Message

From: Croxton, David [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=CA7B9940863640D5B96F4295EA3C9641-CROXTON, DAVE]
Sent: 11/20/2018 4:56:26 PM
To: Opalski, Dan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b5ed6410d934bf699a008a252791a55-Opalski, Dan]
Subject: RE: Draft Deschutes Timeline

We have gotten what we needed from Ecology, Ex. 5 Deliberative Process (DP) Ex. 5 Deliberative Process (DP) Ex. 5 Deliberative Process (DP) Ex. 5 Deliberative Process (DP) I talked about it with Michelle W. and will discuss with Miranda as well.

From: Opalski, Dan
Sent: Tuesday, November 20, 2018 7:37 AM
To: Croxton, David <Croxton.David@epa.gov>
Subject: RE: Draft Deschutes Timeline

Thanks, Dave.

Have we gotten what we need from Ecology or are we at least on track to receive that information? If not, next week's visit to Olympia might be a good opportunity to raise in a sidebar. If we have gotten it, we may want to consider more "public" acknowledgement.

From: Croxton, David
Sent: Monday, November 19, 2018 5:24 PM
To: Opalski, Dan <Opalski.Dan@epa.gov>
Subject: FW: Draft Deschutes Timeline

Ex. 5 Deliberative Process (DP)

From: Hodgkiss, Miranda
Sent: Monday, November 19, 2018 4:04 PM
To: Brown, Leah <Brown.Leah@epa.gov>; Croxton, David <Croxton.David@epa.gov>
Subject: Draft Deschutes Timeline

Hi Leah and Dave,

I received the draft Technical Approach from TetraTech, and the draft timeline. Their timeline was more of a guiding schedule based on how fast they could produce something after EPA comments and/or receiving needed information from Ecology. I'm attaching the schedule, with my attempt to add in due dates for things based on an assumed EPA review schedule (my edits are in track changes).

I'll provide this feedback to TetraTech along with my comments on their Technical Approach, so this timeline isn't considered final yet until we have a chance to discuss it. Ex. 5 Attorney Client (AC) Ex. 5 Attorney Client (AC) Ex. 5 Attorney Client (AC) We can talk more next week.

Thanks,

Miranda Hodgkiss

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Message

From: Schmidt, Michelle [Michelle.Schmidt@tetratech.com]
Sent: 11/19/2018 8:49:22 PM
To: Hodgkiss, Miranda [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9d441ddb44ac4ed486058d2c2690b977-Hodgkiss, Miranda]; Carlin, Jayne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d8fb65515e114f0c9a07cf1a9796132f-Carlin, Jayne]; Zell, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a7206bbb71ff41c999629b86cc25c7e4-Zell, Chris]
CC: Teresa Rafi [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usered545308]; Jon Butcher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usera6b9d251]
Subject: Deschutes TMDLs - Technical Approach Memorandum
Attachments: TentativeSchedule_Deschutes_11-19-18.docx; Deschutes_TechnicalApproach_11-19-2018.docx; Deschutes_TechnicalApproach_11-19-2018.pdf

Miranda,

The technical approach memorandum for *Water Quality Modeling and TMDL Development for the Deschutes River, Percival Creek, and Budd Inlet Tributaries – Phase 2* is attached. Please let us know when you've had a chance to review the memorandum and we will schedule a meeting to discuss any questions and/or comments that you or others at EPA have regarding the technical approach. After we've received EPA's comments we will revise and finalize the technical approach memorandum and begin development of the QAPP (under the Phase 1 TD the QAPP is scheduled to be delivered within 1 month of the final technical approach memorandum). I've drafted a tentative schedule for Phase 2 that maps out the due dates of deliverables in reference to the approved QAPP, technical direction, Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Happy Thanksgiving,

Michelle

Michelle Schmidt | Environmental Engineer
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Modeling and Assessment Support for the Deschutes TMDLs – *Phase 2 Tentative Schedule*

Task Number	Task Description	Deliverable	Tentative Due Date
1	Shade and QUAL2Kw models for impaired tributaries (Section 2.2.3 of the Technical Approach)	Model files and memorandum summarizing technical analyses to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.	**Ex. 5 Deliberative Process (DP)**
2	QUAL2Kw modeling for the Deschutes River DO TMDL (Section 2.2.2 of the Technical Approach)	Model files and memorandum summarizing technical analyses, including potential ambient nutrient targets, to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.	
3	Bacteria analyses (Section 2.1 of the Technical Approach)	Memorandum summarizing technical analyses to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.	
4	RUSLE erosion modeling for Deschutes River fine sediment TMDL (Section 2.3 of the Technical Approach)	Memorandum summarizing RUSLE modeling and results to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.	
5	Technical report	Comprehensive technical report summarizing modeling and assessments from tasks 1-4 that will serve as an appendix to the TMDL report. There will be two draft versions and one final version with tracked changes to show how comments were addressed.	
6	Response to comments	Response to comments document, as an appendix to the TMDL document.	
Potential Task 7	*Allocations*	*Memorandum tabulating wasteload and load allocations for point and nonpoint sources relevant to Tasks 1-4. A draft memorandum will discuss allocation options and based on comments received the final memorandum will include allocation tabulations.*	

Message

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 12/11/2018 7:07:48 PM
To: Schmidt, Michelle [Michelle.Schmidt@tetratech.com]; Jon Butcher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usera6b9d251]
CC: Teresa Rafi [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usered545308]; Carlin, Jayne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d8fb65515e114f0c9a07cf1a9796132f-Carlin, Jayne]; Zell, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a7206bbb71ff41c999629b86cc25c7e4-Zell, Chris]
Subject: RE: Follow-up on Tech Approach
Attachments: Deschutes_TechnicalApproach_12-10-2018_mrh.docx; Chapter 3_QAPP Elements_DRAFT_02212018.docx

Hi Michelle,

I had just a couple of comments which I inserted into the tech approach clean version, so you could find them more easily. **Ex. 5 Deliberative Process (DP)**

Also, Chris let me know about a document (see attached) where a Region 10 workgroup has worked to put together recommendations for temperature and DO factors to be considered in natural condition determinations. It hasn't been finalized by the Region, so it isn't official guidance yet, but it still contains some useful information that we might want to consider. **Ex. 5 Deliberative Process (DP)**

I think at this stage we could incorporate this information into the QAPP, but if you feel it would be better suited to the technical approach, let me know.

Thanks,

Miranda Hodgkiss
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From: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Sent: Monday, December 10, 2018 10:27 AM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>; Jon Butcher <jon.butcher@tetratech.com>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Carlin, Jayne <Carlin.Jayne@epa.gov>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Follow-up on Tech Approach

Miranda,

The revised technical approach for the Deschutes TMDLs is attached. **Ex. 5 Deliberative Process (DP)**

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP) Let me know your thoughts about this - we can still adjust this part for the QAPP if needed.

Thanks,

Michelle

Michelle Schmidt | Environmental Engineer
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From: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Sent: Friday, December 07, 2018 4:36 PM
To: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>; Butcher, Jon <Jon.Butcher@tetratech.com>
Cc: Rafi, Teresa <teresa.rafi@tetratech.com>; carlin.jayne@epa.gov; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Follow-up on Tech Approach

Ok, thanks Michelle!

Miranda Hodgkiss
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From: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Sent: Friday, December 7, 2018 1:02 PM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>; Jon Butcher <jon.butcher@tetratech.com>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Carlin, Jayne <Carlin.Jayne@epa.gov>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Follow-up on Tech Approach

Miranda,

Thanks for the additional information to support the technical approach. I was anticipating to send you the revised technical approach today, however, I need to make a few final updates based on the information you provided, Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP) I will send the revised technical approach to you Monday and we anticipate that we will be able to deliver the QAPP by next Friday, December 14th.

Thanks,

Michelle

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From: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Sent: Friday, December 07, 2018 3:20 PM
To: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>; Butcher, Jon <Jon.Butcher@tetratech.com>
Cc: Rafi, Teresa <teresa.rafi@tetratech.com>; carlin.jayne@epa.gov; Zell, Christopher <zell.christopher@epa.gov>
Subject: Follow-up on Tech Approach

Hi Michelle and Jon,

I've had a chance to talk with Chris Zell about some of his comments Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

And last, do you have an estimate for when the revised TA might be finished, and when the draft QAPP will be ready to review?

Thanks,

Miranda Hodgkiss
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TETRA TECH

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MEMORANDUM

To:	Miranda Hodgkiss, Jayne Carlin, Christopher Zell (USEPA)	**Date:**	December 10, 2018
Cc:	Teresa Rafi	**Subject:**	TMDL Development for the Deschutes River, Percival Creek, and Budd Inlet Tributaries - Technical Approach
From:	Michelle Schmidt, Jon Butcher, Ph.D., P.H.	**Project Number:**	100-IWM-T94501, Task 5

1.0 BACKGROUND

The Washington Department of Ecology (Ecology) submitted the *Deschutes River, Percival Creek, and Budd Inlet Tributaries Multi-parameter Total Maximum Daily Load Report* (Deschutes TMDL) to the U.S. Environmental Protection Agency (USEPA) on December 17, 2015. The Deschutes TMDL is part of a multi-phase process to address water quality impairments for waters flowing into South Puget Sound. The Deschutes River originates in heavily forested regions of the Bald Hills and flows northward to Capitol Lake (formed in 1951), then to Budd Inlet which connects to Puget Sound. Riverine impairments for dissolved oxygen (DO), temperature, pH, fine sediment, and fecal coliform bacteria were addressed in the submittal. This comprehensive report included individual TMDLs for 73 waterbody-pollutant pairs.

