO?

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24	Ch3/Nonpoint Sources of Pollution/Table 24 – last restoring and enhancing natural river process strategy	46	Jackson	Include funding an incentive program (easements, buffer plantings, etc.) to encourage landowners to install BMPs on their property.
25	Ch3/Key strategies for reducing water temp and nutrient inputs	47	Britsch	Include application of nutrients at agronomic rates under the BMPs for nutrient, sedimentation and erosion control.
26	Ch3/Key strategies for reducing water temp and nutrient inputs	47	Leonetti	As it relates to the sentence below – narrower and deeper channels are not demonstrated in unimpaired riparian zones. narrower and deeper is associated with channelization and impaired vegetation “In some locations, they provide indirect benefits related to air cooling, supplying woody material, and eventual narrowing and deepening of the stream channel”.
27	Ch3/key strategies for reducing water temp and nutrient inputs	47	Jackson	The riparian buffer widths map tool does not show 180ft buffer width of the Pilchuck, rather a maximum of 100ft. Need to resolve discrepancy.

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28	Ch3/Establish good riparian vegetation on public/private properties	48	Jackson	Consider referencing the King County Small habitat restoration program as a model incentive program.
29	Ch3/State Environmental Policy Act and Land Use Planning	48	Leonetti	The level of this heading is unclear - is it a key strategy?
30	Ch3/Restoring and Enhancing Natural River Processes	49	Leonetti	As it relates to the sentence below - suggest removing "fed by groundwater" as CWR are formed through numerous surface and or groundwater discharge types. "While trees take many years to reach their full potential to protect streams from excessive heating, CWRs fed by groundwater provide immediate assistance to salmon and other cold-water species during the warmest times of the year.

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31	Ch3/Restoring and Enhancing Natural River Processes	49	Leonetti	<p>As it relates to the sentence below - Cite Leonetti et al. 2015. Leonetti, F.E., K.J. Terpstra, and B. Dittbrenner. 2015. TEMPERATURE ANOMALIES IN THE STILLAGUAMISH RIVER MAPPED FROM 2001 THERMAL INFRARED AERIAL IMAGERY. Snohomish County Public Works, Surface Water Management. Everett, WA. Prepared for Washington State Department of Ecology (grant agreement G1000349).</p> <p>“Many types of hydrological processes including tributary junctions, side channels, alcoves, stratified pools, groundwater seeps, hyporheic exchange (i.e., laterally through point bars and meander bends; or vertically through a pool and riffle system) can create CWRs”.</p>
32	Ch3/Infiltration of Stormwater	51	Britsch	Include the phrase “where feasible” in the heading for this sub section. To read: Infiltrate stormwater “where feasible” and to the maximum extent practicable.
33	Ch3/Infiltration of Stormwater	51	Majewski	The first sentence in this sub-section doesn’t make sense, as roofs, roads, and parking lots don’t increase the impacts from impervious surfaces – they are the impervious surface. Consider re-wording.
34	Ch3/Infiltration of Stormwater	51	Majewski	The second sentence under this sub-section would be easier to read if it said something like “Impervious surfaces prevent rainwater from infiltrating into the ground. When infiltrated, rainwater can recharge groundwater and the natural processes reduce pollutants”.

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35	Ch3/Control Excessive Erosion and Sedimentation	51	Leonetti	<p>As it relates to the sentence below - It should be stated that the relative contributions of sediment (a sediment budget) from these sources is not known so strategic implementation and corrective actions with greatest value are not known.</p> <p>“The most common sources of sediment and altered stream processes typically include 1) landslides; 2) erosion resulting from poor forestry management practices; 3) construction site runoff; 4) alteration of natural stream channels and riparian areas; and 5) hydraulic scouring following urban and rural development.</p>
36	Ch3/Control Excessive Erosion and Sedimentation	51	Bylin	<p>As it relates to the sentence below – consider including changes in storm intensity, increased precipitation or climate change induced flows as additional causes of erosion.</p> <p>“However, when human activities change stream hydrology and increase water flows, the force of the higher flows accelerates this process”.</p>

