Following Up...RE: [EXTERNAL] BNSF SJC: USFWS BA Pile Driving BMP Question RE: USFWS

14 messages

PaDelford, Sue S. <Sue.PaDelford@jacobs.com> Thu, Feb 7, 2019 at 7:37 AM
To: "Williams, Marshall" <marshall_williams@fws.gov>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>

Marshall, et al -

Not using bubble curtains for the construction of the temporary bridges was based on:

- schedule and timing
- based on low numbers of piles
- short frequency and duration of impact, and
- contractor flexibility.

Additionally, for Sand Creek, Bridge 3.1, water levels will likely be very low (less than 3 feet) and not conducive to transmission.

The analysis and action areas for both bridges included the unattenuated impact strikes from temporary bridge work.

I also received your phone voice message and can return your call to discuss some of the Errata Sheet needs. Let me know when a good time to call would be.

Thank you,

Sue.

Sue PaDelford

Jacobs | Senior Biologist – Project Manager | Environmental

101 North Fourth Avenue, Suite 201 | Sandpoint, ID 83864

Phone: [redacted] office | [redacted] dir | [redacted] mobile | [redacted] fax

Sue.PaDelford@Jacobs.com | www.jacobs.com

From: Williams, Marshall <marshall_williams@fws.gov>
Sent: Wednesday, February 06, 2019 11:00 AM
To: PaDelford, Sue S. <Sue.PaDelford@jacobs.com>
Cc: Fischer, Steven M CIV <Steven.M.Fischer3@uscg.mil>; Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil>;

Moore, James M CIV <James.M.Moore2@uscg.mil>; Smith, Jason (Seattle) <Jason.Smith6@jacobs.com>; Broadhead, Craig <Craig.Broadhead@jacobs.com>; Keim, Matthew <Matthew.Keim@bnsf.com>; Bordenave, Pierre <Pierre.Bordenave@jacobs.com>
Subject: Re: [EXTERNAL] BNSF SJC: USFWS BA Pile Driving BMP Question RE: USFWS

Hi James/Sue, I've noted in the BA that no bubble curtains are being used during construction of the temporary bridges, only the new permanent bridges. Can you explain why?

Thanks, Marshall Williams

On Fri, Dec 7, 2018 at 4:34 PM PaDelford, Sue S. <Sue.PaDelford@jacobs.com> wrote:

> Steve, et al -
>
> I spoke with Marshall Williams, USFWS this afternoon about not including the pile driving BMP of using a wood or mycarta block (cushion) for attenuating hydroacoustic impacts.
>
> I shared with Marshall that during project planning discussions with the Design Team (BNSF, Hanson, and a bridge contractor/consultant) the use of a cushion for the larger piles (24" at Sand Creek and 36" at LPO) can be logistically problematic during set-up and driving. The cushion (wood or mycarta) tend to break early on in the impact process rendering them ineffective for attenuation, but requiring removal from the impact hammer in order for it to function properly and safely.
>
> Consequently, the BMPs for fish protection that are referenced and proposed in the BA (use of a vibratory driver when possible, air bubble curtains during impact driving, and a floating silt or turbidity curtain) were the best management minimization measures (MMs) for attenuation, for this project. The analysis included the 3 dB reduction expected from the use of these MMs into the project specific impact calculators and analysis to determine the 'worst case scenario' aquatic impact zone described in the BA.
>
> I hope this helps to clarify Marshall's question. Please don't hesitate to contact me or Craig Broadhead with additional questions.
>
> Thank you,
> Sue.
>
> -----Original Message-----
> From: Fischer, Steven M CIV <Steven.M.Fischer3@uscg.mil>
> Sent: Tuesday, December 04, 2018 10:57 AM
> To: Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil>; Moore, James M CIV <James.M.Moore2@uscg.mil>; PaDelford, Sue S. <Sue.PaDelford@jacobs.com>
> Cc: marshall_williams@fws.gov
> Subject: [EXTERNAL] USFWS
>
> Shelly, Jim, Sue,
>
> Got a question from Marshall Williams (ccd) that I can't answer. In the document there is no reference to BMPs for fish protection...specifically BMPs for pile driving to dampen the hydro acoustics noise (cushion blocks (wood)) is there a reason this is absent? Here is Marshalls phone number if you need to discuss 509-891-0450.
>
> Thanks
>
> Steve Fischer
> 13th Coast Guard District
> Waterways Management (dpw)
> Bridge Administrator/Chief
> Thirteenth Coast Guard District
> [redacted]

--

Marshall L. Williams

Fish and Wildlife Biologist

U.S Fish & Wildlife Service

11103 E. Montgomery Dr

Spokane, WA 99206

eMail: marshall_williams@fws.gov

Main Office: [redacted]

Direct Office: [redacted] (if busy/no answer use Main Office #)

Fax: [redacted]

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Williams, Marshall <marshall_williams@fws.gov> Thu, Feb 7, 2019 at 8:41 AM
To: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>

Shelly/James, the 3.9 temporary bridge requires the installation of 600 piles in water with 76 of them hammer proofed (one pile per pier). Since BNSF says they can't use cushion blocks to mitigate noise while driving piles due to their size, an isolation casings should be considered as an alternative.

