BSDD_Hydrology Discussion Summary Report - 2014

This document is a compilation of emails, comments, and other information relevant to China Camp Creek Project (C3P) hydrology in calendar year 2014.

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8.11.2014

re Freds question on the existing gates:
Based on observed April 2011 to March 2014 data using the North Canal vs. the River elevations the North Canal tidegates were open
First Quarter: 30%
Second Quarter: 28%
Third Quarter: 20%
Fourth Quarter: 20%

Re Tim's question below: Here is a belated attempt at clarification. I'll stick to winter quarter and the example numbers I used below to simplify things. So everything that follows assumes a 5.5 ft setpoint on the MTRs.
In the winter quarter, the river is in 'low flow' conditions 80% of the time. So over one month (30 days) the low flow condition will occur for 24 days. Under these conditions there is a strong tidal signature and low tides drop below the gate setpoint. The gates are operating on a tidal cycle, opening over the full ebb tide and remaining open a portion of the flood tide. Averaging this over multiple tide cycles shows that when the river is in a low flow state the gates are open 65% of the time (from the velocity duration curve). This equates to about 15 days total time with open gates during the 24 days of low flow.
20 % of the time - 6 days of the month- the river will be in 'high flow' conditions. A conservative assumption is that the gates remain fully closed through this entire 6 day period.
Therefore over the entire month (30 days), the gates are open 15 days total (only when the river is in low flow conditions), or about 50% of the time.
I'm not sure if this is helpful or not, when I find something hard to explain clearly to myself I know getting it across to others will not be easy!

Call or email with questions, Vaughn

Vaughn Collins, P.E. | Senior Engineer

nhc

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From: "Timothy Walters" <timothy.r.walters@state.or.us>
To: "Timothy Walters" <timothy.r.walters@state.or.us>, "Vaughn Collins" <vcollins@nhcweb.com>
Cc: "bsdd.bos@gmail.com" <bsdd.bos@gmail.com>, "Michael Gray" <michael.e.gray@state.or.us>, "Nehalemmarine@gmail.com" <nehalemmarine@gmail.com>, "SteveDenney" <sdenney@tnc.org>, "Stuart Love" <stuart.l.love@state.or.us>, "'LEO KUNTZ'" <tidegates@yahoo.com>
Date: 07/30/2014 01:49 PM
Subject: RE: Notes from 7/18 Passage meeting

Vaughn,

One quick question/comment.

Based on the figures, it appears that the minimum stage would be less than the 5.5 set point 80%,94%, 100% and 88% of the time for the first through fourth quarters for the period of record examined.

Unless I misunderstand the information, this would mean that the gates would be open 80%,94%, 100% and 88% of the time during minimum stage, but not open during intermediate stages or high stage. As such, the percentage of time the gates would be open would be approximately ¼ to ½ of the percentages listed.

Please correct me if needed.

Thanks,

Tim

From: Vaughn Collins [mailto:vCollins@nhcweb.com]
Sent: Tuesday, July 29, 2014 12:39 PM
To: Timothy Walters
Cc: bsdd.bos@gmail.com; Michael Gray; Nehalemmarine@gmail.com; SteveDenney; Stuart Love; 'LEO KUNTZ'
Subject: Re: Notes from 7/18 Passage meeting

We had discussed during the meeting the fact that the gates will potentially be fully closed for long periods of time during high water periods, and a request was made to evaluate this is in more detail. Attached are two figures that show the results of a simple evaluation that I believe gives a reasonable approximation of gate performance. I used the observed river stage data from BSDD from April 2011 through (almost) the end of March 2014.
The maximum and minimum daily stage were extracted and are shown in Figure 1. The minimum daily

stage data was then grouped by calendar quarter in order to allow evaluation during different periods of fish use. The resultant duration of minimum stage exceeded by quarter is shown in Figure 2.

