Amy Tarce

From: Amy Tarce
Sent: Thursday, May 9, 2019 12:13 PM
To: 'Karen Walter'
Cc: Tom W. Hardy; Cathy Beam
Subject: RE: Proctor Willows, LAND-2019-00349, Notice of Application

Thank you, Karen. I will forward your comments to the applicant and we will take this into consideration in our review of the project's compliance to the City's Critical Areas regulations.

Amy Tarce, AICP
Senior Planner

From: Karen Walter <KWalter@muckleshoot.nsn.us>
Sent: Thursday, May 9, 2019 11:25 AM
To: Amy Tarce <atarce@redmond.gov>
Subject: Proctor Willows, LAND-2019-00349, Notice of Application

External Email Warning! Use caution before clicking links or opening attachments.

Amy,

We received a copy of the Notice of Application for the Proctor Williams project referenced above. We reviewed this and other available information on the City's website. We offer the following comments in the interest of protecting and restoring the Tribe's treaty-protected fisheries resources:

Stream 1 and 2 classification

Streams 1 and 2 both meet the physical criteria from WAC 222-16-031 for presumed fish habitat (see Cedarock Report appendix D to Critical Areas Report). Salmonids are currently obstructed from reaching Streams 1 and 2 because of downstream artificial barriers described in the Critical Areas Report. There were no documented natural barriers on the stream or areas downstream. Consequently, based on the Cedarock data provided that demonstrates meeting the physical criteria from the WAC for presumed fish habitat, the project needs to consider this stream as a potential fish-bearing stream under Redmond's code and evaluate its potential impacts accordingly.

Project impact comments
The project impact reassessment will likely result in larger regulated stream buffers. If so, then there may need to be modifications to the proposed project design. If there is a need for offsite stream buffer mitigation, then there are streams in Redmond where offsite mitigation could occur.

The mandated road frontage elements along Willows Road could provide an opportunity to improve salmon access to the site by modifying existing pipe sections and/or the "ditched" stream conditions which created a barrier per the Cedarock Report.

We appreciate the opportunity to review this proposal and look forward to Redmond's responses.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
Habitat Program
39015-A 172nd Ave SE
Auburn, WA 98092
253-876-3116

From: Gloria Meerscheidt [mailto:GMeerscheidt@REDMOND.GOV]
Sent: Monday, April 22, 2019 3:58 PM
To: Adam; andy.swayne@pse.com; Chris Jenkins; Dan Sokol; dbeadle@ci.sammamish.wa.us; Elaine Somers; Elizabeth.Elliott@kingcounty.gov; Erika Harris; Fisheries Fileroom; fmiller@lwsd.org; genick@tulaliptribes-nsn.gov; Gretchen.Kaehler@dahp.wa.gov; Heidi Bedwell; Jennifer Meisner; John Greene; Johnson Meninick; Jon Regala; Karen Walter; Kate Valdez; klyste@stillaguamish.com; Laura Murphy; Mark.Wilgus@kingcounty.gov; mattb@snoqualmietribe.us; Miles Penk; Peter Rosen; Philippe D. LeTourneau; Puget Sound Clean Air Agency; Ramin Pazooki; robert.nunnenkamp@kingcounty.gov; rrod; ryoung@tulaliptribes-nsn.gov; sepacenter@dnr.wa.gov; sepadesk@dfw.wa.gov; sepaunit@ecy.wa.gov; Steve Mullen-Moses; Steve.Bottheim@kingcounty.gov; Steven Mullen-Moses; Teresa Smith; tina.morehead@kingcounty.gov; tlavender2@frontier.com; tmcgruder@gmail.com; Todd Scott; Tom Hinman-citizen; wendy klahr
Cc: Gloria Meerscheidt; Amy Tarce
Subject: Courtesy email from City of Redmond regarding Notice of Application with future SEPA - Proctor Willows

Hello SEPA Reviewers,

You are receiving the attached Notice of Application as a courtesy. In the near future, the City will be issuing a SEPA threshold determination, which you will receive as part of the City's standard electronic SEPA notification process.

Project name and number: Proctor Willows, LAND-2019-00349

Please direct any questions to the assigned planner:

- Amy Tarce
- atarce@redmond.gov
- 425-556-2938

Gloria Meerscheidt
Administrative Assistant Planning and Community Development | City of Redmond
☎: 425.556.2407 | ✉: gmeerscheidt@redmond.gov | Redmond.gov
MS: 2SPL | 15670 NE 85th St | Redmond, WA 98052

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Benjamin Sticka

From: Karen Walter <KWalter@muckleshoot.nsn.us>
Sent: Thursday, September 12, 2019 3:52 PM
To: Benjamin Sticka
Subject: FW: City of Redmond SEPA-2019-00807 Proctor Willows
Attachments: SEPA201900807.pdf; RE: Proctor Willows, LAND-2019-00349, Notice of Application

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Ben,

We previously commented on the NOA for this project (see attached email) and did not receive responses. We would appreciate timely written responses to these issues and may have further comments subsequently.

We also request to be made a party of record.

Please advise.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
Habitat Program
39015-A 172nd Ave SE
Auburn, WA 98092
253-876-3116

From: Gloria Meerscheidt [mailto:GMeerscheidt@REDMOND.GOV]
Sent: Wednesday, August 28, 2019 2:55 PM
To: Adam; andy.swayne@pse.com; Chris Jenkins; Dan Sokol; dbeadle@ci.sammamish.wa.us; Elaine Somers; Elizabeth.Elliott@kingcounty.gov; Erika Harris; Fisheries Fileroom; fmiller@lwsd.org; genick@tulaliptribes-nsn.gov; Gretchen.Kaehler@dahp.wa.gov; Heidi Bedwell; Jennifer Meisner; Jil Nogi; John Greene; Johnson Meninick; Jon Regala; Karen Walter; Kate Valdez; klyste@stillaguamish.com; Laura Murphy; Mark.Wilgus@kingcounty.gov; mattb@snoqualmietribe.us; Miles Penk; Peter Rosen; Philippe D. LeTourneau; Puget Sound Clean Air Agency; Ramin Pazooki; robert.nunnenkamp@kingcounty.gov; rrod; ryoung@tulaliptribes-nsn.gov; sepacenter@dnr.wa.gov; sepadahp; sepadesk@dfw.wa.gov; sepaunit@ecy.wa.gov; Stephanie Jolivette; Steve Mullen-Moses; Steve.Bottheim@kingcounty.gov; Steven Mullen-Moses; Teresa Smith; tina.morehead@kingcounty.gov; tlavender2@frontier.com; tmcgruder@gmail.com; Todd Scott; Tom Hinman-citizen; wendy klahr
Cc: Gloria Meerscheidt; Benjamin Sticka; Bonnie Geers
Subject: City of Redmond SEPA-2019-00807 Proctor Willows

Hello SEPA Reviewers,

Attached is a SEPA notification for Proctor Willows.