Isolation casings use an outer case around the driven pile and either de-watering the annular space between the pile and outer casing (best), or used a confined air bubble curtain in the annular space. There are several publications that discuss this technique (it's a BMP for CalTrans) and the attenuation is usually as good as a bubble curtain outside of the pile. Since the temporary bridges uses vertically driven piles (from BA technical drawings) and would only need to be used once a day, it could be moved from one pier location to another easily; one project that I reviewed used a corrugated pipe as the outside casing so the cost, in relation to the project, would be low for the technique. Studies have shown that sound attenuation/mitigation by this technique is at least as good as bubble curtains, and since the action area is shallow, the outside casing would be short. The casing would also work as a sediment trap, and with only one pier a day where it's used, it could be left in place until the disturbed sediment settles by the next morning, reducing sediment transport.

Caltrans *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish* (2015): "Dewatered isolation casings generally can be expected to provide attenuation that is at least as great as the attenuation provided by air bubble curtains. Because of the uncertainties associated with degree of attenuation that would be provided by isolation casings, it is recommended that attenuation assumed for any attenuation device be limited to 5 dB."

This technique would not greatly change the project plan, would be low cost, not significantly increase the project timing, and provide a mitigation measure that helps limit effects to a listed species.

Marshall Williams

[Quoted text hidden]

Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil> Fri, Feb 8, 2019 at 9:56 AM
To: "Williams, Marshall" <marshall_williams@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>

Thanks Marshall – BNSF/Jacobs are reviewing this information. We hope to have a response back in the next week or so.

Shelly Sugarman

[Quoted text hidden]

Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil> Tue, Feb 12, 2019 at 11:06 AM
To: "Williams, Marshall" <marshall_williams@fws.gov>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Hello Marshall –

We discussed your recommendation for an isolation BMP for temporary bridge pile driving with BNSF and Jacobs. They agree that a minimization measure can be used to mitigate sound pressures while impact proofing the 76 piles associated with the 3.9 temporary access/construction bridge. BNSF is proposing the use of an unconfined bubble curtain with no isolation casing and has provided the following reasons and justification for this proposed BMP in lieu of secondary isolation casing:

- In BNSF and Jacobs' experience, it is very difficult to dewater the space between the piles. Varying substrates and bottom topography often prevent the isolation casing from forming an effective seal into the mudline, and corrugated pipes do not stand up to pushing or impacting to try to achieve a seal.

- Even in the case of an adequate seal, another mechanism of effect is the handling of the water from within the isolation casing. To minimize turbid discharges, the Contractor would be required to wait for any turbidity to settle prior to pumping dewatering water back to the lake, or would require pumping a great distance to treat off-site. The Contractor may spend more time trying to seat the isolation casing and handling/treatment dewatering water than actually proofing the pile.

- BNSF is already proposing to use an unconfined bubble curtain for impact driving on the permanent bridges. The Contractor can and will have equipment and plans in place that can be replicated at the temporary bridges.

- Regarding the impacts from sedimentation, BNSF is proposing the use of sediment curtains to minimize impacts. These will be used during operation of the unconfined bubble curtains.

- BNSF and Jacobs' impact analysis presented in the BA included the sound pressure levels associated with unattenuated pile strikes. An assumed 3 dB reduction from using a bubble curtain for this activity will provide a reduction in potential effects to bull trout.

- BNSF has committed to trying to complete as much pile driving as possible when LPO and Sand Creek are drawn down to water levels. For flexibility during construction, they propose to not utilize bubble curtains in water less than 3 feet deep as sound pressures will not propagate well in these shallow conditions.

Please let me know if you have any further questions.

Thank you,

Shelly Sugarman

From: Williams, Marshall <marshall_williams@fws.gov>
Sent: Thursday, February 7, 2019 11:42 AM
To: Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil>; Moore, James M CIV <James.M.Moore2@uscg.mil>
Cc: Fischer, Steven M CIV <Steven.M.Fischer3@uscg.mil>; Smith, Jason (Seattle) <Jason.Smith6@jacobs.com>; Broadhead, Craig <Craig.Broadhead@jacobs.com>; Keim, Matthew <Matthew.Keim@bnsf.com>; Bordenave, Pierre <Pierre.Bordenave@jacobs.com>; PaDelford, Sue S. <Sue.PaDelford@jacobs.com>; Christy JohnsonHughes <christy_johnsonhughes@fws.gov>

[Quoted text hidden]

[Quoted text hidden]

Williams, Marshall <marshall_williams@fws.gov> Wed, Feb 13, 2019 at 10:59 AM
To: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Shelly, thanks for getting back to me. My responses/questions are in red below your individual bullet points.