When the minimum daily stage is below the setpoint we can assume that the gates will be operational and the previously supplied gate open duration figures are applicable. When the minimum daily stage is above setpoint elevations a conservative assumption is that the gates are not open. In fact there will be times when the gates do open on the receding limb of a high water event - this analysis method cannot capture that. In addition, when water levels exceed around 14 feet there is exchange with the river over the Beaver Slough banks. (The data indicates that some overtopping occurs at around 12 feet, but significant volumes do not occur until 14 feet).

For example, if we look at Figure 2 and assume 5.5 feet as a setpoint elevation, the gates would be operational 80%,94%, 100% and 88% of the time for the first through fourth quarters for the period of record examined. The previous winter low flow analysis velocity duration curves indicated the Unit 2 gate would be open around 65% of the time at a 5.5 foot setpoint. Accounting for higher flows, the Unit 2 gates would be open 80% of this, or 49% of the time from Jan-Mar. Again, there would be times when water levels exceed 5.5 feet that the gates would be open or levee overtopping occurring, bumping back up the percentages to some degree. Spring and Fall have less high flow gate restrictions, and the summer quarter has none.

Hopefully my explanation is clear and this gives a sense of the effects higher flows will have on fish passage opportunity at BSDD. Call or email with questions, Vaughn

Vaughn Collins, P.E. | Senior Engineer

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From: "Timothy Walters" <timothy.r.walters@state.or.us>
To: "bsdd.bos@gmail.com" <bsdd.bos@gmail.com>, "Michael Gray" <michael.e.gray@state.or.us>, "Nehalemmarine@gmail.com" <nehalemmarine@gmail.com>, "SteveDenney" <sdenney@tnc.org>, "Stuart Love" <stuart.l.love@state.or.us>, "'LEO KUNTZ'" <tidegates@yahoo.com>, "P. E. CFM Vaugn Collins" <vcollins@nhc-sea.com>
Date: 07/23/2014 04:37 PM
Subject: Notes from 7/18 Passage meeting

Figure 1: Maximum and Minimum Observed Daily Water Level – Coquille River @ BSDD Outlet