USEPA's Final Action Letter to Ecology (June 29, 2018) presented the agency's decisions regarding the submitted Deschutes TMDLs. The letter states that 26 of the TMDLs (all temperature) satisfied the statutory and regulatory requirements of 303(d) of the Clean Water Act and implementing regulations (40 C.F.R. Part 130). Therefore, these 26 TMDLs were approved by USEPA for implementation. Action was not taken by USEPA for 10 of the submitted bacteria TMDLs because these segments were previously delisted from the State's 303(d) list (approved by EPA on July 22, 2016). USEPA's Final Action Letter also states that Ecology submitted revised calculations for 14 bacteria TMDLs on July 17, 2017, which did not allow adequate time for public review as required by 40 C.F.R § 130.7(c)(1)(ii). The revised bacteria TMDLs must undergo public review prior to being eligible for approval by USEPA. Lastly, 23 TMDLs were

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disapproved by USEPA: three for fecal coliform bacteria, 11 for DO, one for fine sediment, three for pH, and five for temperature. Some were not approved because critical TMDL components were lacking, such as a specified loading capacity to attain applicable water quality standards or defined wasteload allocations (WLAs) and load allocations (LAs). Other TMDLs in the submittal were disapproved because the approach was not protective of downstream waterbodies and uses (e.g., not protective of Budd Inlet that has a bacteria criterion for shellfish). The fine sediment TMDL for the mainstem Deschutes River was rejected because the technical analysis lacked a linkage between the water quality target and the established loading capacity. The waterbody-pollutant pair TMDLs that were disapproved are summarized in [REF _Ref527370983 \h].

Table [SEQ Table * ARABIC]. TMDLs Disapproved by USEPA (June 29, 2018 Final Action Letter)

Pollutant	Waterbody	2012 Listing IDs	2010 Listing IDs	Disapproval Rationale
Bacteria	Adams Creek	45462, 45695	45462, 45695	Lacked public review period; TMDLs for the creeks draining directly to Budd Inlet/South Puget Sound were not protective of downstream waters
	Ellis Creek	45480	45480	
	Indian Creek	3758, 74218	3758, 45213, 46410	Lacked public review period
	Mission Creek	45212	45212, 46102	
	Moxlie Creek	3759, 3761	3759, 3761, 45252, 46432	
	Reichel Creek	3763	3763, 45566	
	Schneider Creek	45559	45559	
	Spurgeon Creek	46061	46061	
Dissolved Oxygen	Ayer (Elwanger) Creek	5851	5851	Lacked required TMDL components
	Black Lake Ditch	47761	47761, 47762	
	Deschutes River	10894, 47753, 47754, 47756	10894, 47753, 47754, 47756	Lacked required TMDL components; lacked linkage between water quality target and loading capacity; not protective of downstream waters
	Lake Lawrence Creek	47696	47696	Lacked required TMDL components
	Percival Creek	48085	48085, 48086	Lacked required TMDL components; lacked linkage between water quality target and loading capacity; not protective of downstream waters
	Reichel Creek	47714	47714	Lacked required TMDL components
Fine Sediment	Deschutes River	6232	6232	Lacked linkage between water quality target and loading capacity
pH	Adams Creek	50965	50965	Lacked required TMDL components

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Pollutant	Waterbody	2012 Listing IDs	2010 Listing IDs	Disapproval Rationale
	Ayer (Elwanger) Creek	5850	5850	
	Black Lake Ditch	50989	50990	
Temperature	Ayer (Elwanger) Creek	73229		Lacked required TMDL components
	Huckleberry Creek	3757	3757	
	Reichel Creek	48666	48666	
	Tempo Lake Outlet	48696	48696	
	Unnamed Spring to Deschutes River	48713	48923	

The original Deschutes TMDLs developed by Ecology were based on the 2010 303(d) list. Impairments and associated IDs were updated for the 2012 impairment list, therefore, both 2010 and 2012 listing IDs are provided.

Tetra Tech has been contracted to develop revised TMDLs for all waterbody-pollutant pairs that were not approved by USEPA ([REF _Ref527370983 \h]). This memorandum describes the applicable water quality standards, rationales for disapproval by USEPA, and additional modeling that will be conducted to support revisions to the TMDLs. Data available for the revisions, including data that informed the original TMDLs and newly available data, are also summarized.

It is important to note that Ecology will be simultaneously developing a TMDL for the downstream Budd Inlet that is anticipated to be completed in 2020. The revised Deschutes TMDLs must consider downstream impacts to Budd Inlet. Therefore, USEPA will facilitate coordination of work on the Deschutes TMDL with work on the Budd Inlet TMDL, especially with respect to modeling.

1.1 WATER QUALITY STANDARDS

Surface water quality is protected and regulated for fresh and marine waters under standards approved by USEPA and adopted by the state of Washington. Waters of the state are assigned designated use classifications, also called beneficial uses, that include aquatic life uses (e.g., core summer salmonid habitat), recreational uses (e.g., primary contact), water supply uses (e.g., domestic water supply), and other miscellaneous uses (e.g., navigation). Definitions of the designated uses for fresh and marine waters are found in WAC 173-201A-600 ([HYPERLINK "http://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-600"]) and WAC 173-201A-210 ([HYPERLINK "http://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-210"]), respectively. Aquatic and recreation designated uses of the waterbodies in the Deschutes TMDL that are being reassessed are listed in [REF _Ref527640366 \h].

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Table [SEQ Table * ARABIC]. Designated Use (Beneficial Use) Classifications

Waterbody	Designated use	Designated use of downstream waters
Adams Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	*Budd Inlet/South Puget Sound (Marine):* Aquatic: Excellent Quality Recreation: Primary Contact Other: Shellfish Harvesting
Ayer Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	Same as Ayer Creek
Black Lake Ditch	Aquatic: Core Summer Habitat Recreation: Extraordinary Primary Contact	Same as Black Lake Ditch
Deschutes River	*Upstream of Offutt Lake* Aquatic: Core Summer Habitat Recreation: Primary Contact *Downstream of Offutt Lake* Aquatic: Spawning/Rearing Recreation: Primary Contact	*Capitol Lake (Freshwater):* Aquatic: Core Summer Habitat Recreation: Extraordinary Primary Contact Water Supply: Domestic, Industrial, Agricultural, Stock *Budd Inlet/South Puget Sound (Marine):* Aquatic: Excellent Quality Recreation: Primary Contact Other: Shellfish Harvesting
Ellis Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	*Budd Inlet/South Puget Sound (Marine):* Aquatic: Excellent Quality Recreation: Primary Contact Other: Shellfish Harvesting
Huckleberry Creek	Aquatic: Core Summer Habitat Recreation: Primary Contact	Same as Huckleberry Creek
Indian Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	Same as Indian Creek
Lake Lawrence	Aquatic: Core Summer Habitat Recreation: Primary Contact	Same as Lake Lawrence
Mission Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	*Budd Inlet/South Puget Sound (Marine):* Aquatic: Excellent Quality Recreation: Primary Contact Other: Shellfish Harvesting *Inner Budd Inlet (Marine):* Aquatic: Good Quality Recreation: Secondary Contact
Moxlie Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	*Inner Budd Inlet (Marine):* Aquatic: Good Quality Recreation: Secondary Contact
Percival Creek	Aquatic: Core Summer Habitat Recreation: Extraordinary Primary Contact	*Capitol Lake (Freshwater):* Aquatic: Core Summer Habitat Recreation: Extraordinary Primary Contact Water Supply: Domestic, Industrial, Agricultural, Stock *Budd Inlet/South Puget Sound (Marine):* Aquatic: Excellent Quality Recreation: Primary Contact Other: Shellfish Harvesting
Reichel Creek	Aquatic: Core Summer Habitat Recreation: Primary Contact	Same as Reichel Creek

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Waterbody	Designated use	Designated use of downstream waters
Schneider Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	*Inner Budd Inlet (Marine):* Aquatic: Good Quality Recreation: Secondary Contact
Spurgeon Creek	Aquatic: Spawning/Rearing Recreation: Primary Contact	Same as Spurgeon Creek
Tempo Lake Outlet	Aquatic: Spawning/Rearing Recreation: Primary Contact	Same as Tempo Lake Outlet
Unnamed spring to Deschutes River (Listing ID 48923)	Aquatic: Core Summer Habitat Recreation: Primary Contact	Same as unnamed spring to Deschutes River

The designated uses of a water body or water segment determine the applicable surface water quality standards; these standards include both numeric and narrative criteria that are used to identify impairments and inform the development of critical TMDL components (e.g., loading capacity). The original submittal of the Deschutes TMDL was based on surface water quality standards established by the State in December 2006 that were approved by USEPA in February 2008. A revision of the State's surface water quality standards was adopted by Ecology in August 2016 and released in October 2017 (#06-10-091; [HYPERLINK "https://fortress.wa.gov/ecy/publications/summarypages/0610091.html"]). Surface water quality standards from this latest release will be used to develop loading capacities for the revised TMDLs.