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38	Ch3/Water Conservation and Streamflow Augmentation	51	Leonetti	<p>As it relates to the sentence below – The phrase "adding water back" suggests it has been taken out. Was this already established somewhere else in doc?</p> <p>“Adding water back into the river results in cooler water with more DO. For that reason, increasing summer baseflow levels through water conservation and streamflow augmentation is an important goal of this TMDL”.</p>

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39	Ch3/Water Conservation and Streamflow Augmentation	51	Leonetti	As it relates to the sentence below – Is it a goal or an objective? “For that reason, increasing summer baseflow levels through water conservation and streamflow augmentation is an important goal of this TMDL”.
40	Ch3/Water Conservation and Streamflow Augmentation	51	Leonetti	As it relates to the sentence below – How are the actions required? “Implementation actions required to improve stream flows are discussed below”.
41	Ch3/Water Conservation and Streamflow Augmentation	51	Majewski	As it relates to the sentence below – Using HSPF geology soils data via GIS analysis, it became apparent that the spatial distribution of outwash soils combined with the % of outwash soils capable of infiltration is a barrier to infiltration of stormwater. The percentage of outwash soils within each analyzed basin are as follows: Dubuque = 2%, Lake Stevens = 1%, Little Pilchuck Creek = 9%, Lower Pilchuck River = 9%, Middle Pilchuck River = 25% and Upper Pilchuck River = 20%. Please recognize these limitations in the TMDL.
42	Ch3/Water Conservation and Streamflow Augmentation	51	Jackson	Please recognize the need for and/or identify incentive programs to facilitate use of Low Impact Development.

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43	Ch3/Water Conservation and Streamflow Augmentation	52	Leonetti	<p>As it relates to the paragraph below - Do we know where groundwater flows either to Little Pilchuck or Pilchuck River? Is there a groundwater divide?</p> <p>“Ecology provides a detailed example on how to estimate groundwater volume, groundwater velocity, travel time, and drainage area for infiltration facilities (Appendix J). This analysis is meant to provide a starting point for identifying where water might be strategically added back to the Pilchuck River mainstem and Little Pilchuck Creek”.</p>
44	Ch3/Water Conservation and Streamflow Augmentation – Use of imported water for new development	53	Strandberg	<p>I don’t think it’s feasible in most cases for new homes in the basin to use imported water. The county does not have regulatory tools to require that all new homes in the basin import their water from outside the basin. We can require hook-up to existing water systems where available, but some of the water systems could be using supply obtained in the basin.</p>
45	Ch3/Water Conservation and Streamflow Augmentation – Use of imported water for new development	53	Majewski	<p>Help us understand how having new development obtain water from outside the basin, increases flow in the Pilchuck. Wouldn’t there be just as much water taken out by users as there is now? Seems like it could ensure that stream flows aren’t reduced further.</p>

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46	Ch3/Improve efficiency and timing of irrigation	54	Campbell	<p>Requiring irrigation audits could perhaps have the greatest impact on conservation measures. It revolutionizes irrigation practices and makes sure that every drop counts. This is critical for large-scale irrigation as well as smaller scale. Conservation measures must be fully endorsed and supported by local water purveyor(s) - public, community or private. Funding of incentives may likely be necessary to create the greatest impact.</p> <p>WATER CONSERVATION PRACTICES: A key impact is made when natural soil moisture and soil texture are taken into consideration before plants are selected, and when mulching is applied to bare soil areas.</p>
47	Ch3/Streamflow Augmentation through Beaver Management	54	Leonetti	<p>As it relates to the paragraph below - Provide a citation for streamflow augmentation. It's not clear that this has been demonstrated in western Washington.</p> <p>“Beaver dams can significantly increase summer baseflows by increasing both surface and subsurface water storage by causing water to pond and infiltrate”.</p>
48	Ch3/Streamflow Augmentation through Beaver Management	54	Leonetti	<p>As it relates to the sentence below - I would be cautious about equating storage with downstream flow improvement?</p> <p>Dittbrenner (2019) found that beaver relocations to headwater streams in the Skykomish watershed created 243 m³ of surface water storage and 581 m³ of subsurface water storage per 100 m of stream reach in the first year following relocation.</p>