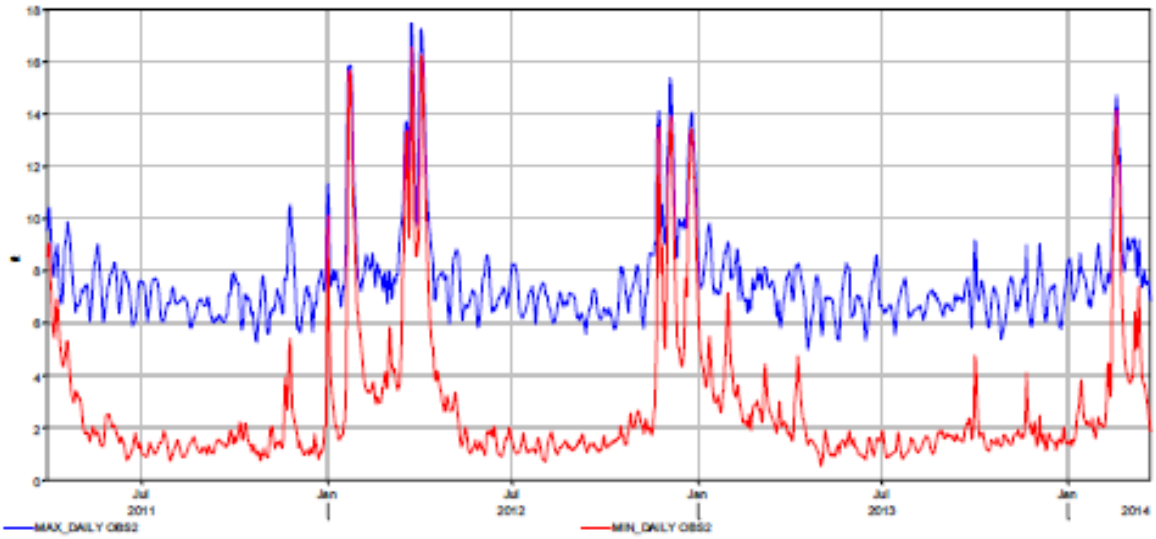
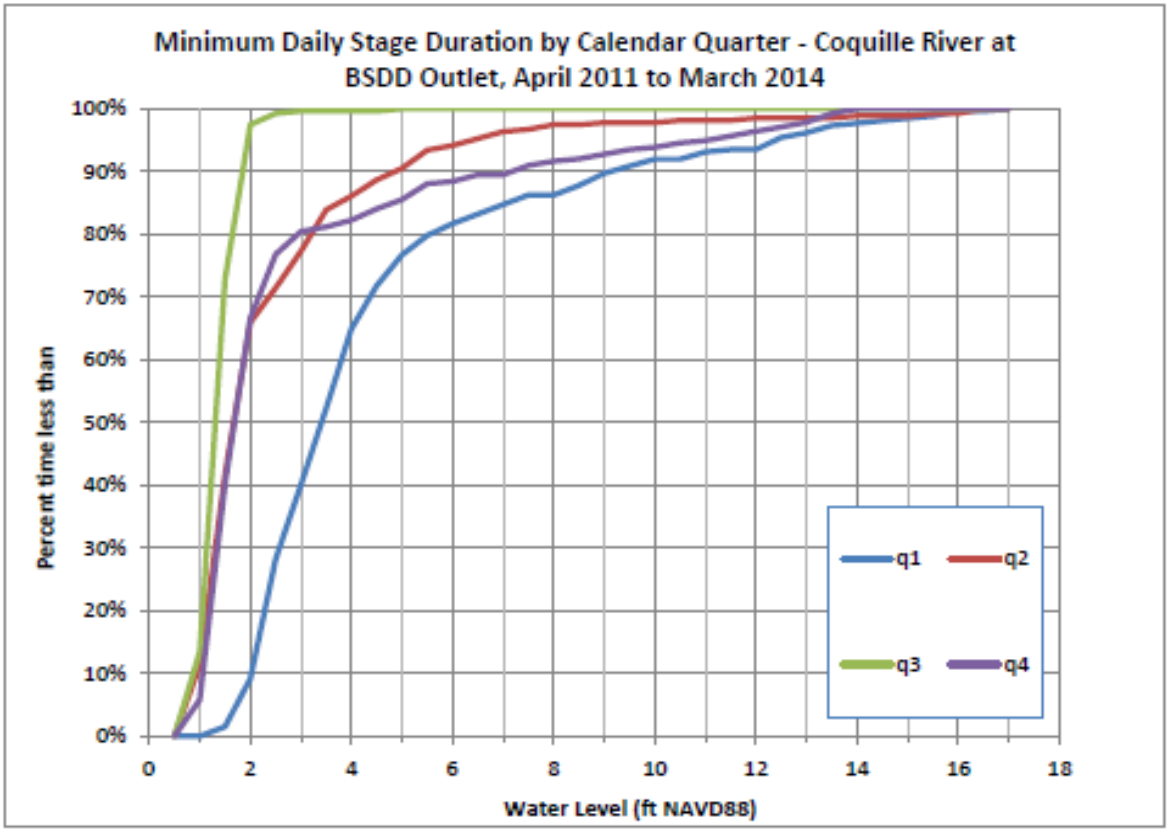


Figure 2



Hello all,

Here are my rough notes from our meeting last Friday, with the culvert velocity study, which was referenced during the meeting. Please review and revise (using track changes) as needed.

Take care,

Tim Walters
Umpqua Watershed Manager
Oregon Department of Fish And Wildlife
4192 North Umpqua Hwy
Roseburg, OR 97470
541-440-3353
[attachment "Coquille Passage Meeting 140718.docx" deleted by Vaughn Collins/NHC] [attachment "July2014culvert velocity.pdf" deleted by Vaughn Collins/NHC]

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Coquille Passage Meeting
July 18, 2014
Coos Bay Library, 525 Anderson Ave., Coos Bay, Oregon

Led by Fred Messerle of the Beaver Slough Drainage District.