1.1.1 Bacteria

Exposure to harmful waterborne bacteria, pathogens, and viruses can result in serious illness. Fecal coliform bacteria originate from the fecal waste of warm-blooded animals. These bacteria are generally not harmful, but presence of fecal coliform indicates that other disease-causing organisms associated with fecal waste may be in the water. Because of this, fecal coliform is often used as a bacteria indicator. The State's surface water quality standards specify two statistical measures for assessing bacteria for each recreational class. Both a geometric mean criterion and a top 10 percent of samples criterion must be met for compliance.

For freshwaters, fecal coliform organism levels in waters designated as *Extraordinary Primary Contact* or *Lake Class* must not exceed a geometric mean value of 50 colonies/100 mL. A second component of the standard states that not more than 10 percent of all samples (or any single sample when less than 10 sample points exist) obtained for calculating the geometric mean value can exceed 100 colonies/100 mL. Fecal coliform organism levels in waters designated as *Primary Contact Recreation* must not exceed a geometric mean value of 100 colonies /100 mL, and not more than 10 percent of all samples (or any single sample when less than 10 sample points exist) obtained for calculating the geometric mean value can exceed 200 colonies /100 mL. The bacteria water quality standards for fresh waters recommend that the geometric mean is calculated seasonally, preferably with five or more samples for each period.

Bacteria criteria for marine waters are more stringent. The *Primary Contact Recreation* standard, which matches the *Shellfish Harvesting* bacteria criterion, both of which apply to Budd Inlet/South Puget Sound, requires that fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL. In addition, not more than 10 percent of all samples (or any single sample when less than 10 sample points exist) obtained for calculating the geometric mean value can exceed 43 colonies/100 mL. The

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Secondary Contact Recreation bacteria standard that applies to Inner Budd Inlet is defined in terms of enterococci rather than fecal coliform: enterococci organism levels must not exceed a geometric mean value of 70 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value can exceed 208 colonies/100 mL.

1.1.2 Temperature

Water temperature affects the behavior and survival of fish and other aquatic species and is an important factor affecting dissolved oxygen concentrations. Water temperature standards for Washington are established based on the most sensitive species that the waterbody supports. Thus, the aquatic life water temperature criterion for a waterbody supporting cold-water species is generally defined as the highest allowable 7-day average of daily maximum temperature (7-DADMax). To ensure that a waterbody provides a suitable habitat, water temperature criteria are often defined by critical life-stages, such as spawning and rearing of juvenile fish.

Temperature TMDLs are being reassessed for five waterbodies. Ayer Creek and Tempo Lake Outlet support salmonid spawning, rearing, and migration and the applicable 7-DADMax standard is 17.5 °C (activity period September 16 – June 14). The 7-DADMax standard is 16 °C for Huckleberry Creek, Reichel Creek, and an unnamed Spring to Deschutes River, which provide core summer salmonid habitat (activity period June 15 – September 15). Water temperatures are not to exceed the 7-DADMax standards more than once every 10 years on average. In addition to the 7-DADMax criterion for a waterbody, human activities are prohibited from cumulatively causing more than a 0.3 °C increase in water temperature when a waterbody is naturally warmer than the 7-DADMax standard. Anthropogenic sources of thermal load that should be accounted for include destruction to shade-providing riparian vegetation, heat loads from point source effluent, and elevated temperatures due to development (e.g., increased impervious area that increases temperature of surface runoff and reduces baseflow contributions).

1.1.3 Dissolved Oxygen

Fish and other aquatic species rely on dissolved oxygen (DO) in water to survive, and low DO can be a significant impairment. Low levels of DO in fresh water can be due to excessive algae, which produce oxygen through photosynthesis during daylight hours, but uptake oxygen for respiration during nighttime hours, resulting in large diurnal DO fluctuations. Warm waterbodies may also exhibit low DO levels because warmer temperatures decrease oxygen solubility in water. Slow moving, or stagnant, waters with slow rates of reaeration may also exhibit low DO.

Similar to water temperature, the aquatic life DO criteria are defined by the most sensitive species supported by the waterbody and differ according to life-stage. DO TMDLs are being developed for multiple waterbodies in the Deschutes River Basin that have been assigned aquatic life designated uses of either salmonid spawning, rearing, and migration or core summer salmonid habitat. The lowest 1-day minimum DO concentration defined for salmonid spawning, rearing, and migration is 8.0 mg/L (activity period: September 16 – June 14). The lowest 1-day minimum DO concentration for core summer salmonid habitat segments is 9.5 mg/L (activity period: June 15 – September 15). DO is not to fall below the specified concentration at a probability frequency of more than once every ten years on average. Human activity may not reduce DO concentrations by more than 0.2 mg/L if natural conditions result in DO concentrations lower than the criterion. Human activities that can contribute to the DO deficit include

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degradation of shade-providing riparian vegetation that cools water temperatures and limits algal growth, nonpoint source oxygen-demanding pollutant loads (e.g., nutrients in runoff and groundwater), point source oxygen-demanding pollutant loads, low DO associated with waste discharges to ground water, and altered streamflow regimes caused by development or land management practices. Note that the DO standards apply to well mixed portions of the stream, and not shallow, stagnant pools, or abnormally oxygen-rich sections of the waterbody.

There is not a minimum numeric DO criterion for Lake Class waters; however, a narrative criterion specifies that anthropogenic activities must not cumulatively decrease DO concentrations by more than 0.2 mg/L from that of natural conditions. The lowest 1-day minimum DO standards for marine waters designated as *Excellent Quality* (applies to Budd Inlet/South Puget Sound) and *Good Quality* (applies to Inner Budd Inlet) are 6.0 mg/L and 5.0 mg/L, respectively.

1.1.4 pH

Washington adopted aquatic life pH criteria for fresh water because excessive deviations from neutral pH (7.0) can cause cognitive and physiological damage to fish (e.g., inhibit predator detection, stunt the growth of juvenile fish), and can sometimes be lethal. In addition, overly acidic or alkaline waters can facilitate chemical reactions and alter the toxicity of other substances. In some cases, abnormal pH is related to natural geology or waste discharges; however, it is more common to find pH deviations resulting from excess algal growth that depletes carbon dioxide during daytime photosynthesis (raising pH) and increases carbon dioxide during nighttime respiration (lowering pH). For core summer salmonid habitat streams and salmonid spawning, rearing, and migration streams the target pH range is 6.5 to 8.5 (expressed as the negative logarithm of the hydrogen ion concentration). Human-caused variation is to be less than 0.2 units for core summer salmonid habitat segments, and less than 0.5 units for salmonid spawning, rearing, and migration segments.

1.1.5 Fine Sediment

Open space between the rocks of streambeds provides young fish with habitat to hide from predators and provides a place to graze for food. Fine sediment that accumulates and clogs the spaces between cobbles and boulders can inhibit the survival of young fish. Adult salmon build spawning nests in the riffle of a gravel streambed and enhanced fine sediment can block oxygen flow to the nest and prevent successful hatching. Numeric targets have not been formally established for fine sediment in Washington, however, fine sediment accumulation that degrades the habitat of sensitive species is covered by narrative standard WAC 173-201A-260(2), which states:

> *"Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health."*

The Washington Forest Practices Board (1997) classifies streams with less than 12 percent fine sediment in gravels as of good habitat quality, 12 to 17 percent as of fair quality, and greater than 17 percent as of poor habitat quality. Past field studies (e.g., by Konovsky and Puhn, 2005) found excessive fine sediment levels in the streambed of the Deschutes River for which a TMDL is being developed.

Fine sediment loading is also associated with elevated turbidity (decreased water clarity). Washington has adopted numeric aquatic life turbidity criteria for fresh water. The same standard applies to

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designated uses of core summer habitat and spawning, rearing, and migration. When background turbidity is 50 nephelometric turbidity units (NTU) or less, the turbidity shall not exceed 5 NTU over background. When background turbidity is more than 50 NTU there cannot be more than a 10% increase in NTU. While the Deschutes River has not been listed as impaired for turbidity, it will be appropriate to also evaluate compliance with the turbidity criterion in the TMDL for fine sediment.