To review the environment documents related to this project, click the link below.
https://www.redmond.gov/1210/Proctor-Willows

If you have any questions, please contact the assigned planner.
Benjamin Sticka

Amy Tarce

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Watersheds and Land Use Team Leader

Benjamin Sticka

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Subject: FW: City of Redmond SEPA-2019-00807 Proctor Willows
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Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
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Cc: Gloria Meerscheidt; Benjamin Sticka; Bonnie Geers
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https://www.redmond.gov/1210/Proctor-Willows

If you have any questions, please contact the assigned planner.
Benjamin Sticka

MEMORANDUM

TO:	Ben Sticka, City of Redmond
FROM:	Quadrant Homes
DATE:	September 16, 2019
RE:	Proctor Willows, Response to Muckleshoot Tribe Stream Comments

This memorandum responds to the May 9, 2019 email comments from the Muckleshoot Tribe related to the classification of Streams 1 and 2 on the Proctor Willows property, site of a proposed mixed-use development at the southwest corner of the intersection of NE 124th Street and Willows Road NE. This response supplements Quadrant's response to the City's Natural Resources comments, submitted on July 11, 2019.

1. Stream 1 and 2 classification

Comment: Streams 1 and 2 both meet the physical criteria from WAC 222-16-031 for presumed fish habitat (see Cedarock Report appendix D to Critical Areas Report). Salmonids are currently obstructed from reaching Streams 1 and 2 because of downstream artificial barriers described in the Critical Areas Report. There were no documented natural barriers on the stream or areas downstream. Consequently, based on the Cedarock data provided that demonstrates meeting the physical criteria from the WAC for presumed fish habitat, the project needs to consider this stream as a potential fish-bearing stream under Redmond's code and evaluate its potential impacts accordingly.

Response:

Extensive site-specific data confirms that the on-site streams are "Class IV" streams under the Redmond Zoning Code ("RZC"). The streams have no potential to support fish as a result of their low flows and shallow depth. The artificial barriers and uncontrolled stormwater runoff from the adjacent site pose additional impediments, but even if those issues were removed/resolved, there would still be insufficient habitat to support fish.

Stream 2 is an ephemeral stream that averages less than 15 percent in grade, has a channel width of less than 2' at ordinary high water mark and does not meet the physical characteristics of a watercourse that could potentially offer fish habitat due to high grade (8.4%), very shallow depths, and lack of any refuge habitat. *Stream Habitat Report*, p. 12. Stream 1 nominally meets the physical characteristics, but it is fed via culvert from upgradient parking areas and experiences high flows, which lead to flushing during storm events. These factors result in an

artificially exaggerated bankfull width due to significant upstream development influences (extensive land clearing and undetained impervious surface runoff). The channel upstream provides very little, if any, usable fish habitat. No fish have been observed in the larger, deeper watercourses downstream of the site, indicating there is no demand to move upstream. Given these factors, there is no evidence to support a finding that the site has potential for fish use.

In addition, WAC 222-16-031(3)(b)(i)(B) has not been adopted into City Code, and the RZC does not authorize its use in determining stream type. However, even if the WAC had been adopted, it establishes a presumption for fish presence, not potential for fish use, which is the relevant criterion under the RZC. Finally, it is not appropriate to rely on the WAC presumption criteria where as here, the bankfull widths were artificially created due to extensive land clearing and, particularly with respect to Stream 1, uncontrolled stormwater runoff. In the absence of these artificial conditions, neither stream would meet the presumption criteria. More detail supporting this stream classification is outlined below.

Quadrant's consultant team, including Carl Hadley from Cedarock Consultants, Inc. and Scott Brainard from Wetland Resources, have conducted several site visits, most recently on May 31, 2019. Mr. Hadley has reviewed extensive studies performed on the on-site and downslope streams prepared by King County, Washington Trout (now Wild Fish Conservancy), the Muckleshoot Tribe, and Washington State Department of Fish and Wildlife ("WDFW"). They have also reviewed the RZC and WAC 222-16-031.

The RZC defines Class III streams as those that have "non-salmonid fish use or the potential for non-salmonid fish use" or are "headwater streams with a surface water connection to salmon-bearing or potentially salmon-bearing streams (Class I or II)." RZC 21.64.020.A.2.d.iii. The on-site streams do not meet either of these definitions. They do not have potential for fish use, they are not "headwaters" as defined in RZC 20A.20.080, and they have no direct connection to Class I or II streams. The on-site streams drain into a series of ditches and the City's stormwater system before connecting to a Class III stream segment, before ultimately connecting to a Class II stream and draining into the Sammamish River.

As previously noted, the streams do not have the "potential" for fish use. As consistently reported in the literature, no fish have been observed within 1,600 feet downstream of the site during three independent stream surveys by groups who specialize in locating fish populations in Pacific Northwest streams (Washington Trout, Muckleshoot Tribe, King County). The absence of fish cannot be solely attributed to the blocking culvert located on Willows Road NE, southeast of the project site. If the absence of fish were solely attributable to the blocking culvert, fish would be present in the larger, deeper watercourses downstream of the site and attempting to reach the blocking culvert. To the contrary, no fish have been observed anywhere near the culvert.

The on-site channels provide very little, if any, usable fish habitat, primarily because of their normally low flows and shallow depth. Both on-site channels, but particularly Stream 1, have artificially exaggerated bankfull widths due to upstream development influences—specifically,

extensive land clearing and undetained impervious surface runoff. Although WAC 222-16-031 might suggest that fish use could occur, the facts as observed by numerous independent professional fisheries biologists in the field contradict and override these guidelines (and as explained below, the City has not adopted the WAC). "Potential" means "likely." Based on the extensive historical data and recent on-site observations, there is no data to support a conclusion that non-salmonid use of the subject streams is likely.

Second, the streams are not "headwater streams with a surface water connection to Class I or II streams." *See* RZC 21.64.020.A.2.d.iii. The RZC defines a "headwater" as "a stream that is in the uppermost regions of a watershed or catchment area." RZC 20A.20.080. The on-site streams are located at the lower elevations in the Sammamish River Valley just above the floodplain. Stream 1 ranges between elevation 44 and 115 feet MSL. Stream 2 ranges between elevations 113 and 117 MSL. In contrast, "the top of the watershed where headwater streams are located is between elevations 335 and 385." *Stream Habitat Report*, p. 1. Accordingly, the Stream Habitat Report concludes that "the subject watercourse is not located within a headwater area being located just above the floodplain in the lower third of the watershed based on elevation." The RZC definition is clear, as is the data. The streams do not meet the definition of "headwater" under the RZC.

Given the fact that the streams cannot qualify as "headwaters," it is not necessary to address whether these streams have a surface water connection to Class I and II streams (the second clause of RZC 21.64.020.A.2.d.iii.B). Nevertheless, the streams do not meet that criterion either. There is no direct surface water connection between the on-site streams and Class I or II Streams. Stream 1 is fed via a culvert from upgradient parking areas. *Stream Habitat Report, p 12; Talasaea Report, Figure 7*. Stream 1 terminates in a ditch on the west side of Willows Road, which then drains into the City's stormwater system. The stormwater system drains into another ditch located between the road and the railroad grade. From there, the water is piped across the railroad grade and then drops to the valley floor. The on-site streams do not connect with Class 1 or II streams; they connect with an unnamed Class III stream off-site, where no fish have ever been observed.