Regards, Marshall Williams

On Tue, Feb 12, 2019 at 11:07 AM Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil> wrote:

> Hello Marshall –

We discussed your recommendation for an isolation BMP for temporary bridge pile driving with BNSF and Jacobs. They agree that a minimization measure can be used to mitigate sound pressures while impact proofing the 76 piles associated with the 3.9 temporary access/construction bridge. BNSF is proposing the use of an unconfined bubble curtain with no isolation casing and has provided the following reasons and justification for this proposed BMP in lieu of secondary isolation casing:

- In BNSF and Jacobs' experience, it is very difficult to dewater the space between the piles. Varying substrates and bottom topography often prevent the isolation casing from forming an effective seal into the mudline, and corrugated pipes do not stand up to pushing or impacting to try to achieve a seal.
- Even in the case of an adequate seal, another mechanism of effect is the handling of the water from within the isolation casing. To minimize turbid discharges, the Contractor would be required to wait for any turbidity to settle prior to pumping dewatering water back to the lake, or would require pumping a great distance to treat off-site. The Contractor may spend more time trying to seat the isolation casing and handling/treatment dewatering water than actually proofing the pile.
- BNSF is already proposing to use an unconfined bubble curtain for impact driving on the permanent bridges. The Contractor can and will have equipment and plans in place that can be replicated at the temporary bridges.
    - This is an acceptable alternative.
- Regarding the impacts from sedimentation, BNSF is proposing the use of sediment curtains to minimize impacts. These will be used during operation of the unconfined bubble curtains.
    - This is also, an acceptable alternative.
- BNSF and Jacobs' impact analysis presented in the BA included the sound pressure levels associated with unattenuated pile strikes. An assumed 3 dB reduction from using a bubble curtain for this activity will provide a reduction in potential effects to bull trout.
    - Please provide a revised spreadsheet of the area/distance/duration of impact for injury and behavioral disturbance incorporating the mitigation technique for the temporary bridge construction, so these values can be incorporated into the Biological Opinion.
- BNSF has committed to trying to complete as much pile driving as possible when LPO and Sand Creek are drawn down to water levels. For flexibility during construction, they propose to not utilize bubble curtains in water less than 3 feet deep as sound pressures will not propagate well in these shallow conditions.
    - The water depth for reduced acoustic energy is actually water less than 2 ft. in depth, not 3 ft. The BA stipulates bubble and turbidity curtains will be used when pile driving in water 2 feet deep or more (permanent bridges) and is consistent with the WSDOT (2018) guidance used in the BA. Was the 3 foot depth a newly proposed depth, or just an oversight from the 2 foot depth used in the BA?

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Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil> Thu, Feb 14, 2019 at 1:48 PM
To: "Williams, Marshall" <marshall_williams@fws.gov>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Hi Marshall – we should be able to get you a response by the middle of next week, if not sooner.

Thanks,

Shelly

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Sugarman, Shelly CIV <Shelly.H.Sugarman@uscg.mil> Thu, Feb 21, 2019 at 10:40 AM
To: "Williams, Marshall" <marshall_williams@fws.gov>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Hello Marshall – the Coast Guard's response is attached.

Thank you,

Shelly Sugarman

From: Williams, Marshall <marshall_williams@fws.gov>
Sent: Wednesday, February 13, 2019 1:59 PM

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2 attachments

USCG Response to USFWS dated February 13 2019.pdf
539K

Attachments 1 & 2.pdf
65K

Williams, Marshall <marshall_williams@fws.gov> Fri, Feb 22, 2019 at 7:30 AM
To: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Received, thank you.

Marshall Williams
[Quoted text hidden]

Williams, Marshall <marshall_williams@fws.gov> Fri, Feb 22, 2019 at 10:15 AM
To: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Broadhead, Craig" <Craig.Broadhead@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Hi Shelly, I have one point I need to ensure is correct on attachment 2 of the documents you sent:

Temporary Bridge 3.1 has a reduction in the behavioral disturbance distance from 5.33 mi to 3.4 mi, or roughly a reduction of 36%, yet the disturbance area has remained the same at 310 acres. I would expect this area to be reduced, similarly as it was for Temporary Bridge 3.9, where the area of disturbance was reduced from 9,100 acres to 7,230 acres. Is there a reason that I'm not seeing for why the area of disturbance remained the same?

Thank you.