1.2 DATA SUMMARY

Available data were compiled to support the modeling and assessment of current conditions within the impaired waterbodies. Environmental monitoring data collected by Ecology, partner agencies, and other researchers is made publicly available through Washington's Environmental Information Management System (EIM). Water quality data for impaired waterbodies in the Deschutes River watershed and those draining directly to Budd Inlet were extracted from the online EIM database. Fecal coliform, DO, pH, and temperature data are summarized by pollutant and collection period/year in [REF _Ref530325343 \h] to [REF _Ref530325354 \h]. Data from continuous measurements available through EIM are included in the totals (e.g., 15-minute interval DO data collected in the Deschutes River in August 2004). Monitoring records for recent years (collected between 2010-present) are limited. In addition to the data shown in the plots, two chlorophyll *a* samples were collected in 2015 for the DO impaired segment of the Deschutes River. Most of the data available for the impaired tributaries comes from assessments conducted between 2003-2004. It is anticipated that all available monitoring data will inform modeling and assessment efforts, but the use of older data (e.g., DO data for the Deschutes River collected in the 1960s – 1980s) will be reviewed and evaluated to determine its applicability to current conditions.

Percent fine sediment within riffle crests were sampled in the mid-1990s by Schuett-Hames and Child (1996) and in the mid-2000s by Konovsky and Puhn (2005). Sampling was conducted upstream (Lake Lawrence, Site 22) and downstream (State Route 507, Site 28) of the fine sediment impaired segment of the Deschutes River ([REF _Ref530380064 \h]). Data from these sites will be compiled to inform the fine sediment TMDL for the Deschutes River.

Additional data sources were also reviewed. Data housed in USEPA's Water Quality Portal, which replaces USEPA's STORET database, were extracted, mapped with ArcGIS, and reviewed. However, no additional data were available for the impaired segments through the Water Quality Portal that was not already available through other sources (e.g., EIM). Thurston County conducts routine water quality monitoring that is relevant to the TMDL. It is anticipated that Thurston County will be providing their data in a spreadsheet or database format. However, if Thurston County doesn't provide their data directly then Tetra Tech will compile data from tables in their annual reports to be incorporated into the technical analyses and modeling.

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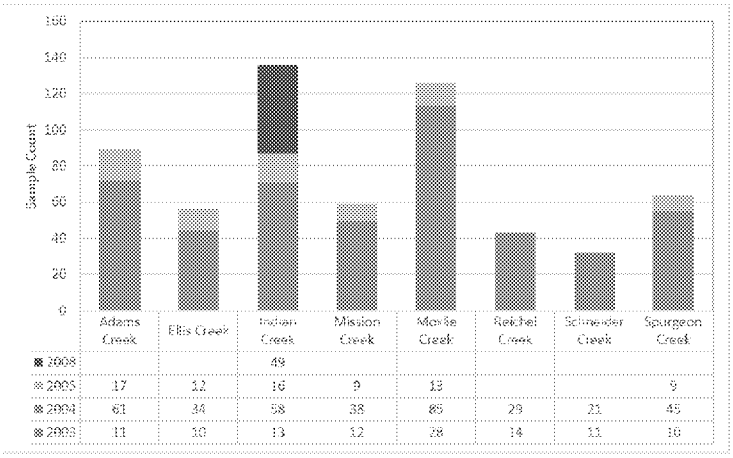

Figure [SEQ Figure * ARABIC]. Fecal Coliform Grab Sample Summary for Bacteria Impaired Waterbodies

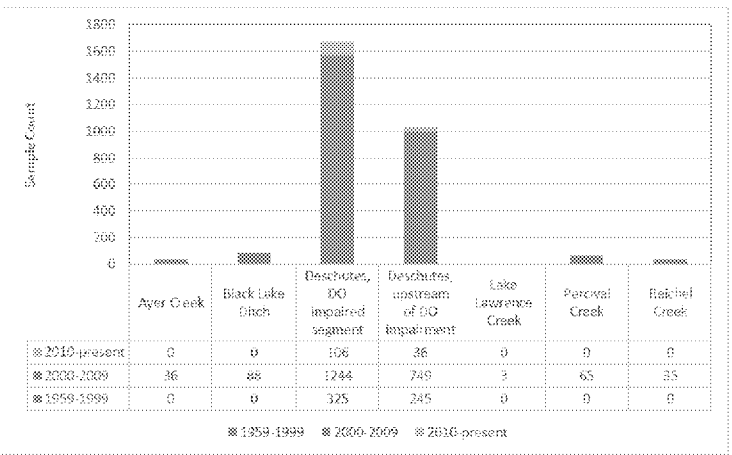

Figure [SEQ Figure * ARABIC]. Dissolved Oxygen Grab Sample Summary for Oxygen Impaired Waterbodies

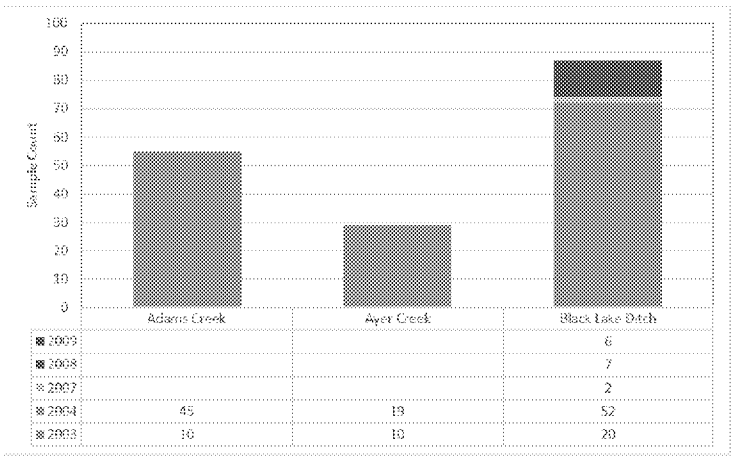

Figure [SEQ Figure * ARABIC]. pH Grab Sample Summary for pH Impaired Waterbodies

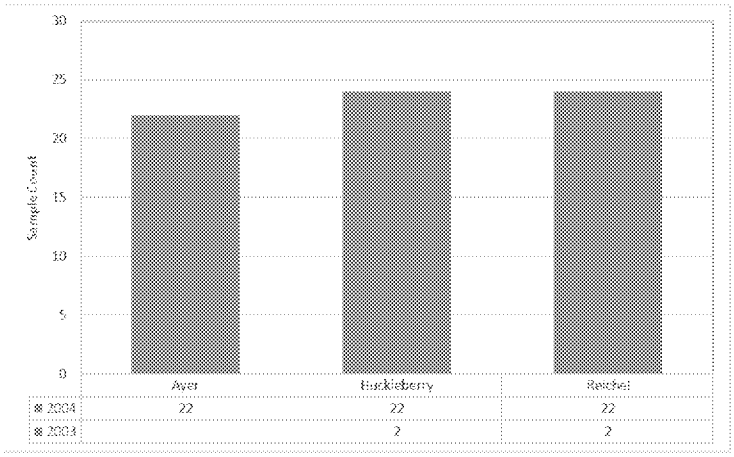

Figure [SEQ Figure * ARABIC]. Water Temperature Grab Sample Summary for Temperature Impaired Waterbodies

Table [SEQ Table * ARABIC]. Deschutes River Fine Sediment Monitoring

Segment	River Mile Range	Fine Sediment Sample Count by Year		
		1995	2004	2005
Lake Lawrence (Site ID 22)	28.8 - 30.4	16	14	16
State Route 507 (Site ID 28)	20.8 - 24.4	18	14	18

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2.0 TECHNICAL APPROACH

2.1 BACTERIA TMDLS

As shown in [REF _Ref527370983 \h], bacteria TMDLs for several creeks, many of which drain directly to Budd Inlet, were disapproved by USEPA. The bacteria TMDLs were not deemed acceptable for a variety of reasons. For all waterbodies except Ellis and Adams Creeks, EPA found the revised TMDLs submitted in 2017 technically acceptable; however, they need to undergo a public review period. For Ellis and Adams Creeks, the shellfish standard for Budd Inlet/South Puget Sound is more stringent than the primary contact standard applicable to the creeks. Thus, TMDLs for those creeks failed to ensure protection of downstream water quality. Mission Creek discharges on the border of the southern-most part of Budd Inlet/South Puget Sound and northern-most part of Inner Budd Inlet; updates to the Mission Creek bacteria TMDL must also protect these downstream marine waters. Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

The technical approach to update the analyses and support revisions to the bacteria TMDLs includes incorporating fecal coliform monitoring data that were not previously available. Data collected in the years following the original bacteria TMDL analyses will be included in the reassessment of current conditions and the loading capacities needed to achieve the applicable water quality standard. Monitoring data provided by other relevant agencies, such as Thurston County, will be used.