The WAC guidance does not affect this analysis. WAC 222-16-031 is an "Interim water typing system" that establishes "presumption criteria" to be used "<u>if fish use has not been determined</u>." *See* WAC 222-16-031(3)(b)(emphasis added). In other words, the agencies developed this guidance for use *in the absence of stream-specific data*. But where, as here, there is ample site-specific data, the WACs direct that the site-specific data controls. There is no need to apply presumption criteria. Here, the data confirms no current or potential use of the on-site streams by fish. Even if the WAC were applicable here, use of the "bankfull width" presumption criteria would not be appropriate because the current bankfull widths were artificially created as a result of uncontrolled runoff and exaggerated peak flows being dumped onto the channel, particularly with respect to Stream 1. In the absence of these artificial conditions, the channels would not meet the presumption criteria in the WAC.

Finally, we acknowledge that the barrier culverts under Willows Road NE are man-made barriers that could be removed in the future. Again, the Class IV stream determination is not based on those man-made barriers. Instead, it is based on the fact that the on-site streams have no potential for fish use (due to poor habitat, shallow depth, and periodic flushing/high flows caused by uncontrolled stormwater runoff on adjacent property), and they are not headwaters connected to a Class I or II stream. The upstream fish migration barrier system is long and complex, but if it were to be removed in the future, Quadrant is proposing voluntary mitigation in the form of enhancement (and a larger buffer than required for Class IV streams) that will improve habitat conditions. In the unlikely event that fish reach the site at some point in the future, Quadrant's proposal will result in improved habitat.

2. Project impact comments

Comment: The project impact reassessment will likely result in larger regulated stream buffers. If so, then there may need to be modifications to the proposed project design. If there is a need for offsite stream buffer mitigation, then there are streams in Redmond where offsite mitigation could occur.

The mandated road frontage elements along Willows Road could provide an opportunity to improve salmon access to the site by modifying existing pipe sections and/or the "ditched" stream conditions which created a barrier per the Cedarock Report.

Response:

As explained above, the on-site streams do not meet the RZC definition for a Class III stream. Nevertheless, buffers larger than required for Class IV are proposed. Shading, both topographic and vegetative, is near 100 percent under existing conditions. As no development is proposed to the south or east, shade characteristics will continue unchanged under proposed conditions. These buffers, along with enhancements being proposed, will protect shading while improving other characteristics of the buffer (*e.g.* wildlife habitat, nutrient supply, LWD recruitment, etc.). The voluntary mitigation would improve habitat on the site.

Sarah Pyle

From: Benjamin Sticka
Sent: Friday, September 20, 2019 10:48 AM
To: Sarah Pyle; Carol Helland
Subject: FW: Response on Proctor Willows
Attachments: coho and intermittent streams.pdf

Sarah/Carol,

Please see the response below and attached from Karen Walter based upon her review of the letter from Courtney. I have also forwarded to Bonnie and Courtney. Thank you.

Ben

From: Karen Walter <KWalter@muckleshoot.nsn.us>
Sent: Friday, September 20, 2019 9:33 AM
To: Benjamin Sticka <bsticka@redmond.gov>
Cc: Penk, Miles A (DFW) <Miles.Penk@dfw.wa.gov>; Reinbold, Stewart G (DFW) <Stewart.Reinbold@dfw.wa.gov>
Subject: RE: Response on Proctor Willows

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Ben,

Thank you for sending us the applicants' responses to our comments and questions.

In response, please note that we disagree with the stream classifications for this project. The stream meets physical criteria from the WAC which is what the State agencies, tribes, and federal agencies use to determine potential fish bearing waters that are upstream of artificial barriers. The data provided from the applicant is too limited to reflect all hydrologic conditions and the stream has not been surveyed extensively to determine definitive fish use or alternatively fish absence. Even intermittent streams are documented to be used by coho salmon (see attached). Further, the MITFD work cited was a spot survey on a portion of the stream downstream of the site because many of the Sammamish River tributaries were shown as unclassified under King County's 1990s SAO map portfolio. At the time, Redmond had no stream surveys or fish use data for areas streams to our knowledge. Our survey was not and should be used as the upward extent of fish use; rather, we documented fish in the stream at that location.

To determine the extent of definitive fish use in the stream it would take **at least 10 years** of repeated surveys to make such a determination of fish use extent downstream of the artificial barriers to capture a range of flow and habitat conditions. The artificial barriers skew the fish distribution data which is in part why WAC 222-16-031 was developed. The WAC was based on both habitat conditions and electroshocking results from several thousand data points collected around Washington State. Also, as we noted previously, there are no documented natural barriers in this system downstream of the site that we are aware of. If the applicant has data to suggest otherwise, we request a copy for our review and further comments before the City finalizes the environmental review for this project.

We understand the City of Redmond's code issue; however, it does not reflect the best available science used by tribes, state, and federal agencies, including the State's Forest Practices Rules which were accepted as part of Section 10 Habitat Conservation Plan under the Federal Endangered Species Act. Quandrant Homes parent company, Weyerhaeuser, was part of the negotiations that lead to the adoption of the "Forest and Fish Report"; the development of the Forest Practice Rules' HCP. We have noted these discrepancies over the years to Redmond staff in the water typing update work, as well as, individual projects undergoing SEPA review.

From recent conversations with WDFW Region 4 staff, they, too, note that WDFW types streams based on the current conditions regardless as to how unregulated stormwater and urbanization may have changed the natural hydrology, which is not fully supported by the arguments made by the applicant as they provided no historical evidence of stream channel conditions that would not meet the physical criteria from the WAC.

Finally, the applicant did not fully respond to our comments about roadway frontage improvements which could affect the Willows Road crossing. If there are modifications to this crossing, then the City and applicant should expect comments from us during the HPA and Corps permit process to require the crossing to be upgraded to a bridge or stream simulation designed culvert. The applicants' response merely described riparian buffer proposals and did not directly answer the issue.

We appreciate the continued coordination with the City of Redmond on this project. Please let me know if you have any questions.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
Habitat Program
39015-A 172nd Ave SE
Auburn, WA 98092
253-876-3116

From: Benjamin Sticka [mailto:bsticka@redmond.gov]
Sent: Thursday, September 19, 2019 3:50 PM
To: Karen Walter
Subject: Response on Proctor Willows

Hi Karen,

I apologize in the delay getting back to you. Please review the attached memo, which responds to your questions about the proposed Proctor Willows project. Thank you and please let me know, if you have any additional follow-up questions? Thanks.