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49	Ch3/Streamflow Augmentation through Beaver Management	54	Leonetti	<p>As it relates to the sentence below - I'm sure they are much more widespread. Would it be useful to have an assessment of beaver occupancy?</p> <p>Beavers are currently present in both the Little Pilchuck and Dubuque subbasins (Snohomish County, verbal communication 11/16/17).</p>
50	Chapter 3 Streamflow augmentation through beaver management	56	Rustay	<p>Beavers do great things for water quality and fish and wildlife, but we know a lot about some of the impact's beavers have on human activity and infrastructure. These are known and should be briefly mentioned in the section that talks about needed planning and human/beaver interactions</p> <p>Modify language to say:</p> <p>Known and potential conflicts between beavers and humans include...</p> <ul style="list-style-type: none"> • Impacts to roads and other transportation infrastructure through plugging of road culverts and/or backwatering of water behind beaver dams. • Flooding of private property including dwellings and septic drain fields. • Unwanted beaver browse of crops and ornamental plants. • Potential reduction of fish passage in confined streams, especially those associated with built infrastructure.
51	Ch/3 Streamflow augmentation through beaver management	56	Rustay	<p>Landowner outreach for beaver restoration is critical but may also want to mention/consider acquisition (fee simple, easement, other) of properties (or portion) with characteristics suitable for beaver colonization and water storage.</p>

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52	Ch/3 Streamflow augmentation through beaver management	56	Rustay	Agree that further beaver population should be assessed, but my experience tells me it is likely that there are enough animals in the Pilchuck basin that we should assume any constructed BDA constructed will shortly be occupied by beavers.
53	General Beaver Text Comment	NA	Rustay	Throughout the document pertaining to beaver planning (ex. see pg 74) text says “a” WDFW biologist should be consulted. This should be changed to WDFW wildlife biologists or something similar.
54	Ch3/Streamflow Augmentation through Beaver Management	56	Leonetti	<p>As it relates to the sentence below - I would be cautious about the applicability to Pilchuck from observations in eastern WA or elsewhere in the country. Maybe use more cautious language.</p> <p>“By increasing groundwater storage, beaver dams and BDAs can shift slightly losing stream reaches to gaining reaches (Majerova et al., 2015), shorten the non-flowing duration of intermittent streams (Woo and Waddington, 1990), and even convert intermittent streams into perennial streams (Snodgrass, 1997; Pollock et al., 2003)”.</p>

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55	Ch3/ Nutrient Sediment, and Erosion Control	56	Majewski	<p>As it relates to the sentence below - add "natural" so the link says "Snohomish County natural yard care website"</p> <p>See Snohomish County yard care website for more information or resources about natural yard care.</p>
56	Ch3/ Nutrient Sediment, and Erosion Control	57	Majewski	<p>As it relates to the sentence below – I think it would be more appropriate to say that 7.53 prohibits discharges that contain contaminants, including sediment. Regardless of whether a stormwater prevention plan exists, which they don't for rural residential/hobby farms, they are still prohibited from discharging pollution.</p> <p>Also – edit to include highlighted language below.</p> <p>The Snohomish County Water Pollution Ordinance¹⁴ (Snohomish County Code 7.53) may allow or require best management practices (BMPs) described in appropriate stormwater prevention plans. The need to plant trees in riparian areas is not specifically discussed in the ordinance, so landowners must be sure to include this in the design of animal grazing areas.</p>

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57	Ch3/Add protections where livestock are present	57	Bylin	Include Snohomish County Critical Areas regulations and required use of best management practices for agriculture.
58	Ch3/Where do we have opportunities for improvement	58	Majewski	<p>Please describe who “they” are in the following sentence</p> <p>“They should include an analysis demonstrating a high likelihood of creating new or increased groundwater inputs as a prioritization criterion. Public safety should also be weighed as a factor during LWM project design”.</p>
59	Ch3/Where do we have opportunities for improvement	58	Majewski	<p>Please add the highlighted language to the sentence below. Also – suggest ending the sentence after “high” and then starting new sentence "Pools also provide habitat for fish rearing.</p> <p>Increasing the number of pools is another key component towards providing more cold-water refuges that can act as stepping stones for fish when temperatures are too high to tolerate and as habitat for fish rearing.</p>
60	Ch3/Where do we have opportunities for improvement	58	Majewski	<p>As it relates to the sentence below - Either define or use a word that is more common. I googled "near stream disturbance zone" and no definition was found.</p> <p>Table 25 shows average near stream disturbance zone (NSDZ) channel widths, average frequency of pools/kilometer targets and average frequency of pools/mile targets within the Middle Pilchuck and the Lower Pilchuck reaches.</p>