Others in attendance:
Stuart Love, Mike Gray, Greg Apke, Tim Walters-ODFW
Steve Denney-The Nature Conservancy

Attending by phone: Leo Kuntz, Vaughan Collins

Operating plan
Mike Gray provided a summary of proposed water management in Unit 2 (ODFW and CCGC)
- Access for fish in fall and winter. Manage for extensive tidal exchange
- Drain out in spring
- Summer-Limited tidal exchange. Focus on improved water quality

Passage modeling

Vaughan Collins described passage and velocity modeling

- Based on 50 foot channel
- Gates 10 ft by 8 ft, with -2 foot invert
- Gates experience gradual closure when operated by MTR, then the gate slam
- Provided a graph depicting water velocities, percent time gates open (see attached PDF File)

General Discussion re: passage velocities, structural requirements, velocity mitigation, project review
Leo Kuntz noted that high velocities (above 4 fps) are very problematic. Challenging to ensure structure is not damaged.

Leo noted that we would be better off setting a maximum water velocity of 4 fps. Based on the model, a set point for the muted tidal regulators at 4.5 feet would be best. Set point of 5.5 feet results in the highest water velocities.

When asked about high winter flow, either Leo or Vaughan noted:

1. high winter flow (before flooding) should not cause a problem with water velocity, since there would be back pressure from creek flow, rain, etc.
2. Highest velocity through the gates will be during the driest period.
3. MTR's will be less active during flood events due to back pressure.

Leo and/or Vaughan noted that one solution to the high velocities is to make a smaller pool. That can be accomplished through fill, or through MTR set point.

Leo or Vaughan noted that channel roughness will also influence water velocity. However, the channel with cut itself through time to a velocity of 2.5 fps. However, this will lead to higher water velocities at the gates, which are the constriction points.

Leo noted that during low flow periods, such as summer, gates would be open more if Unit 2 was operated at 5.5-6 ft. However, this would yield higher velocities.

Steve Denney and others noted that we must have MTR set points. Simply tying open the gates would lead to isolated pools after high tide cycles. This is not acceptable, since it could lead to mosquito production.

Leo or Vaughan noted that options to ensure openings for fish passage during more time periods also included adding a top hinged gate, or placing apertures in the gates slightly above the expected operating level. Also could reduce velocity through roughness (woody vegetation in unit, large wood), plus reducing pool size.

General discussion: Permitting, timing
Greg noted that NOAA approval is key for this process. Need to ensure their review and comments/approval ASAP.

Fred will make sure NOAA has all relevant materials (Aaron, Ken Phippen, Kirkendall)

Leo noted that structural engineering could be done in 30 days.

Fred noted that permit needed by September 1

Greg noted that ODFW is going to deal with the proposed structures.

Vaughan reviewed the passage/velocity graph, stating that under winter low flow conditions, at 5.5 set point, 2 fps passage velocity criteria is met approximately 18% of the time.

ODFW would have to issue a design exception.

Greg can write the exception just prior to the 30% design.

Discussion: Dike Height, impacts of high flows without flooding
Vaughan stated that a 6-8 foot dike height should cause no damage to the structure, even when water levels are at 8-12 feet (prior to flood height).

Vaughan sees no purpose in developing higher dikes

All thought that based on water velocity restrictions, set points for minimizing velocity, and operating needs of the BSDD, a 6.5 ft dike height was recommended.

Questions to address:

1. Will modest dike/berm height result in better interchange?
2. Will a permanent opening in tidegates (PET door just above set point, or vertical slot) allow unfettered access for fish (despite velocity)
3. Vaughan will look at 3-4 years of winter data to determine % of time all gates would be closed, and dike/berms not overtopped.