Marshall Williams

[Quoted text hidden]

Broadhead, Craig <Craig.Broadhead@jacobs.com> Mon, Feb 25, 2019 at 7:22 AM
To: "Williams, Marshall" <marshall_williams@fws.gov>, "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>
Cc: "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Good morning Marshall – Shelly asked that I respond directly regarding your question. The reduced 3.4 mile distance of behavioral disturbance is representative of the furthest sound pressure would travel if unimpeded. However, land forms and shorelines limit the extent and direction that underwater sound pressure can travel. In the case of Bridge 3.1, which is tucked into the mouth of Sand Creek, sound transmission is limited to the area shown in the snapshot below. The red area represents the approximate 310-acre disturbance zone. Because the opposite shoreline of LPO is only approximately 1.5 miles from Bridge 3.1, the reduction of the disturbance zone to 3.4 miles doesn't translate to a reduction of effect for this activity. The area of effect remains the same. Conversely, since Bridge 3.9 can "see" a much larger area of LPO, there is a reduction in the area of disturbance as described.

Please let me know of any other questions, or if further clarification is needed. Thanks!

Craig Broadhead

JACOBS | Inland Northwest Environmental Group Lead and Manager of Projects | 32 North 3rd Street, Ste. 304, Yakima WA 98901 | [redacted] Direct | Craig.Broadhead@jacobs.com | www.jacobs.com

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Williams, Marshall <marshall_williams@fws.gov> Mon, Feb 25, 2019 at 7:28 AM
To: "Broadhead, Craig" <Craig.Broadhead@jacobs.com>
Cc: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Thanks, Craig. Just what I needed to know.

Regards, mw
[Quoted text hidden]

Williams, Marshall <marshall_williams@fws.gov> Mon, Feb 25, 2019 at 9:52 AM
To: "Broadhead, Craig" <Craig.Broadhead@jacobs.com>
Cc: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>

Craig, this is a follow up to my voicemail message. In the BA, Jacobs mentions that the use of a vibratory hammer is expected to have an effect on bull trout behavior.. Since vibration hammers operate at a different frequency range, no injury is expected, but what is the extent of the area likely to impact behavior? Is it local only, or does the sound carry underwater for some distance?

I want address this in the take statement, and need to put some boundaries on it.

Thanks, Marshall Williams

On Mon, Feb 25, 2019 at 7:22 AM Broadhead, Craig <Craig.Broadhead@jacobs.com> wrote:
[Quoted text hidden]
[Quoted text hidden]

Broadhead, Craig <Craig.Broadhead@jacobs.com> Mon, Feb 25, 2019 at 2:54 PM
To: "Williams, Marshall" <marshall_williams@fws.gov>
Cc: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>, "Santiago, Railin" <Railin.Santiago@jacobs.com>, "Williams, Diane M." <Diane.Williams@jacobs.com>

Hello Marshall – good question. The Services have used 150dBrms as a threshold for behavioral changes. Sound pressure levels in excess of 150 dBRMS are expected to cause temporary behavioral changes, like avoidance of an area. Sound pressures above this level are not expected to cause direct permanent injury, but may indirectly affect individual bull trout.

WSDOT/FHWA guidance lists typical sound pressure levels associated with vibratory driving of 36-inch steel piles at 175 dBrms. No information is provided for 24-inch piles, but we can use the data for 36-inch piles to cover worst-case for the construction at both bridges. Using these parameters and shown on the attached calculator, behavioral effects during vibratory pile installation would be limited to **464 meters** (0.29 miles) from the pile.

Please let me know any questions or if you need any further information. Thanks!

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BNSF SPJ Behavioral Distance Vibratory 2-25-2019.pdf
48K

Williams, Marshall <marshall_williams@fws.gov> Tue, Feb 26, 2019 at 7:50 AM
To: "Broadhead, Craig" <Craig.Broadhead@jacobs.com>
Cc: "Sugarman, Shelly CIV" <Shelly.H.Sugarman@uscg.mil>, "Fischer, Steven M CIV" <Steven.M.Fischer3@uscg.mil>, "Smith, Jason (Seattle)" <Jason.Smith6@jacobs.com>, "Keim, Matthew" <Matthew.Keim@bnsf.com>, "Bordenave, Pierre" <Pierre.Bordenave@jacobs.com>, "PaDelford, Sue S." <Sue.PaDelford@jacobs.com>, Christy JohnsonHughes <christy_johnsonhughes@fws.gov>, "Moore, James M CIV" <James.M.Moore2@uscg.mil>, "Santiago, Railin" <Railin.Santiago@jacobs.com>, "Williams, Diane M." <Diane.Williams@jacobs.com>

Thanks, Craig. This value is pretty close to some values that I found for a Navy Report: Pile-Driving Noise Measurements at Atlantic Fleet Naval Installations. They measured dBrms at different distance for different types of piles (see pg. 14-19). You may find the report handy.

Marshall
[Quoted text hidden]