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61	Ch3/Where do we have opportunities for improvement	58	Leonetti	<p>As it relates to the sentence below - Summary of NSDZ, pool frequency and targets needs to be revised. The pers. comm referenced is incorrect. Snohomish County has never used NSDZ for channel width measurement, nor for pool frequency calculation. Please reference the source for pool target estimates.</p> <p>“The frequency of pools was calculated by multiplying the NSDZ channel widths by 1.9 channel width/pool (Leonetti, F. Personal communication. April 2018). Further information on where additional pools are needed is discussed later in the Middle and Lower Pilchuck subbasin sections”.</p>
62	Ch3/ Where do we have opportunities for improvement – Table 25.	59	Leonetti	<p>It would be useful to highlight the gap between existing and target pool frequency.</p> <p>Also –</p> <p>Include units (meters) and source. Are these Ecology measurements or from SnoCo 2012.?</p>
63	Ch3/ Upper Pilchuck Mainstem and Subbasins	59	Leonetti	<p>As it relates to the sentence below - Priority in what sense?</p> <p>“The Pilchuck River Dam Removal Restoration project will restore unimpeded fish access to 37 miles of high- quality priority habitat”.</p>

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64	Ch3/ Upper Pilchuck Mainstem and Subbasins	59	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“In August 2020, Tulalip Tribes and City of Snohomish completed full removal of completely removed the City of Snohomish Diversion Dam (built in 1932) on the Pilchuck River, which impeded upstream fish migration”.</p>
65	Ch3/ Upper Pilchuck Mainstem and Subbasins	59	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“The Pilchuck River Dam Removal Restoration project will restore restored unimpeded fish access to 37 miles of high-quality priority habitat. During this project, a second smaller dam (built in 1912) was also removed”.</p>
66	Ch3/ Upper Pilchuck Mainstem and Subbasins	62	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“Modeling scenarios characterized later in this document in the ‘System potential conditions’ section, show that the Middle Pilchuck is unable to meet the state standard, even under system potential conditions”. in mid-August.</p>
67	Ch3/Figure 12.	64	Leonetti	<p>Most of Figure 12 is wasted space. Can you break into 2 panels from upstream to downstream and zoom in on the stream reaches?</p>

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68	Ch3/Figure 13.	65	Leonetti	Revise Figure 13 as described for Figure 12.
69	Ch3/ Upper Pilchuck Mainstem and Subbasins	66	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>Over half of the total riparian area or 440.2 acres in the Middle Pilchuck already has large-sized trees.</p>
70	Ch3/ Upper Pilchuck Mainstem and Subbasins	66	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“Ecology also examined pool targets in the Middle Pilchuck and from and compared these targets with Snohomish County’s assessment (Snohomish SWM, 2012a)* – see Table 27. Reaches 1, 2, 3, 5, 6, 7 all meet the average pool target of 11.8 pools/km, as shown in Table 25. Reaches that did not meet the average targets are discussed in the following section”. reach by reach discussion.</p>
71	Ch3/ Reaches 8 and 7 (collectively RM 26.44 to 22.52)	67	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“During this same timeframe, temperatures would dip down to about 12-13°C. Dissolved oxygen levels in at RM 25.5 at its were lowest in August 2012 when they dipped to just above 9.5 mg/L in August 2012. See Appendix D, Figure D.1 for further details. Reach 8 is definitely an area to protect for fish and other organisms”.</p>