As previously discussed, three bacteria-impaired streams drain directly to Budd Inlet/South Puget Sound. The location of this part of Budd Inlet is described in Washington's Water Quality Standards as "South Puget Sound west of longitude 122°52'30"W (Brisco Point) and longitude 122°51'W (northern tip of Hartstene Island, except as otherwise noted)." This portion of Budd Inlet/South Puget Sound has a more stringent fecal coliform criterion to safeguard shellfish habitat. In addition to meeting targets applicable to the waterbody based on its designated use, conditions in the waters must not degrade downstream water quality. Protection of downstream water quality was not explicitly assessed in the original bacteria TMDLs. Revisions to the technical analyses will seek to evaluate downstream impacts of bacteria in the creeks draining to Budd Inlet/South Puget Sound, which include Adams Creek, Ellis Creek, and Mission Creek. Based on discussions with USEPA, bacteria discharged from these creeks must meet the criteria within Budd Inlet. The remaining tributaries to Budd Inlet drain to Inner Budd Inlet. The location of this part of Budd Inlet is described in Washington's Water Quality Standards as "Budd Inlet south of latitude 47°04'N (south of Priest Point Park)." The water quality standard for this portion of Budd Inlet is secondary contact recreation. This standard is established in terms of enterococci; thus, a translation, through application of a fecal coliform to enterococci ratio or regression relationship, will be applied to determine the most stringent standard for Moxlie Creek and Schneider Creek. Paired enterococci and fecal coliform samples (i.e., collected at the same location at the time) from waterbodies in the region will be used to derive the relationship between the bacteria indicators. Loading capacities for the creeks will be developed based on the most stringent target, either the bacteria standard directly applicable to the creek or the bacteria standard applicable to the receiving water (Budd Inlet/South Puget Sound or Inner Budd Inlet), to ensure comprehensive protection of water quality in the creek and downstream waters.

Analyzing pollutant levels in conjunction with water quality standards and flow is useful for assessing critical conditions, and existing and required loads. The Load-Duration Curve Method (Stiles, 2001, 2002; Cleland, 2002, 2003) will be used to assess the fecal coliform impairments. This method plots flow and

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observed data to examine the flow conditions under which impairment occurs and water quality deviates from the standard. A flow-duration curve analysis will be performed to identify the flow regimes during which excursions of the most stringent bacteria standard occur. This method determines the relative ranking of a given flow based on the percent of time that historic flows exceed that value. Long-term gaging records are not available for the bacteria impaired creeks, thus historic flow regimes will be estimated by scaling daily flows observed at the USGS Deschutes River at Tumwater gage based on relative drainage area. Once relative rankings are calculated for flow, existing bacteria loads will be computed. This type of analysis can help define the flow regime during which excursions occur, which can help identify the key sources contributing to the impairment. The Load-Duration Curve approach will also be used to determine assimilative capacity for each bacteria impaired creek, evaluated for both the target geometric mean and highest allowable 10th percentile of samples. An explicit Margin of Safety (MOS) may also be incorporated into each of the bacteria TMDLs based on input from USEPA.

Stormwater discharges via designated Municipal Separate Storm Sewer Systems (MS4s) are subject to NPDES permits. These will need to be accounted separately from other stormwater sources because they are subject to WLAs rather than non-point source LAs in the TMDL. To support this effort, existing fecal coliform loads attributed to permitted MS4s will be estimated. This will be accomplished by tabulating the proportion of the creek's drainage area under MS4 regulations (e.g., impervious land within the MS4 boundary) and proportioning the total load to MS4s and non-MS4 areas. Separate loads will be computed for each permitted MS4 to support allocations.

USEPA may also request support on bacteria allocation approaches and calculations (if so, this will be specified in the Technical Direction). For example, a brief memorandum that proposes an approach to establish potential WLAs for individual stormwater permittees (i.e., MS4s) and LAs for nonpoint sources of bacteria could be prepared and allocations calculated.

2.2 WATER TEMPERATURE, DISSOLVED OXYGEN, AND PH TMDLS

2.2.1 Modeling Platforms

Modeling support for the water temperature, DO, and pH TMDLs will include applications of a riparian shade model (Shade model) and riverine water quality model (QUAL2Kw).

Shade Model

The Shade model was developed by Oregon Department of Environmental Quality (ODEQ) and can be used to evaluate solar radiation along a stream using specific geographic information system (GIS)-based data derived with the TTools ArcGIS extension. TTools uses input coverages and grids to develop vegetation and topography data perpendicular to the stream channel, and samples longitudinal stream channel characteristics such as the near-stream disturbance zone (NSDZ) and elevation. TTools can sample spatial data within the riparian zone including vegetation height and land use classification depending on available remote sensing data. Typically, these include LIght Detection And Ranging (LiDAR) outputs, digital elevation models (DEMs), riparian vegetation digitized from aerial imagery (digital orthophoto quadrangles and rectified aerial photos), and FLIR thermal imaging temperature data.

Ecology's Shade model (Shade.xls—a Microsoft Excel spreadsheet available at [HYPERLINK "http://www.ecy.wa.gov/programs/eap/models.html"]) quantifies potential daily solar load and generates percent effective shade. Effective shade is the fraction of shortwave solar radiation that does not reach the stream surface because vegetative cover and topography intercept it. Effective shade is influenced

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by latitude/longitude, time of year, stream geometry, topography, and vegetative buffer characteristics, such as height, width, overhang, and density. Data inputs for a Shade model are readily available (e.g., aerial imagery; DEMs), and additional data (e.g., vegetation height from first and last returns, overhang) can be estimated from LiDAR and other data sources. TTools output serves as input for the Shade model, which is then used to generate longitudinal effective shade profiles. Reach-averaged integrated hourly effective shade (i.e., the fraction of potential solar radiation blocked by topography and vegetation) serves as an input into an accompanying QUAL2Kw model.

QUAL2Kw

The modeling framework of QUAL2K was originally developed at Tufts University as a one-dimensional river water quality model capable of simulating steady-state hydraulics, and diel heat budget and water quality kinetics. Ecology updated the original model to QUAL2Kw, which is capable of simulating dynamic hydraulics with continuous simulation of variable boundary conditions (Pelletier and Chapra, 2006). QUAL2Kw is a one-dimensional model that simulates a diel heat budget, diel water quality, phytoplankton, bottom algae, pH, and a full DO balance. The model also allows for the incorporation of hyporheic flow through the riverbed, and several other dynamic and complex simulation options. The QUAL2Kw model is most appropriate for simulating short-term, critical periods and it requires heat and constituent mass inputs for point and nonpoint sources.

2.2.2 Deschutes River Dissolved Oxygen TMDL

The calibrated Deschutes River QUAL2Kw model that was developed by Ecology to support the previous TMDL submission will be used to update the DO TMDL for the Deschutes River. The steady-state QUAL2Kw model was paired with a riparian Shade model for the Deschutes River and these were applied in the development of the Deschutes River temperature TMDL, which was approved by USEPA; however, achievement of the riparian shade targets for water temperature were not shown to comprehensively attain DO standards in the river or downstream Capitol Lake.

Achievement of the riparian shade targets for temperature is not sufficient to meet DO standards in the river with the designated use of core summer habitat. An additional contribution to depressed DO is caused by attached and planktonic algal growth and respiration, which is in turn driven by nutrient concentrations, therefore, the DO TMDL must also evaluate potential limits on nutrient loads. Potential ambient targets for nutrients to address DO impairments in the Deschutes River will be assessed through application of the QUAL2Kw model. Stressor response curves will be developed based on simulations of the QUAL2Kw model; these curves will provide information regarding the relationships between stressors (e.g., ambient concentrations of nitrogen and phosphorus) and DO in the impaired segments of the river. Ambient targets for nutrients will be evaluated in the context of restoration of system potential riparian vegetation as required by the USEPA approved Deschutes River temperature TMDL.

Loads of oxygen demanding waste and nutrients from two fish hatcheries will also be represented in the model. The first is a proposed fish hatchery to be located downstream of Pioneer Park and discharging to the Deschutes River. The second is a small existing hatchery which discharges into Tumwater Falls. Ex. 5 Deliberative Process (DP) These will be incorporated as point sources in the TMDL requiring WLAs, or a future WLA, as appropriate.

Ex. 5 Deliberative Process (DP)

Washington requires that the TMDL be protective of both water quality in the river and downstream waters. Therefore, potential ambient nutrient targets will be evaluated for the most stringent standard, either based on the DO water quality standard applicable to the impaired segments of the Deschutes River or based on the conditions needed in the Deschutes River to protect water quality in Capitol Lake.

Ex. 5 Deliberative Process (DP)

As part of the revision to the TMDL technical support, relevant monitoring data that were not previously available will be incorporated into the model and related analyses. Data collected in the years following the original analyses for the Deschutes River DO TMDL will be included in the reassessment of existing loads and the loads required to achieve the applicable water quality standard. Additional monitoring data will be used to refine the representation of tributaries in the QUAL2Kw model (i.e., flow and water quality inputs from tributaries will be reviewed and updated). Monitoring data provided by other agencies, such as data collected and reported by Thurston County, will also be incorporated.

Instead of directly defining a DO loading capacity (or DO deficit loading capacity) for the river, modeling results will be used to characterize the stressor-response relationship between ambient nutrient conditions and the resulting DO concentrations. Daily loading capacities for nutrients will be defined as the ambient nutrient concentrations needed to be protective of conditions in both the river and Capitol Lake. Daily loading capacities will be calculated based on the most stringent standard (either the standard directly applicable to the river or the standard determined to be protective of downstream waters through GEMSS modeling). The application of an explicit Margin of Safety (MOS) will be discussed with USEPA prior to finalizing the daily loading capacities.