Ben Sticka
Planner │City of Redmond
☎: 425.556.2470 | ✉: bsticka@redmond.gov | Redmond.gov
MS: 2SPL │ 15670 NE 85th St │ Redmond, WA 98052

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Coho salmon dependence on intermittent streams

PJ Wigington Jr[1*], JL Ebersole[1], ME Colvin[2], SG Leibowitz[1], B Miller[3], B Hansen[4], HR Lavigne[5], D White[1], JP Baker[1,6], MR Church[1], JR Brooks[1], MA Cairns[1,7], and JE Compton[1]

In February 2006, the US Supreme Court heard cases that may affect whether intermittent streams are jurisdictional waters under the Clean Water Act. In June 2006, however, the cases were remanded to the circuit court, leaving the status of intermittent streams uncertain once again. The presence of commercial species, such as coho salmon (*Oncorhynchus kisutch*), can be an important consideration when determining jurisdiction. These salmon spawn in the upper portions of Oregon coastal stream networks, where intermittent streams are common. In our study of a coastal Oregon watershed, we found that intermittent streams were an important source of coho salmon smolts. Residual pools in intermittent streams provided a means by which juvenile coho could survive during dry periods; smolts that overwintered in intermittent streams were larger than those from perennial streams. Movement of juvenile coho into intermittent tributaries from the mainstem was another way in which the fish exploited the habitat and illustrates the importance of maintaining accessibility for entire stream networks. Loss of intermittent stream habitat would have a negative effect on coho salmon populations in coastal drainages, including downstream navigable waters.

Front Ecol Environ 2006; 4(10): 513–518

Intermittent streams only flow during part of the year and are often under-appreciated as aquatic resources. In the western US, over 65% of total stream length is intermittent (Stoddard *et al.* 2005). Whether intermittent streams are included under the jurisdiction of the Clean Water Act (CWA) is not clear. Under the CWA, the definition of "waters of the United States" is vague, leading to substantial debate in the courts and federal agencies about the geographic scope of the statute (Downing *et al.* 2003). Until recently, regulatory interpretations were fairly broad, but a 2001 US Supreme Court ruling (*Solid Waste Agency of Northern Cook County v US Army Corps of Engineers*, 531 US 159 [2001]) re-emphasized the importance of a water body's navigability and its "significant nexus" with navigable waters. In June 2006, the Court issued decisions in two additional cases (*United States v John Rapanos and June Carabell v United States Army Corps of Engineers and United States Environmental Protection Agency*, slip op, 547 US ___ [2006]) that concerned the jurisdictional status of non-navigable waters. An issue that remains unresolved is whether a tributary to a navigable waterbody must be perennial to be included, or whether it can be intermittent. Research documenting the impact of intermittent streams on interstate or foreign commerce in navigable waters, in particular, could influence whether such systems are protected under the CWA.

[1]*US Environmental Protection Agency, Corvallis, OR 97333 *(wigington.jim@epa.gov); [2]Independent contractor, Corvallis, OR 97333; [3]Oregon Department of Fish and Wildlife, Charleston, OR 97420; [4]USDA Forest Service, Corvallis, OR 97333; [5]Dynamac Corp, Corvallis, OR 97333; [6]Current address: Beavercreek, OR 97004; [7]Current address: Independence, OR 97351*

Pacific salmon are extremely important to the ecosystems and economies of the Pacific Northwest and support valuable commercial and recreational fisheries. Salmon populations have experienced major declines and local extinctions, due in part to loss of freshwater habitat (Lichatowich 1999; CENR 2000). Coastal coho salmon (*Oncorhynchus kisutch*), which use headwater areas where intermittent streams are common, have experienced declines similar to other Pacific salmon and have been the focus of major restoration efforts (Oregon Watershed Enhancement Board 2005). The potential importance of intermittent streams to coho and other salmonids has been documented (Everest 1973; Erman and Hawthorne 1976; Kralik and Sowerwine 1977; Cederholm and Scarlett 1982; Brown and Hartman 1988), but quantitative data are limited.

Coho salmon commonly have an 18-month freshwater life cycle. Adult coho return from the ocean in late fall, when streamflows increase, and spawn in the upper portions of coastal stream networks. Coho fry emerge in late winter and remain in these streams through the summer and winter before migrating (as smolts) to the ocean the following spring. Juvenile survival during winter flood events is one of the most important factors controlling smolt production (Nickelson *et al.* 1992). High streamflows can physically displace or fatally injure fish unable to find suitable, low-velocity refugia. Larger smolts tend to have higher ocean survival rates (Holtby *et al.* 1990). Thus, both the number and size of smolts affect the size and biomass of adult populations.

In this paper, we quantify the contributions of intermittent streams to coho salmon production in an Oregon coastal watershed. Specifically, we provide estimates of

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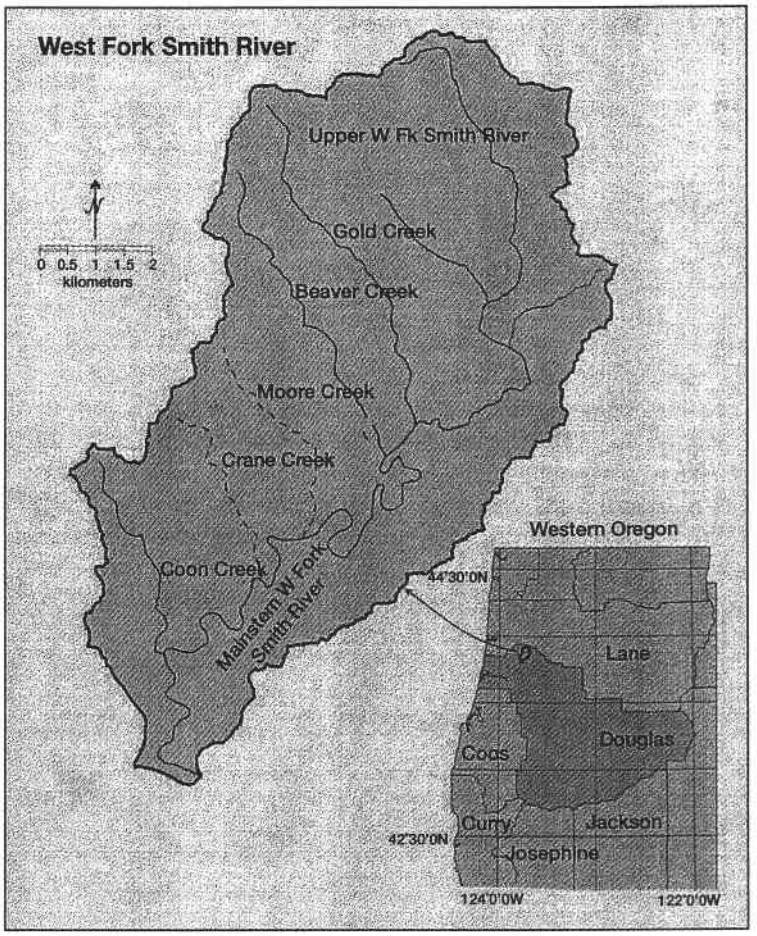

Figure 1. *West Fork Smith River watershed and stream network. Intermittent streams are shown with dashed lines.*

the (1) proportion of spawning that occurred in intermittent streams, (2) movement of juveniles into intermittent streams, (3) juvenile survival in intermittent and perennial streams during winter, and (4) relative size of smolts produced from intermittent and perennial streams. This effort is part of a larger study that is examining how coho use habitat in the whole stream network of an Oregon coastal watershed during their freshwater life cycle (Ebersole *et al.* in press).