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72	Ch3/ Reaches 8 and 7 (collectively RM 26.44 to 22.52)	67	Majewski	Based upon what has been said in the 1 st paragraph on page 67 it seems that reach 8 is an area that needs improvement not an area to "protect". When "protect" is used, I think most folks who work in this field assume conditions are fine.
73	Ch3/ Reaches 8 and 7 (collectively RM 26.44 to 22.52)	67	Majewski	Suggest the following edits to the sentence below. “According to ArcGIS, it appears there may be a couple of unnamed tributaries (with a seep noted at each tributary) coming in on the left bank side. This might be an area which might be an area to explore for potential cold-water refuge areas for fish in concert with planting”.
74	Ch3/Reaches 4,5 and 6 (collectively RM 18.32 to 22.52)	68	Majewski	Suggest the following edits to the sentence below. In between the two of the parcel clusters is a potential CWR site near a seep. Downstream of RM 19, there may be small intermittent planting opportunities and a potential CWR site along the right bank.
75	Ch3/Reaches 4,5 and 6 (collectively RM 18.32 to 22.52)	68	Leonetti	As it relates to the sentence below - Change to residual pool depth of 10m to 1.0 m. “High quality pools were defined in the report as pool locations within the mainstem that are ≥10 m in residual depth and have ≥10% cover (i.e. wood debris, boulder, riprap, brushy/overhanging vegetation)”.

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76	Ch3/Reach 3 (RM 14.45 to 18.32)	68 - 69	Leonetti	<p>As it relates to the sentence below - At the same time this complex of wetlands has formed partially due to the large mid-floodplain dike placed in the 1940s, that now is largely obscured in forest but which fills wetland area and alters channel processes in this reach. Dike removal could be explored for wetland restoration and channel process restoration</p> <p>“This area should be explored for expanding and connecting off-channel habitat and upland wetlands to the north where glacial outwash soil and alluvium exist, so the water being held in the wetland remains cooler for a longer time in order to increase the likelihood of groundwater/surface water exchange in the summer months when it is most needed. At the meander upstream of RM 16 (Figure 14), a feasibility assessment for side channel or starter channel creation to the east (where there is existing tree cover) should be explored”.</p>
77	Ch3/Reach 3 (RM 14.45 to 18.32)	69	Leonetti	<p>As it relates to the sentence below - Sentence doesn't make sense as far as explaining the logic for hyporheic cooling. Also please expand on the potential that the abandoned mainstem (now effectively an oxbow channel) is a new CWR due to groundwater inflow, improved shading, and possible beaver colonization. Beaver dam analogs may also be appropriate.</p> <p>“With wetlands to the north and west, the island formed by the abandoned mainstem and the newly occupied side channel upstream of RM 14.45 is likely a source of hyporheic cooling that should also be explored for potential CWR expansion”.</p>

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78	Ch3/Reach 2 (RM 11.38 to 14.45)	71	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>An opportunity to shade the tributary may help bring in cooler water into the Pilchuck.</p>
79	Ch3/Reach 1 (RM 8.60 to 11.38)	71	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>“There may be a few intermittent spots for riparian planting on both sides upstream of the Russell Road, which require field verification”.</p>
80	Ch3/Reach 2 (RM 11.38 to 14.45)	71	Leonetti	<p>As it relates to the sentence below - Change the following, "even groundwater exchange coming from Little Pilchuck Creek." TO ".....reach-scale flow gain in this more-confined Pilchuck river segment just downstream from the Pilchuck-Little Pilchuck outwash plain."</p> <p>“From temperature probe data, Snohomish County (Leonetti, F. Personal communication. Nov. 16, 2017 and July 28, 2020) indicated the area around RM 13 was one of the colder spots they monitored, which is thought to be due to floodplain hyporheic exchange or even groundwater exchange coming from Little Pilchuck Creek”.</p>

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81	Ch3/Reach 1 (RM 8.60 to 11.38)	72	Majewski	Suggest the following edits to the sentence below. Little Pilchuck Creek: Water temperature measurements taken in 2012 about 200 feet downstream of bridge at 12th Street in the Little Pilchuck Creek showed the following:
82	Ch3/Snohomish County Public Works – Surface Water Management	86	Leonetti	To list of bullets on Page 86 add instream restoration and stormwater BMPs
83	Ch3/Snohomish County Public Works – Surface Water Management	86	Majewski	To list of bullets on Page 86 add: Implements County's NPDES municipal stormwater permit requirements related to drainage facility operation, water quality issues and education and outreach programs.
84	Ch3/Snohomish County Public Works – Surface Water Management	86	Majewski	As it relates to the list of bulleted Snohomish County programs - Temp monitoring program generally falls within State of Our Waters.