To support the development of WLAs and LAs, existing loads for nutrients will be evaluated for point and non-point sources. Nutrient loads from point sources will be tabulated and, where available, effluent data (flow and nutrients) will be directly used to characterize point source loads. Point sources discharging directly to the Deschutes River will be represented in the QUAL2Kw model, and monitoring data that were not previously available will be incorporated where appropriate. Loads from non-point sources will also be tabulated as follows: 1) unit area loading rates of nitrogen and phosphorus by land use will be identified from literature relevant to western Washington, 2) land use areas draining to the impaired river will be tabulated, and 3) nutrient loads will be tabulated by multiplying the unit area loading rates with land

use areas in the catchment. In addition, permitted MS4 loads will be tabulated separately (e.g., nutrient loads from impervious land within the MS4 boundary will be attributed to MS4s and not to nonpoint sources). These loads will be represented in the steady-state QUAL2Kw model as diffuse pollutant sources along the length of the stream. Separate loads will be computed for each permitted MS4 to support allocations.

2.2.3 Tributary TMDLs for Dissolved Oxygen, Temperature, and pH

TMDLs are being developed for nine tributary streams impaired for dissolved oxygen, temperature, and/or pH, and additional modeling is needed to support the revisions. Riparian shade models will be developed for temperature impaired waterbodies that currently lack Shade models to examine the potential thermal benefits of rejuvenating riparian vegetation. (Shade models have already been developed by Ecology for Black Lake Ditch and Percival Creek.) In addition, QUAL2Kw models will be developed to simulate water quality under critical conditions in each of the impaired tributary streams. The shade and QUAL2Kw models will be used to identify critical stressors and to derive stressor response curves; these curves will provide information regarding the relationships between stressors (e.g., riparian shade, nutrients) and the response variables of interest (DO, water temperature, and/or pH). A summary of the models to be developed is provided in [REF _Ref529865736 \h].

Point and nonpoint source loads will be quantified for the key stressor(s) identified for each tributary to support the WLA and LA process, where applicable (e.g., where nutrients are the key stressor for a DO or pH impairment). As part of this process, existing nutrient loads for permitted MS4s and nonpoint sources outside of MS4 boundaries will be tabulated using the approach described for the Deschutes River DO TMDL (see previous section). Pollutant loads for point sources will also be calculated and effluent data will be directly used to characterize point source loads, where available. Modeling results will inform the selection of the constituent (or constituents) to use for daily loading capacities for each waterbody-pollutant pair. In addition to nutrients, sensitivity of DO to loads of carbonaceous biochemical oxygen demand (CBOD) will be assessed with the models, and CBOD will be considered as a potential constituent for which to derive daily loading capacities for the impaired waterbodies. The application of an explicit MOS will be determined with input from USEPA.

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

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Table [SEQ Table * ARABIC]. Modeling Approach to Support Development of Tributary TMDLs

Waterbody	Pollutants	Model Development
Huckleberry Creek	Temperature	- Develop Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess temperature response to thermal loads
Reichel Creek	Temperature, DO	- Develop Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess temperature and DO response to thermal loads and oxygen demanding pollutant loads (nutrients)
Tempo Lake Outlet	Temperature	- Develop Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess temperature response to thermal loads
Ayer Creek	Temperature, pH, and DO	- Develop Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess temperature, DO, and pH response to thermal loads and oxygen demanding pollutant loads (nutrients)
Unnamed Spring to Deschutes River	Temperature	- Develop Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess temperature response to thermal loads
Adams Creek	pH	- Develop QUAL2Kw model to assess pH stressor response
Black Lake Ditch	pH, DO	- Utilize existing Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess pH and DO stressor response
Lake Lawrence Creek	DO	- Develop QUAL2Kw model to assess DO stressor response
Percival Creek	DO	- Utilize existing Shade model to assess existing and potential riparian vegetation - Develop QUAL2Kw model to assess DO stressor response

2.3 DESCHUTES RIVER FINE SEDIMENT TMDL

The portion of the Deschutes River between the confluence with Lake Lawrence Creek and with Reichel Creek is impaired for fine sediment. Loading capacities for the original TMDL submission were expressed in terms of percent fine sediment in gravels and were defined to achieve "Good" habitat quality for fishes and other aquatic species (<12% fines). The required reduction was established based on a field study by the Squaxin Island Tribe (Konovsky and Puhn, 2005) that measured percent fine sediment in gravels in the Deschutes River. USEPA agreed with the percent fines target and required reduction in loads but rejected the TMDL because a linkage between the assigned loading capacity and allocations for point and nonpoint sources were lacking.

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Previous analyses (Raines, 2007) quantified fine sediment loads to the Deschutes River from bank erosion (hillslope and glacial terraces), landslides, and unpaved roads. The estimated rates and relative contributions of these fine sediment sources were assessed at Capitol Lake. However, the section of the Deschutes River listed as impaired for fine sediment and for which a TMDL is being developed is located further upstream, spanning the section of the river below Lake Lawrence Creek and above Reichel Creek. In addition, approximately 29% of the sediment load to Capitol Lake was unaccounted for in the previous mass balance analysis (Raines, 2007), and tasks outlined below will help to address gaps in the source assessment.

Sediment loading rates from forest roads and bank erosion estimated by Raines (2007) will be retained, but recalculated for the area upstream of the impaired segments of the Deschutes River (no additional modeling will be completed for these sources). More information is needed regarding other sources of sediment. As part of the revision, average annual soil loss from sheet and rill erosion in the drainage area will be modeled with the Revised Universal Soil Loss Equation (RUSLE) method (Renard, 1997). The RUSLE method estimates sheet and rill erosion caused by rainfall and its associated runoff through five multiplicative factors:

$$A = R * K * LS * C * P$$

Where A is the average annual soil loss from sheet and rill erosion caused by rainfall and its associated overland flow (short tons/acre/year). The input factors are summarized in [REF _Ref530043263 \h].

Table [SEQ Table * ARABIC]. RUSLE Factors

RUSLE Variable	RUSLE Factor
R	Rainfall-Runoff Erosivity Factor
K	Soil Erodibility Factor
LS	Slope Length and Steepness Factor
C	Cover-Management Factor
P	Support Practice Factor

The RUSLE approach will be implemented spatially (grid-based) and parameter inputs will build on equations and recommendations found in the RUSLE's user guide to estimate upland soil loss. RUSLE does not directly estimate downstream delivery of this sediment, much of which may be trapped near the source. It is common practice to apply a sediment delivery ratio (SDR) to RUSLE soil loss to estimate sediment yield to the river. The SDR will be estimated as described below.

A group of researchers led by Lorenzo Borselli has developed advanced geographical information system (GIS) techniques for determining sediment and flow connectivity on landscapes (Borselli et al., 2008) and has extended the method to provide parametric landscape-based estimates of sediment delivery ratios that can be used with grid-based applications of RUSLE (e.g., Vigiak et al., 2012). This provides an effective means of converting the RUSLE analysis to an estimate of net (delivered) sediment yield from upland sources.

The RUSLE-SDR method will be implemented to support the fine sediment TMDL for the Deschutes River. Average sediment yields from upland erosion will be tabulated by land use to support allocation efforts.

In addition, existing sediment loads for relevant point sources (e.g., sand and gravel facilities regulated under general permits) upstream of the impairment will be estimated where data is available. Note that there are not any permitted MS4s upstream of the fine sediment impaired segment.

The modeling results will be combined with past studies of sediment sources to calculate the total sediment load from point and nonpoint sources upstream of the impairment. The needed percent reductions in fine sediment were previously calculated from field survey data and the healthy habitat levels established in the Timber Fish and Wildlife Watershed Analysis Manual (Washington Forest Practices Board, 1997; Roberts et al., 2012). USEPA's Protocol for Developing Sediment TMDLs provides several potential options for linking water quality targets to sources of sediment (USEPA, 1999). Process-based or mechanistic models can be used to identify the change in erosion and sedimentation processes needed restore water quality. However, development of a mechanistic model for the Deschutes River watershed is not feasible due to time constraints on completing the TMDL. Empirical linkage models are also acceptable. This method is more suitable for suspended sediment TMDLs where source loads can be paired with flows to derive instream concentrations. Available water column sediment data (e.g., total suspended sediment) is insufficient to apply this approach for the impaired segment, and a linkage between water column sediment and fines in gravel would remain uncertain. Given the time constraint and minimal monitoring information, the linkage between sediment sources and fine sediment in gravels will be determined through a direct arithmetic linkage. First, the existing sediment mass balance including loads from point and nonpoint sources will be established as previously discussed. Second, the required percent reduction in fine sediment previously computed by Ecology will be applied proportionally to the existing total sediment load to establish the daily loading capacity (Roberts et al., 2012). If preferred by USEPA, higher percent reductions could be applied as an explicit MOS.