Methods

Since 2002, we have studied survival and movement of juvenile coho salmon in the stream network of the West Fork Smith River (WFSR), a 67 km^2 forested drainage in coastal Oregon (Figure 1). The watershed supports a wild coho salmon population, and produced an average of 24 000 coho salmon smolts per year during 2002–2005 (Jepson *et al.* 2006). The stream network consists of a mainstem and six major tributaries (Figure 1). Two tributaries, Moore Creek and Crane Creek, have intermittent flow during many summers and represent 9% of the total stream network.

Douglas County has measured streamflow continuously on the mainstem WFSR, near the mouth, since 1981. During 2003–2005, we periodically measured streamflow in tributary streams using Swoffer flowmeters (Swoffer Instruments, Seattle, WA) mounted on wading rods (Gordon *et al.* 1992). We compared mainstem and tributary streamflows to establish mainstem threshold values below which intermittent tributaries ceased to flow. We also deployed an array of Onset Stowaway Tidbit (Onset Computer Corporation, Bourne, MA) temperature data loggers in 43 pools in the WFSR stream network (Cairns *et al.* 2005), and made recordings at 30-minute intervals.

Adult coho salmon spawner abundance was calculated from surveys conducted by Oregon Department of Fish and Wildlife (ODFW) personnel, using established field survey protocols (ODFW 2005). Area under the curve estimates were obtained from repeated ODFW surveys throughout the spawning period, and were converted to estimates of abundance assuming a 75% observation probability (Jacobs 2002). Because estimates of observation and associated variance are not available at the stream level (Jacobs 2002), we developed confidence intervals for the estimate of adult coho spawners using intermittent streams. A confidence interval was constructed using the difference between the spawner estimate and the actual number of coho observed during stream surveys to create upper and lower bounds for each stream. This confidence interval corresponds to an assumed range of observation probabilities from 50% to 100%.

Coho salmon juveniles were individually tagged from August to October each year, with 11 mm passive integrated transponder (PIT) tags (PIT Tag Steering Committee 1999). We collected coho for tagging by seining (Ebersole *et al.* in press); fish were recaptured as they left the watershed using a rotary screw trap that was operated continuously (February through June, except for brief periods during extremely large hydrologic events), with a trap efficiency of 33–39% (Jepson *et al.* 2006). Each fish was measured for fork length (distance from tip of snout to indentation in caudal fin) at time of tagging and at time of recapture at the smolt trap. From August to October 2003, we PIT tagged an average of 328 coho salmon (range = 94 to 469) in each of eight reaches located in the upper and lower sections of Crane, Moore, Beaver, and Gold Creeks, and at ten reaches within the mainstem. Each tributary reach was 800 m long and each mainstem reach was 400 m long. In total, 3977 coho salmon were tagged in the mainstem, 1214 were tagged in

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the perennial tributaries, and 400 were tagged in the intermittent tributaries. During August to October 2004, we established 30 PIT-tagging reaches, spaced systematically across the WFSR stream network. Each reach was 300 m long. We tagged an average of 149 coho salmon (range = 86 to 185) within each reach, tagging a total of 3012 coho salmon in the mainstem, 2010 coho salmon in the perennial tributaries, and 1156 coho salmon in the intermittent tributaries.

We estimated overwinter survival for each tagged group per reach by dividing the number of fish recovered at the rotary screw trap by the number released, after correcting for trap efficiency and the proportion scanned for PIT tags. Variance estimates for overwinter survival were derived using a bootstrap method (a technique for estimating the sampling distribution of an estimator by resampling with replacement from the original sample; Thedinga *et al.* 1994).

Movement of PIT-tagged coho salmon between the mainstem and four tributaries (two perennial: Beaver and Gold, and two intermittent: Moore and Crane) was monitored using stationary PIT-tag monitoring stations positioned in the tributary near the junction with the mainstem West Fork Smith River. All four antennae were in operation for the winters of 2003–2004 and 2004–2005. Each monitoring station consisted of a Destron-Fearing (South St Paul, MN) FS1001 transceiver powered by deep-cycle batteries. A rectangular antenna (3.3 m x 1.2 m) was positioned in the stream and bracketed with weir panels to capture all but the highest streamflows. PIT-tagged fish passing through the antenna field were recorded (PIT-tag identification number, date, and time) continuously on a laptop computer attached to the transceiver. Coho salmon smolts PIT tagged during the autumns of 2003 and 2004 were classified according to the recapture history (where they were located within the stream network during the overwinter period) as (1) mainstem, (2) perennial tributary, or (3) intermittent tributary habitat users.

We used analysis of covariance (ANCOVA; Gotelli and Ellison 2004) to compare the length of PIT-tagged coho salmon smolts recaptured at the smolt trap that used mainstem, perennial tributary, or intermittent tributary stream habitats. We used the year of PIT tagging as a categorical variable to account for between-year variations and coho salmon length at the time of PIT tagging as a covariate to control for variability in initial fish length. Date of recapture at the smolt trap was also included as a covariate, because juvenile coho salmon grow rapidly in the spring, and smolts that out-migrate later in the spring tend to be larger. A model of the two covariates and two factors and all interactions for the ANCOVA were fit using the mixed procedure (PROC MIXED) in SAS 9.1 (SAS Institute; Carey, NC). Model fit, structure, and assumptions were visually assessed using diagnostic plots of predicted values and residuals.

Table 1. Estimated number of days with no open channel streamflow for two intermittent streams

Stream	2002	Summer 2003	2004
Moore Creek	65	38	0
Crane Creek	47	21	0

Results

We were able to use streamflow data from the summer of 2003 to establish mainstem streamflow thresholds below which streamflow ceased at the mouth of the intermittent tributaries (Moore Creek and Crane Creek). Using these thresholds, we estimated that one or both intermittent tributaries experienced periods with no flow during approximately 14 of the 24 years of streamflow record, with 6 years having no streamflow in intermittent streams for periods of 15 to 87 days. During our study, two summers (2002 and 2003) had extended periods with no streamflow in the intermittent streams, but during the summer of 2004 streamflow did not cease at any time (Table 1).

During periods with no streamflow, residual pools (Figure 2) were present in Moore and Crane Creeks for a considerable period of time after streamflow had ceased. Water temperature data in intermittent and perennial

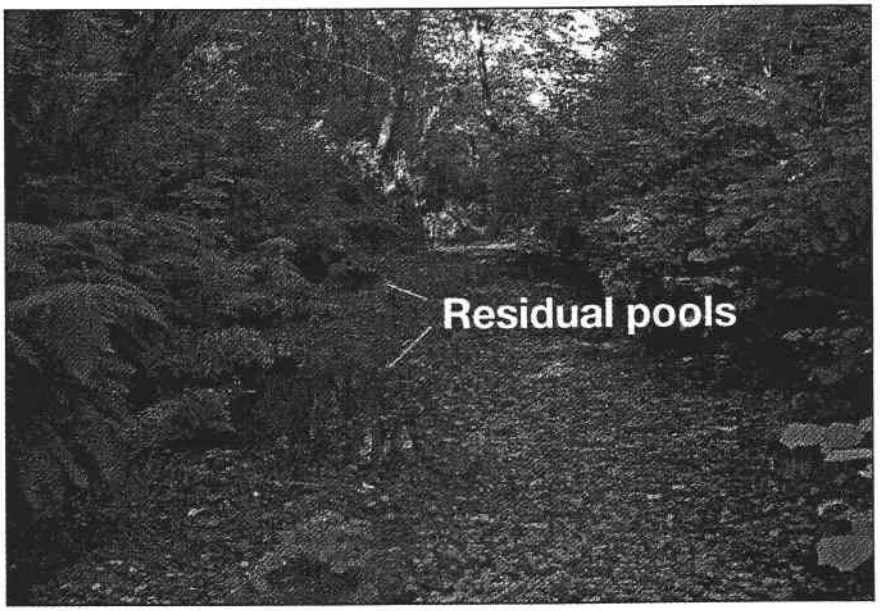

Figure 2. *Residual pools during a dry summer in a West Fork Smith River intermittent tributary stream.*