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85	Ch3/Snohomish County Public Works – Surface Water Management	86	Bylin	<p>Suggest the following edits to the sentence below.</p> <p>Surface Water Management (SWM) is involved in a wide range of water pollution control activities including education and outreach, water quality and habitat monitoring, riparian restoration, salmon recovery, native plant salvaging, technical assistance to landowners, and NPDES permit administration. SWM activities in the Pilchuck River watershed are largely coordinated through their salmon recovery efforts. The county also has the following programs and projects in place to improve water quality in the Pilchuck River watershed:</p>
86	Ch3/Snohomish County Planning and Development Services	87	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>The PDS also enforces the Snohomish County Code as it relates to protection of water quality, implements the Critical Areas Regulations and other development regulations, and works closely with the agricultural community through its agricultural liaison and the Agricultural Advisory Board.</p>
87	Ch3/Snohomish County Planning and Development Services	87	Majewski	<p>Suggest the following edits to the sentence below.</p> <p>Along with other parts of Snohomish County Government, PDS is promoting Low Impact Development (LID) principles and has folded LID provisions as part of its into drainage code where the use of LID facilities and BMPs is are required where functionally feasible (Ordinance 30.63A).</p>

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88	Ch3/Snohomish County Planning and Development Services	87	Bylin	<p>Suggest the following edits to the sentence below.</p> <p>PDS and SWM are also working with the agricultural community to develop and implement the Sustainable Lands Strategy (SLS), which seeks to reconcile the land-based needs of agriculture and habitat restoration activities in Snohomish County and find net gains for both of these county needs.</p>
89	Ch3/Snohomish County Planning and Development Services	87	Bylin	<p>When discussing the Critical Areas regulations, consider adding that they require the use of best management practices on agricultural lands to protect functions and values of habitat.</p>
90	Ch3/Snohomish County Planning and Development Services	87	Bylin	<p>In reference to ESHB 1886, Snohomish County did not choose to implement the alternative and voluntary process for addressing the Growth Management Act to address critical areas in agricultural areas.</p>
91	Ch3/Adopt-A-Stream Foundation	90	Majewski	<p>As it related to the sentence below - Can this be updated since project was supposed to be complete in 2019? Was it completed?</p> <p>From 2014 to 2017, AASF planted 12 acres along Catherine Creek. AASF is expecting to complete a project in Upper Catherine Creek to restore 8.2 acres in 2019.</p>

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92	Ch3/Riparian Restoration	92	Majewski	<p>Suggest the following changes to the sentence below.</p> <p>To achieve clean water in the Pilchuck River, meet water quality standards, and support aquatic life uses, it is necessary to restore riparian forest areas and implement restoration projects that benefit streamflow, and stream temperatures and DO.</p>
93	Ch3/Riparian Restoration. Table 30	92	Bylin	Add Snohomish County SWM to the list of active partners for restoration of riparian shade.
94	Ch3/Riparian Restoration	93	Majewski	Need to introduce and reference table 31.

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95	Ch3/Cold Water Refuge Enhancement	93-94	Leonetti	<p>As it relates to the sentence and highlight below – add tributaries, seeps and springs, among other sources – after the word groundwater.</p> <p>Enhancing and protecting cold water refuges (CWRs) is vital to salmon recovery. CWRs are generally defined as water that is 2°C cooler than the surrounding waters. While trees take many years to reach their full potential to protect streams from excessive heating, CWRs fed by groundwater provide immediate assistance to salmon and other cold-water species during the warmest times of the year. Initial CWR assessment work outlined below should be completed by 2026. Additional future assessments may be conducted as resources allow on an as needed basis.</p>
96	Ch3/Table 33.	94	Bylin	Add Snohomish County SWM to the list of active partners implementing the 1 st 3 rd and 5 th activities in the table.
97	Ch3/Streamflow Augmentation and Water Conservation – Table 34	95	Majewski/ Bylin	<p>Add “SWM” to Snohomish County under “Evaluate and install impoundment BMP’s” and “Promote water conservation” activities.</p> <p>Also add Snohomish County SWM to the list of active partners who promote water conservation, irrigation efficiency, natural yard care and LID BMPs.</p>