An additional analysis will be completed to ensure that the turbidity criterion is also achieved for the fine sediment impaired reach. The total sediment load from the mass balance assessment will be paired with flow records at Deschutes River near Rainier, Washington (USGS 12079000) to approximate the resulting total suspended sediment concentration. A previously developed relationship between total suspended sediment and turbidity for streams in the Puget Lowlands will be applied to estimate the resulting turbidity (Packman et al., 1999), which will be compared to the applicable turbidity criterion that depends on the background turbidity condition. When background turbidity is 50 nephelometric turbidity units (NTU) or less, the turbidity shall not exceed 5 NTU over background. When background turbidity is more than 50 NTU there cannot be more than a 10% increase in NTU. A recently completed N-STEPS (Nutrient Scientific Technical Exchange Partnership Support) assessment for Washington estimated the mean turbidity for the least disturbed, reference stream monitoring sites in ecoregion 2 (Puget Lowlands) as equal to 0.933 NTU (median 1.2 NTU; Tetra Tech, 2018). If 0.933 NTU is applied as the background turbidity, for example, then the allowable turbidity due to human activities would be 5.933 NTU and the associated TSS concentration would be 12.2 mg/L based on the regional TSS-turbidity regression (Packman et al., 1999). The loading capacity developed for fine sediment will be reduced if the estimated turbidity exceeds the criterion.

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ED_004094_00027256-00019

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ED_004094_00027256-00020

Ex. 5 Deliberative Process (DP)

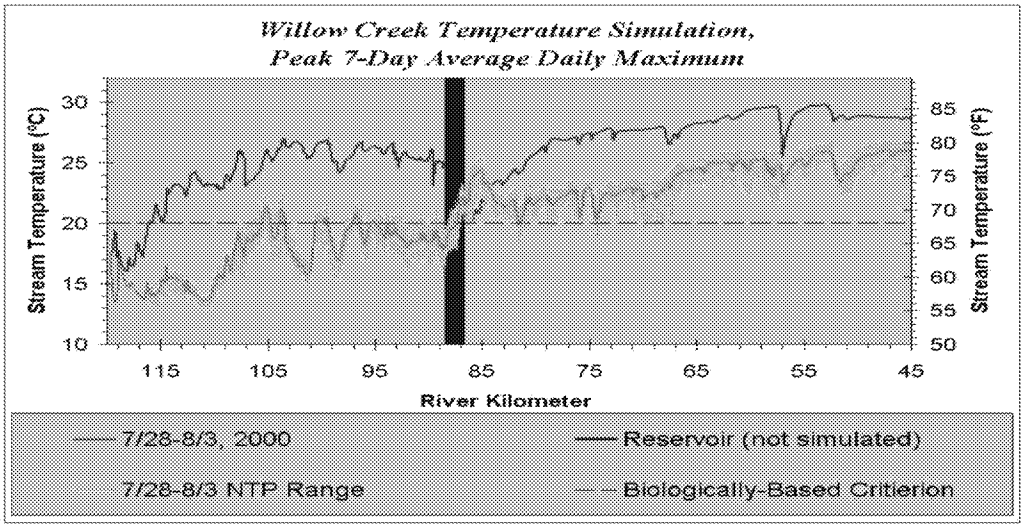

Figure D4-12. *Maximum seven day rolling average of the daily maximum temperatures for summer 2000 and NTP temperature simulations. The light green band and dark green line result from the range and midpoint of natural potential veg[redacted]ely. The maximum 7-day rolling average of the daily m[redacted]as July 28 to August 3.*

Ex. 5 Deliberative Process (DP)

Parking lot issues for refining the concept and implementing:

Ex. 5 Deliberative Process (DP)

Parking lot for TSD

Ex. 5 Deliberative Process (DP)

Message

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 12/7/2018 8:19:36 PM
To: Schmidt, Michelle [Michelle.Schmidt@tetratech.com]; Jon Butcher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usera6b9d251]
CC: Teresa Rafi [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usered545308]; Carlin, Jayne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d8fb65515e114f0c9a07cf1a9796132f-Carlin, Jayne]; Zell, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a7206bbb71ff41c999629b86cc25c7e4-Zell, Chris]
Subject: Follow-up on Tech Approach
Attachments: Packman et al._TSS v Turb_Puget Sound_1999.pdf

Hi Michelle and Jon,

I've had a chance to talk with Chris Zell about some of his comments Ex. 5 Deliberative Process (DP) Ex. 5 Deliberative Process (DP) Here's some feedback for you to think about as you make the revisions to the tech approach. We can also set up a call if you need to discuss any of this.

Ex. 5 Deliberative Process (DP)

And last, do you have an estimate for when the revised TA might be finished, and when the draft QAPP will be ready to review?

Thanks,

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

USING TURBIDITY TO DETERMINE TOTAL SUSPENDED SOLIDS IN URBANIZING STREAMS IN THE PUGET LOWLANDS

James J. Packman[1]

Karen J. Comings[2]

Derek B. Booth[2]

Published as: J. J. Packman, K. J., Comings, and D. B. Booth, 1999, Using turbidity to determine total suspended solids in urbanizing streams in the Puget Lowlands: *in* Confronting Uncertainty: Managing Change in Water Resources and the Environment, Canadian Water Resources Association annual meeting, Vancouver, BC, 27–29 October 1999, p. 158–165.

[1] College of Forest Resources, University of Washington, Box 352100, Seattle, WA 98195, U.S.A. 206/543-5506. jpackman@u.washington.edu

[2] Center for Urban Water Resources Management, University of Washington, Box 352700, Seattle, WA 98195, U.S.A. 206/543-7923. kcomings@u.washington.edu and dbooth@u.washington.edu

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Task Number	Task Description	Deliverable	Tentative Due Date/Schedule	Tentative Due Date
1	Shade and QUAL2Kw models for impaired tributaries for temperature, DO & pH (Section 2.2.3 of the Technical Approach)	Model files and memorandum summarizing technical analyses to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.	Ex. 5 Deliberative Process (DP)	Ex. 5 Deliberative Process (DP)
2	QUAL2Kw modeling for the Deschutes River DO & pH TMDL (Section 2.2.2 of the Technical Approach)	Model files and memorandum summarizing technical analyses, including potential ambient nutrient targets, to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.		
3	Bacteria analyses (Section 2.1 of the Technical Approach)	Memorandum summarizing technical analyses to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.		
4	RUSLE erosion modeling for Deschutes River fine sediment TMDL (Section 2.3 of the Technical Approach)	Memorandum summarizing RUSLE modeling and results to be incorporated into a TMDL appendix document (Task 5). Relevant point and nonpoint source loads will also be tabulated.		
5	Technical report	Comprehensive technical report summarizing modeling and assessments from tasks 1-4 that will serve as an appendix to the TMDL report. There will be two draft versions and one final version with tracked changes to show how comments were addressed.		Ex. 5 Deliberative Process (DP)

6	Response to comments	Response to comments document, as an appendix to the TMDL document.	**Ex. 5 Deliberative Process (DP)**
Potential Task 7	*Allocations*	*Memorandum tabulating wasteload and load allocations for point and nonpoint sources relevant to Tasks 1-4. A draft memorandum will discuss allocation options and based on comments received the final memorandum will include allocation tabulations.*	

Task

Subject: Deschutes

Status: Not Started
Percent Complete: 0

Total Work: 0
Actual Work: 0

Owner: Hodgkiss, Miranda

**When should we share technical approach with Ecology?

Technical questions:

- How detailed to make the sediment calcs? (in terms of quantifying upland loads)
    - We don't have turbidity data, but we have limited TSS data
        - Check in municipal SW work, USGS gages, graduate student paper, Derek Booth (summarized numerous sediment turbidity rating curves)
    - The waters aren't listed for turbidity
        - When we run existing sediment budget and/or RSULE, we will generate sediment in tons/yr.
        - Ex. 5 Deliberative Process (DP)
        - Primary source of turbidity is non-volatile solids or mineral sediment
    - Ex. 5 Deliberative Process (DP)
    - What does WA do for sediment TMDLs?
    - Ex. 5 Deliberative Process (DP)
- Does state have any translators/ratios between fecal coliform and enterococci?
    - We don't have data for enterococci
    - Fecal to e. coli is well established at 0.6 – may be able to pull data from nearby waters and do a regression

Policy questions:

Ex. 5 Deliberative Process (DP)

Task

Subject: Deschutes

Status: Not Started
Percent Complete: 0

Total Work: 0
Actual Work: 0

Owner: Hodgkiss, Miranda

Technical questions:

- Does state have any translators/ratios between fecal coliform and enterococci?
    - We don't have data for enterococci
    - Fecal to e. coli is well established at 0.6 – may be able to pull data from nearby waters and do a regression

Policy questions:

-
-
-
-

Ex. 5 Deliberative Process (DP)

Appointment

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 1/30/2019 10:47:31 PM
To: Hodgkiss, Miranda [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9d441ddb44ac4ed486058d2c2690b977-Hodgkiss, Miranda]; Cope, Ben [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=497efadd936e4d378225116b8f50fd3f-Cope, Ben]
BCC: R10Sea-Room-19Orca/R10-Rooms-Service-Center [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=userc0222f1f]

Subject: Deschutes QAPP
Attachments: Deschutes_Draft_QAPP_12-14-2018 Cope.docx; Deschutes_Draft_QAPP_12-14-2018_mrh.docx
Location: R10Sea-Room-19Orca/R10-Rooms-Service-Center

Start: 1/31/2019 9:30:00 PM
End: 1/31/2019 10:00:00 PM
Show Time As: Busy

Your comments and mine for reference. And here's the email you sent, too. Talk to you tomorrow!