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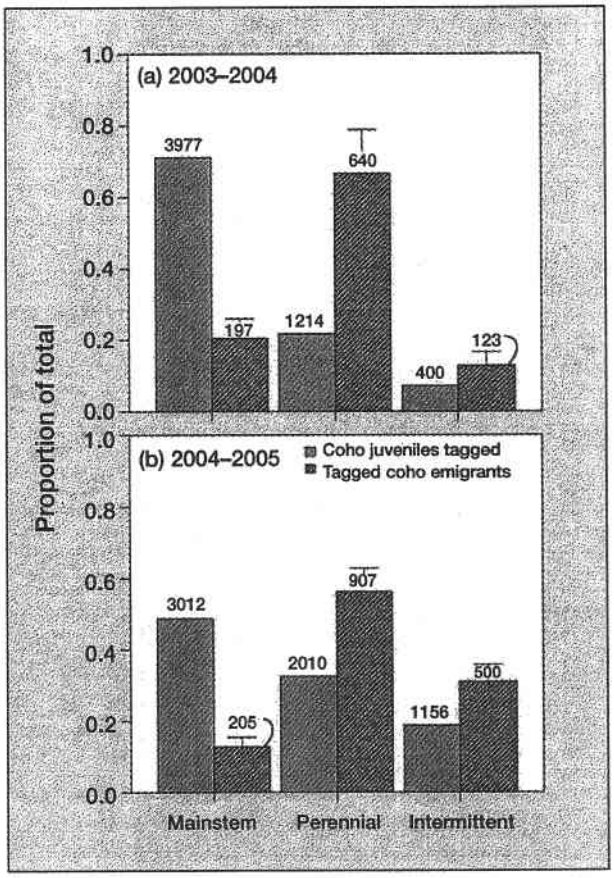

Figure 3. *Proportion of juvenile coho tagged during the fall in mainstem, perennial tributaries, and intermittent tributaries, and the estimated proportion of the same tagged coho emigrating from the West Fork Smith River (based on recaptures at the smolt trap) that were classified as mainstem users, perennial tributary users, or intermittent tributary users. (a) Coho tagged in fall 2003 and captured in smolt trap in spring 2004; (b) coho tagged in fall 2004 and captured in smolt trap in spring 2005. The number of coho comprising the bars are shown above the bars. The standard error of the tagged coho smolt emigrants are shown as whiskers above the bars. Coho smolts that were located during the over-winter period exclusively in mainstem habitats were classified as* mainstem users; *smolts that were originally tagged in or located at some time during the over-winter period in the perennial tributaries were classified as* perennial tributary users; *and smolts that were originally tagged in or located at some time during the over-winter period in the intermittent tributaries were classified as* intermittent tributary users.

streams confirm the presence of residual pools. Diel water temperature patterns were consistent in upper and lower Gold Creek throughout the course of the summer of 2003 and are indicative of perennial streamflow. In contrast, water temperature patterns in Moore Creek show moderately fluctuating temperatures followed by widely fluctuating temperatures, indicative of a dry channel in the lower stretches during that period. We observed cool, constant temperatures, indicative of a residual pool sustained by groundwater, at an upper Moore Creek site from early July into September.

Intermittent tributaries were used by coho salmon in several ways. During 2002–2004, 11% (confidence interval [CI] = 8 to 14%) to 21% (CI = 16 to 26%) of the adult coho salmon spawned in the two intermittent streams. The total number of spawners in the West Fork Smith were 3451, 3728, and 994 in 2002, 2003, and 2004, respectively. We detected 833 (460 in Moore Creek and 373 in Crane Creek) coho juveniles originally PIT tagged in the mainstem at one or more of the intermittent tributary antennas during the winters of 2003–2004 and 2004–2005. Most mainstem-tagged juvenile coho salmon entered the intermittent tributaries during high streamflows in the fall months. Juvenile coho that had been tagged in or used intermittent and perennial tributary streams comprised a higher proportion of the smolts that were recaptured at the smolt trap during the subsequent smolt migration period than coho that had remained in the mainstem (Figure 3). Overwinter survival of coho salmon PIT tagged in intermittent streams during the winters of 2002 through 2005 was similar to survival rates in perennial tributaries, but higher than mainstem survival rates in all years (Table 2).

After accounting for variation in the length at tagging and smolt migration timing, our statistical analysis showed a significant difference in the length of coho smolts that used perennial (mainstem and tributary) and intermittent tributary habitats ($F_{2,861} = 9.06$, $P = 0.0001$) during 2004 and 2005. Significant interaction terms complicated direct interpretation of the model, so we evaluated differences in smolt length at lower, middle, and upper values of the covariates used in the model for all habitat user classes and cohort years resulting in a total of 54 comparisons. Statistical significance of the differences was set at a P value < 0.0009 (0.05/54 pairwise tests).

Coho smolts that used intermittent tributaries were larger than coho smolts that used perennial tributary habitats during both 2004 and 2005 (Figure 4). This difference was statistically significant throughout the smolt migration period in 2004, but only during the middle portion of the 2005 smolt migration. Coho smolts that used intermittent tributary habitats were larger than coho that used the mainstem during 2004 (Figure 4). This difference was statistically significant for the middle and end of the migration period. On the other hand, coho smolts that had used intermittent tributary streams were significantly smaller than coho

Table 2. Estimated overwinter survival (%) of PIT-tagged juvenile coho salmon in the West Fork Smith River drainage by stream type

Stream type	Winter 2002-03	2003-04	2004-05
Intermittent streams	13	21	41
Perennial streams	12	25	38
Mainstem	9	14	14

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smolts that had used mainstem habitats through the early and middle portions of smolt migration during 2005.

Discussion

Although intermittent streams experience periods with no streamflow, they provide valuable habitat for juvenile coho salmon. In the WFSR network, Moore and Crane Creeks provided both spawning and rearing habitat for coho salmon. Even during years in which the streams had extended periods with no streamflow, they accounted for an important component of the coho smolts leaving the WFSR watershed (Figure 3). In addition, overwinter survival rates for juvenile coho originally tagged in the intermittent streams were higher than survival rates in mainstem habitats and equivalent to survival in perennial streams (Table 2). How can intermittent streams produce coho smolts even though the streams have extended periods with no streamflow?