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98	Ch3/Streamflow Augmentation and Water Conservation	95	Leonetti	<p>As it relates to the sentence below – Refer to table 34 at the end of the sentence.</p> <p>Implementing water conservation and stream augmentation actions to restore water back into Pilchuck River with a particular focus on Little Pilchuck subbasin should be a priority as part of this implementation plan.</p>
99	Ch3/Technical Feasibility	96	Majewski	<p>As it relates to the sentence below - It might be helpful for readers to understand that much of this area and any area that discharges straight to the river or tribs is not regulated by the NPDES permit.</p> <p>Also – suggest making the following edits.</p> <p>The Phase 1 and Phase 2 Municipal Stormwater permit requires the development, implementation, and management of source control programs to prevent and reduce the discharge of point and nonpoint source pollutants to stormwater systems.</p>

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100	Ch3/Costs	96	Majewski	<p>Suggest making the following edits to the sentences below.</p> <p>Gives a sense of how realistic load reduction goals are (see Technical Feasibility section below).</p> <p>And</p> <p>Helps implementers develop sound budgets and/or ensures that funding requests are accounted for.</p>
101	Ch3/Costs	98	Majewski	<p>As it relates to the sentence below - I don't think most BDAs could be installed quickly as they will require an HPA.</p> <p>BDAs and PALS can be installed cheaply and quickly if a stream is small and easily accessible, materials (e.g. posts) can be harvested on-site, and volunteers or AmeriCorps or Washington Conservation Corps crews install them.</p>

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102	Ch3/Education	104	Majewski	<p>As it relates to the sentence below – Please remove this reference (Environmental Justice screening tool) as organizations use other tools to do this work. This includes Title VI related compliance datasets, datasets from WA DOH (Environmental Health Disparities Map), etc.</p> <p>Local partners should identify which communities in the project area have more than 5% or 1,000 people that speak English less than very well using EPA’s Publication 20-10-035 October 2020 Page 105 Environmental Justice screening tool.46</p>
103	Ch3/Tracking Progress	106	Leonetti	<p>Call out WDFW and Tulalip tribes in first sentence.</p> <p>Also – fix spelling of “completed” in first sentence.</p>
104	Ch3/Effectiveness Monitoring	107	Majewski	<p>Suggest making the following edits to the sentences below.</p> <p>It became clear this subbasin did not have a completed watershed assessment to guide recovery efforts, so SCSWM completed habitat.</p>

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105	Ch3/Effectiveness Monitoring	107	Majewski	As it relates to the sentence below - I don't think this is a true statement "Most project managers have some level of effectiveness they are required to meet as part of their planning projects."
106	Ch3/Effectiveness Monitoring	108	Leonetti	In addition to pools created and enhanced, need to also specify effectiveness to form cold water refuge or improvement. A lot of the justification for LWM and pool formation is predicted on a CWR response. Need to monitor for that.
107	Ch3/Effectiveness Monitoring	108	Leonetti	As it relates to the sentence below - Is the effective shade target simply 100% of potential? Is this stated somewhere? "A major goal of this TMDL is to implement water quality improvement projects that will cumulatively meet the effective shade and streamflow restoration targets established in this TMDL".
108	Ch3/Tracking Progress	108	Leonetti	As it relates to the sentence below - I don't recall seeing a specific streamflow restoration target? Completing a new shade deficit analyses as early as 2031, would provide the most detailed measure of progress towards meeting riparian forest restoration goals in the Pilchuck River watershed.