Miranda

Happy 2019 Miranda –

Please see attached for comments on the draft Deschutes QAPP. Ex. 5 Deliberative Process (DP)

-
-
-

Ex. 5 Deliberative Process (DP)

Let's discuss when you're settled back in.

Cheers. -BC

Task Order 01

TMDL Development for the Deschutes River, Percival Creek, and Budd Inlet Tributaries

Technical Call – November 13, 2018

Participants

EPA Region 10: Miranda Hodgkiss

Tetra Tech: Jon Butcher, Michelle Schmidt, Teresa Rafi

Call Summary

This call was scheduled to discuss technical concepts related to the proposed approach and to confirm that Tt's plans match what EPA wants and needs. Also discussed scheduling and deliverable formats.

Michelle led the call and noted that she has started drafting the technical approach and has questions and today is requesting feedback from EPA. Major points of discussion are listed in bullets below.

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-
-
-

Ex. 5 Deliberative Process (DP)

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Ex. 5 Deliberative Process (DP)

Timeline

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Action Items:

- Tetra Tech will prepare a summary of the call and distribute it to the team for comments.
- Tetra Tech will finalize technical approach and send to EPA November 19.
- After approval (week following Thanksgiving), Tt will revise the TD to reflect new details and proceed with QAPP. Can discuss LOE estimates for the technical work with Jayne.
- Miranda will send answers related to her followup items as she gets them.

ED_004094_00034340-00003

Message

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 12/4/2018 4:46:30 PM
To: Hunter, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=32905162cc58495da107db89c7dea903-Hunter, Chr]
Subject: RE: Your review - Draft timeline for Deschutes TMDLs

Thanks, Chris!

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

From: Hunter, Christopher
Sent: Tuesday, December 4, 2018 6:50 AM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Cc: Croxton, David <Croxton.David@epa.gov>
Subject: RE: Your review - Draft timeline for Deschutes TMDLs

Thanks for sharing this Miranda. Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Also, thanks for your voicemail response to my question about the FOIA, I'll be working on that this month.
Chris

Chris Hunter
202.566.1454
Watershed Branch, Office of Water
US Environmental Protection Agency

From: Hodgkiss, Miranda
Sent: Friday, November 30, 2018 7:16 PM
To: Hunter, Christopher <Hunter.Christopher@epa.gov>
Cc: Croxton, David <Croxton.David@epa.gov>
Subject: Your review - Draft timeline for Deschutes TMDLs

Hi Chris,

Our regional counsel suggested that I share our draft timeline for the Deschutes TMDLs with you to review for any major red flags from HQ's perspective. Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Thanks,

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

Message

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 11/28/2018 7:08:52 PM
To: Schmidt, Michelle [Michelle.Schmidt@tetratech.com]
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

Sounds good, thanks!

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

From: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Sent: Wednesday, November 28, 2018 11:04 AM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>; Carlin, Jayne <Carlin.Jayne@epa.gov>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Jon Butcher <jon.butcher@tetratech.com>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

Miranda,

Friday from 10-11 PST works better. I'll send the meeting invite.

Michelle

Michelle Schmidt | Environmental Engineer
Direct: 919.485.2081 | Main: 919.485.8278 | Fax: 919.485.8280
michelle.schmidt@tetratech.com

Tetra Tech | Complex World, Clear Solutions
P.O. Box 14409 | 1 Park Drive, Suite 200, Research Triangle Park, NC 27709 | www.tetratech.com

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From: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Sent: Wednesday, November 28, 2018 12:17 PM
To: Carlin, Jayne <Carlin.Jayne@epa.gov>; Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Cc: Rafi, Teresa <teresa.rafi@tetratech.com>; Butcher, Jon <Jon.Butcher@tetratech.com>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

It looks like Chris's availability is limited Thurs and Fri, but Jayne and I can meet from 2-3 (PST) on Thursday. I would rather meet sooner than later on this, and I think I can speak to Chris's comments if he is unable to meet with us. Chris, is that ok with you?

Michelle, does that time work for you? An alternative that works for us is Friday from 10-11 (PST).

Thanks,

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

From: Carlin, Jayne
Sent: Wednesday, November 28, 2018 8:45 AM
To: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>; Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Jon Butcher <jon.butcher@tetratech.com>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

Best on Thursday at 9 or 9:30 am or 1:30, 2, or 2:30 pm (Seattle time). If needed I could make it work on Friday at 9, 9:30, 10, 10:30 or Thursday at 12:30 or 1 PM.

Jayne Carlin, Watersheds Unit
US EPA, Region 10
1200 6th Ave, Suite 155 (OWW-192)
Seattle, WA 98101-3140
(206) 553-8512
carlin.jayne@epa.gov

From: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Sent: Wednesday, November 28, 2018 6:49 AM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Jon Butcher <jon.butcher@tetratech.com>; Carlin, Jayne <Carlin.Jayne@epa.gov>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

Miranda,

Thanks for sending comments on the technical approach and schedule. Let's find a time this week to discuss revisions to the approach - what is your availability tomorrow and Friday?

Michelle

Michelle Schmidt | Environmental Engineer
Direct: 919.485.2081 | Main: 919.485.8278 | Fax: 919.485.8280
michelle.schmidt@tetratech.com

Tetra Tech | Complex World, Clear Solutions
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From: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>
Sent: Tuesday, November 27, 2018 7:59 PM
To: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Cc: Rafi, Teresa <teresa.rafi@tetratech.com>; Butcher, Jon <Jon.Butcher@tetratech.com>; Carlin, Jayne <Carlin.Jayne@epa.gov>; Zell, Christopher <zell.christopher@epa.gov>
Subject: RE: Deschutes TMDLs - Technical Approach Memorandum

Hello -

I'm attaching our comments on the technical approach. Some of these will require us to talk through options, so once you've had a chance to review this, let me know and we can set up a call to discuss.

On the projected schedule, I attempted to add in dates because I'd like us to be on the same page about the timing and order of things (and since some of it required EPA to provide comments, I wanted to see how that would affect the schedule. Let me know what you think of it, and we can also talk about this more, if you want.

Thanks,

Miranda Hodgkiss
Office of Water and Watersheds
U.S. EPA Region 10
(206) 553-0692
hodgkiss.miranda@epa.gov

From: Schmidt, Michelle <Michelle.Schmidt@tetratech.com>
Sent: Monday, November 19, 2018 12:49 PM
To: Hodgkiss, Miranda <Hodgkiss.Miranda@epa.gov>; Carlin, Jayne <Carlin.Jayne@epa.gov>; Zell, Christopher <zell.christopher@epa.gov>
Cc: Teresa Rafi <teresa.rafi@tetratech.com>; Jon Butcher <jon.butcher@tetratech.com>
Subject: Deschutes TMDLs - Technical Approach Memorandum

Miranda,

The technical approach memorandum for *Water Quality Modeling and TMDL Development for the Deschutes River, Percival Creek, and Budd Inlet Tributaries – Phase 2* is attached. Please let us know when you've had a chance to review the memorandum and we will schedule a meeting to discuss any questions and/or comments that you or others at EPA have regarding the technical approach. After we've received EPA's comments we will revise and finalize the technical approach memorandum and begin development of the QAPP (under the Phase 1 TD the QAPP is scheduled to be delivered within 1 month of the final technical approach memorandum). Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Happy Thanksgiving,

Michelle

Michelle Schmidt | Environmental Engineer
Direct: 919.485.2081 | Main: 919.485.8278 | Fax: 919.485.8280
michelle.schmidt@tetratech.com

Tetra Tech | Complex World, Clear Solutions
P.O. Box 14409 | 1 Park Drive, Suite 200, Research Triangle Park, NC 27709 | www.tetratech.com

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Appointment

From: Hodgkiss, Miranda [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9D441DDB44AC4ED486058D2C2690B977-HODGKISS, MIRANDA]
Sent: 1/31/2019 12:37:13 AM
BCC: R10Sea-Room-19Orca/R10-Rooms-Service-Center [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=userc0222f1f]

Subject: Canceled: Deschutes QAPP
Attachments: Deschutes_Draft_QAPP_12-14-2018 Cope.docx; Deschutes_Draft_QAPP_12-14-2018_mrh.docx
Location: Miranda will call Ben Personal Matters / Ex. 6

Start: 1/31/2019 9:30:00 PM
End: 1/31/2019 10:00:00 PM
Show Time As: Free

Importance: High

Your comments and mine for reference. And here's the email you sent, too. Talk to you tomorrow!

Miranda

Happy 2019 Miranda –

Please see attached for comments on the draft Deschutes QAPP. Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Let's discuss when you're settled back in.

Cheers. -BC