One reason is that if periods without streamflow are not too long, residual pools (see Figure 2) can sustain juvenile coho until streamflow resumes with autumn rains. May and Lee (2004) found that in Oregon coastal streams, gravel-bed pools sustained by hyporheic flow were able to carry over coho juveniles during the summer, but the pools experienced a decrease in juvenile coho abundance of 36% because of fish mortality caused by pool drying.

We observed numerous residual pools in Moore Creek and Crane Creek during late summer periods, when no streamflow occurred at the mouth of the streams. Water temperature patterns in the pools were consistent with two types of pools in Oregon coastal streams identified by May and Lee (2004), which may have the potential to maintain water during periods with no streamflow. One pool type is comprised of gravel pools with bedrock contact for which hyporheic flow is the primary source of water during dry periods. Lower Moore Creek was a location that featured this type of pool; in this case, the pool dried out during late summer, as evidenced by the wide fluctuations of temperature, typical of air temperature fluctuations. Bedrock pools that received no surface flow from upstream but are recharged by groundwater from fractured bedrock represents another class of pools. These have relatively low water temperatures and little diurnal fluctuation.

The importance of residual or isolated pools in sustaining fish populations in intermittent streams has been documented in a wide range of settings. Closs and Lake (1996) found that *Galaxias olidus*, a small salmoniform fish, was able to survive in scattered small pools throughout the upper reaches of an intermittent stream in Australia. Pires *et al.* (1999) noted that isolated pools were important habitats for fishes in intermittent streams in Portugal. Labbe and Fausch (2000) reported that, during summer drought, permanent pools were important habitats for the Arkansas darter (*Etheostoma cragini*) in two intermittent streams in the Colorado plains.

Another reason that WFSR intermittent streams were

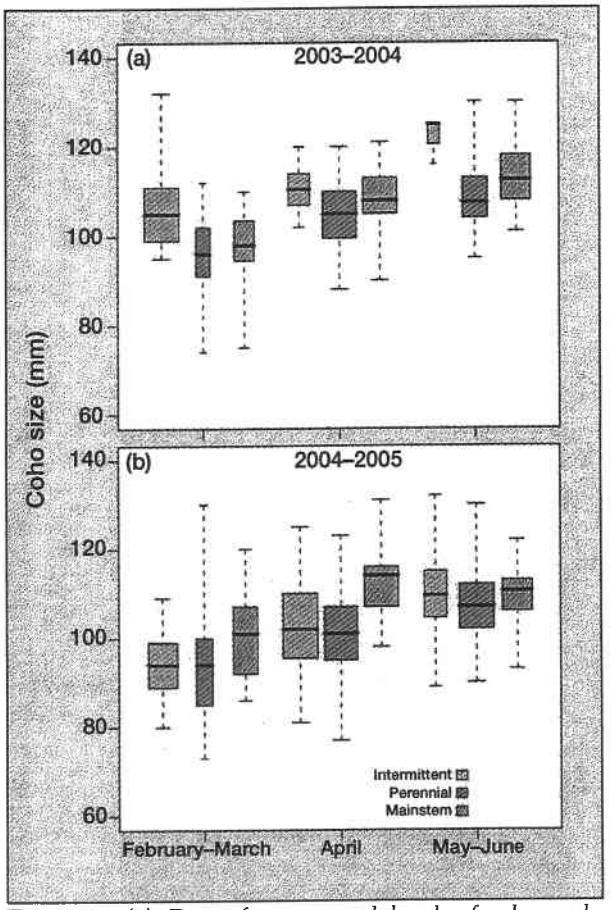

Figure 4. (a) Date of capture and length of coho smolts originally tagged in 2003 and recaptured at the smolt trap in 2004, and (b) originally tagged in 2004 and recaptured in 2005. The width of the box is proportional to the number of coho used to generate the box.

able to produce coho smolts was that some coho tagged in the mainstem moved into intermittent tributaries when streamflow resumed in the fall. Once the intermittent tributaries resumed streamflow, coho that had survived in the residual pools or immigrated in the fall probably experienced lower densities and higher food resources compared to coho in perennial tributaries. We hypothesize that this provides higher survival and growth of coho that overwinter in intermittent streams via release of density dependence (Chapman 1966). Our observation that, following a particularly dry summer in 2003–2004, coho smolts from intermittent streams were considerably larger than smolts that used perennial habitats (Figure 4) is consistent with this hypothesis.

In conclusion, WFSR intermittent streams provided both valuable spawning and rearing habitat for coho salmon. Residual pools in intermittent streams provided one means by which juvenile coho could survive during dry periods. Movement of juvenile coho into intermittent tributaries from the mainstem was another way in which juvenile coho exploited intermittent stream habitat, and illustrates the

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importance of maintaining accessibility of entire stream networks to coho. Under particularly dry conditions, smolts that overwintered in intermittent streams were larger than those from perennial streams. Low-gradient intermittent streams, such as those in the WFSR, are common in watersheds with sedimentary bedrock, which comprise the prime coho salmon habitat among Oregon coastal drainages. Our results demonstrate that loss of intermittent stream habitat would have a negative effect on coho salmon populations in coastal drainages, and in general, our study illustrates the important role that intermittent streams can play in maintaining the biological integrity of navigable waters. Research and methods that demonstrate these interconnections are critical in helping regulators and policy makers respond to recent US Supreme Court decisions.

Acknowledgments

The authors thank S Hendricks, C Oyler, R St Claire, R Emig, N Raskauskas, T Mintkeski, C Meengs, S Davis, and S Orlaineta for tireless field work in support of this project, and P Haggerty of Indus Corp, for GIS support. We thank Roseburg Resources and the USDI Bureau of Land Management (BLM) for providing access to research sites, and P Olmstead with the BLM, who provided encouragement and logistical support. We are very appreciative of the efforts of G Cicchetti, J Hall, R Lackey, B McComb, R Ozretich, D Poon, and J Richardson, who reviewed earlier versions of this manuscript. We also acknowledge D Downing for reviewing our discussion of the Supreme Court cases. This paper was funded by the US Environmental Protection Agency, USDA Forest Service, USDI Bureau of Land Management, and Oregon Department of Fish and Wildlife. It has been subject to Agency review and approved for publication. Reference to trade names does not imply endorsement by the US Government.

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From:	Benjamin Sticka
To:	Karen Walter
Cc:	Sarah Pyle
Subject:	Proctor Response to Muckleshoot Tribe comments
Date:	Wednesday, September 25, 2019 11:59:10 AM
Attachments:	Proctor Willows Second Response to Muckleshoot Tribe Comments.docx 19100 Proctor Willows - Map REV1.pdf image001.png image002.png image003.png image004.png image005.png

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Hi Karen,

I apologize for the delay in getting back to you. Please find the response to you questions related to the proposed Proctor Willows development. Please let me know, if you have any additional questions or comments? Thank you.