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109	Ch3/Tracking Progress	108	Leonetti	<p>As it relates to the sentence below – Shouldn't the effective shading and improvement just be modeled, using hemispherical data as a calibration input?</p> <p>“Establish baseline hemispherical photography of watershed, then take hemispherical photographs every 10 years to evaluate whether shade deficit target of 85% has been met (Table 36)”.</p>
110	Ch3/Tracking Progress	108	Leonetti	<p>As it relates to the bullets under the sentence below - Can this set of bullets reference the streamflow restoration target mentioned in the previous paragraph?</p> <p>Baseflow monitoring to evaluate progress towards restoring water to the river system.</p>
111	Ch3/Reasonable Assurance	111	Majewski	Should regulatory authority be added the Ecology's list of bulleted items?
112	Ch3/Reasonable Assurance	112	Bylin	Consider adding riparian restoration to the bulleted list of Snohomish County activities.

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113	Ch4/Water Temperature – under Table 43.	137	Leonetti	<p>As it relates to the sentence below – It looked like groundwater flow gains ended near Dubuque Creek. Can you explain the apparent cooling present downstream from RM 8.5. Flow gain from seepage was reported in the reach above this. Is this a downstream effect from that or a possible undetected seepage that continues down river? There are few to none cool surface inputs downstream from Dubuque Cr.</p> <p>“The results (Table 44) show rapid stream heating from RM 25.5 to 21.5 and RM 15 to 11.6, with stable or cooling daily maximum temperatures from RM 21.5 to 18.7, RM 11.6 to 5.7, and RM 3.6 to 2.0. This is generally consistent with previous temperature monitoring (SCSWM, 2012a) and estimates of groundwater flow gains (see Groundwater Results section)”.</p>
114	Ch4/Stormwater and General Permit Wasteload Allocations	172	Britsch	<p>Does Ecology consider all TMDL analysis to constitute a "reasonable potential analysis" under 40 CFR 122.44(d)(1)(i), which aids in determining that MS4 discharges have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numeric criteria?</p> <p>If so - does Ecology expect EPA may approve this as a stormwater TMDL - whereby Ecology would then require implementation of programmatic actions under municipal stormwater permits?</p>

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115	Ch4/Stormwater and General Permit Wasteload Allocations	172	Britsch	Please help the County understand why a Wasteload Allocation for temperature has been assigned, when stormwater has not been found to be a source of temperature loading to the stream when receiving water temperatures are impaired. In fact, temperature monitoring from the 2012 study indicates that stream temperatures are likely to decrease during significant runoff events.
116	Ch4/Wide Riparian Buffer Widths	183	Leonetti	As it relates to the sentence below - Change "working" buffer to functional. In some cases, "working buffers" refers to agricultural uses within wider buffers. "Planting or protecting a wide buffer retains some working buffer and effective shade following large channel migration events".
117	Ch4/Restoring Hyporheic Connectivity through Bank, Floodplain, and In-Channel Modifications	185	Leonetti	As it relates to the sentence below - Please provide a reference to the "strong conceptual relationship" "It is important to note that there is not a measurable quantitative link between percent of bank modified and hyporheic flow fraction; however, it does provide a qualitative assessment of the relative potential impacts based on the strong conceptual relationship between bank armoring and hyporheic connectivity".

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118	Ch4/Seasonal Variation	187	Leonetti	<p>As it relates to the sentence below - Given peak annual air temps are the largest driver, how is climate change expected play into load allocations or strategies?</p> <p>“Peak annual air temperatures, typically in August, are the largest driver of critical conditions. Minimum annual flows, typically occurring in late August or early September, are also an important driver”.</p>
119	Ch4/Conclusions and model findings	189	Leonetti	<p>As it relates to the sentence below - Can a brief reminder be added here to explain the steep increase in temperature - shading?, losing reach?, air temp increase?, withdrawals, point discharge??</p> <p>“The 7-DADMax temperatures during 2012 did not meet (were above) water quality criteria at all sites monitored in the watershed, including the upstream boundary and tributaries. The steepest increase in longitudinal temperature on the river occurred at the upstream end of the study area between Menzel Lake Rd (~RM 25) and Robe Menzel Rd (~RM 21). This increase represents about 2.7°C over about 4 river miles”.</p>
120	Ch4/Conclusions and model findings	189	Leonetti	<p>As it relates to the sentence below – Shouldn’t this bullet be a sub-bullet of the previous bullet point.</p> <p>“Quantify hyporheic flow fraction, depth, and thermal properties to refine our understanding of the impact of hyporheic restoration over multiple scales”.</p>