Ben Sticka
Planner ¦City of Redmond
☎: 425.556.2470 |✉: bsticka@redmond.gov | Redmond.gov
MS: 4SPL ¦ 15670 NE 85th St ¦ Redmond, WA 98052

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MEMORANDUM

TO:	Ben Sticka, City of Redmond
FROM:	Quadrant Homes
DATE:	September 24, 2019
RE:	Proctor Willows, Additional Response to Muckleshoot Tribe Comments

We appreciate the opportunity to provide further response to comments from Karen Walter, Watersheds and Land Use Team Leader for the Muckleshoot Indian Tribe Fisheries Division. The response below addresses Ms. Walter's emailed comments of September 20, 2019.

1. Stream classification

We understand and respect Ms. Walter's statements related to the WAC presumption criteria, but we disagree that this criteria controls over the clear terms of the Redmond Zoning Code ('RZC"). The RZC clearly classifies the on-site streams as Class IV streams. RZC 21.64.020.A.2.d.iv. Stream 2 is an ephemeral stream that averages less than 15 percent in grade and has a channel width of less than 2' at ordinary high-water mark. It does not meet the WAC criteria, and it cannot offer salmonid habitat. Stream 1 has the physical characteristics of a watercourse that could potentially offer salmonid habitat per the WAC, but these characteristics were artificially created as a result of extensive land clearing and periodic, uncontrolled dumping of stormwater from adjacent property. Stream 1 cannot support salmonids due to its very shallow depths and lack of habitat. Both streams meet the criteria for Class IV streams under the RZC.

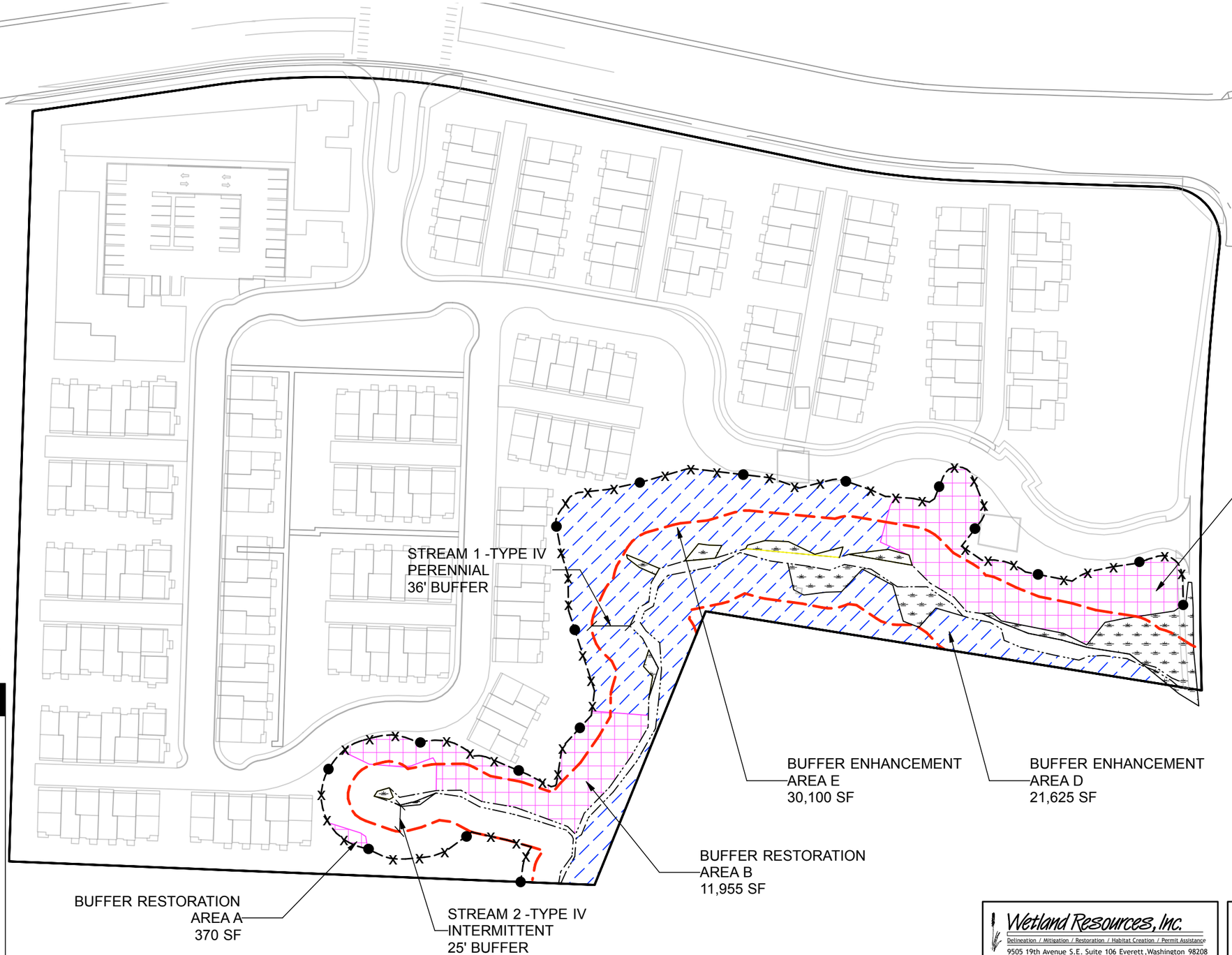
Nevertheless, Quadrant will provide an increased buffer and voluntary buffer enhancements in excess of what is required for Class IV streams. These buffers and enhancements will protect shading and improve other characteristics of the buffer (*e.g.* wildlife habitat, nutrient supply, LWD recruitment, etc.). *See* attached Proposed Mitigation plan.

2. Willows Road crossing

Ms. Walter's email noted that our initial response did not fully respond to her comment regarding potential opportunities to upgrade the Willows Road crossing as part of the required frontage improvements for the Proctor Willows project.

To clarify, the Proctor Willows project is not modifying the crossing, which is located approximately 100' south of the southeast corner of the Proctor Willows property. The crossing

PROPOSED MITIGATION
PROCTOR WILLOWS
PORTION OF SECTION 27, TOWNSHIP 26N, RANGE 05E, W.M.



Scale 1" = 100'

0 50 100 150 200

LEGEND

- REQUIRED ENHANCEMENT
- VOLUNTARY ENHANCEMENT
- STREAM
- WETLAND
- FINAL BUFFER
- FENCING & SIGNS

Wetland Resources, Inc.
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance
9505 19th Avenue S.E. Suite 106 Everett,Washington 98208
Phone: (425) 337-3174
Fax: (425) 337-3045
Email: mailbox@wetlandresources .com

Proposed Mitigation
Proctor Willows
Redmond, Washington

Quadrant Corporation
Attn: Bonnie Geers
15900 SE Eastgate Way, #300
Bellevue, WA 98008

Sheet 3/3
WRI Job#: 19100
Drawn by: T. Amen
Date: June 25, 2019
Rev.#1: August 19, 2019

is adjacent to property owned by a different owner and not under Quadrant's control. The required frontage improvements end near the southeast corner of the Proctor property, which again, is approximately 100' from the culvert/crossing. The below figure depicts the property boundaries and existing crossing/culvert.

Please let us know if there are additional questions related to stream classifications or mitigation you would like our team to address.