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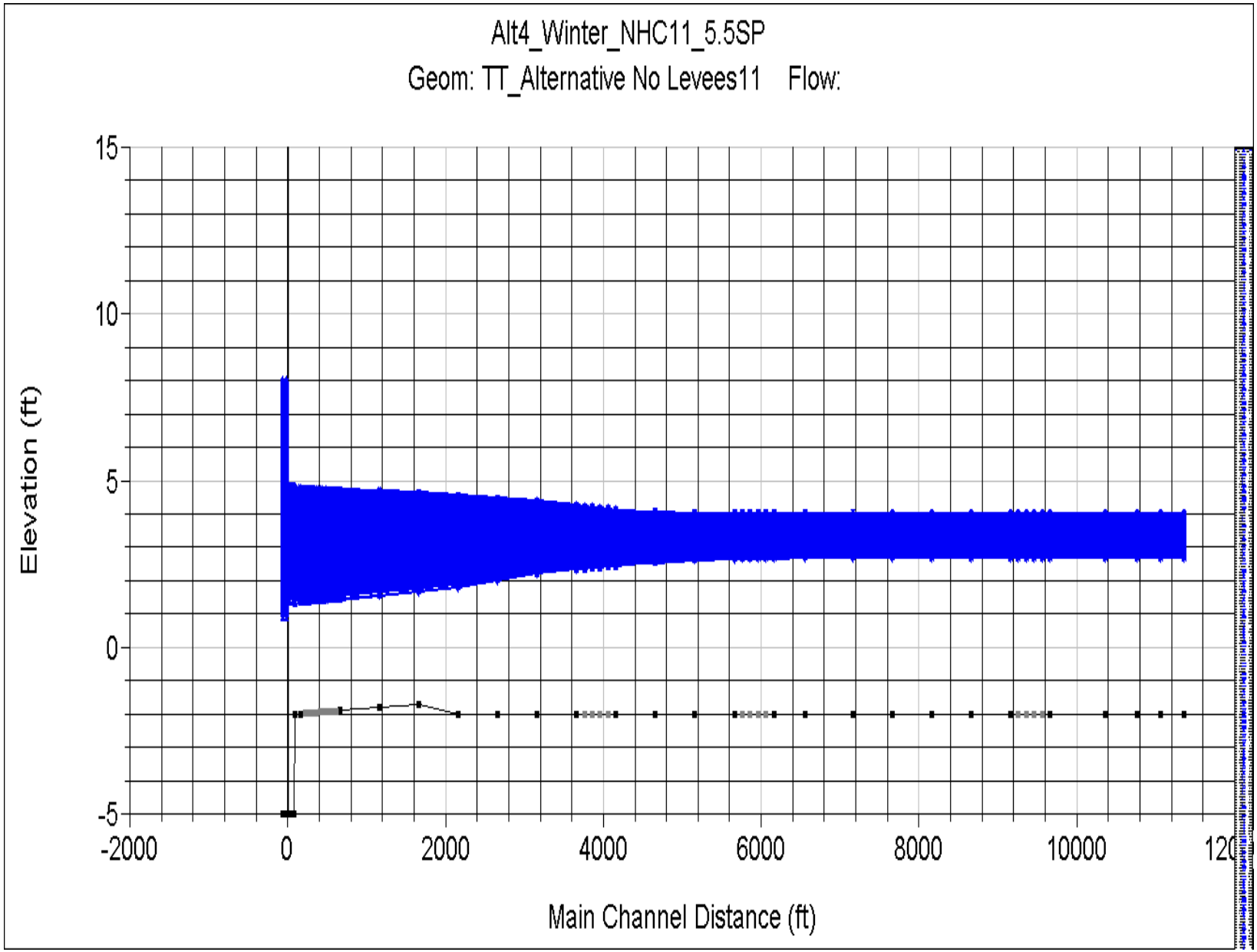
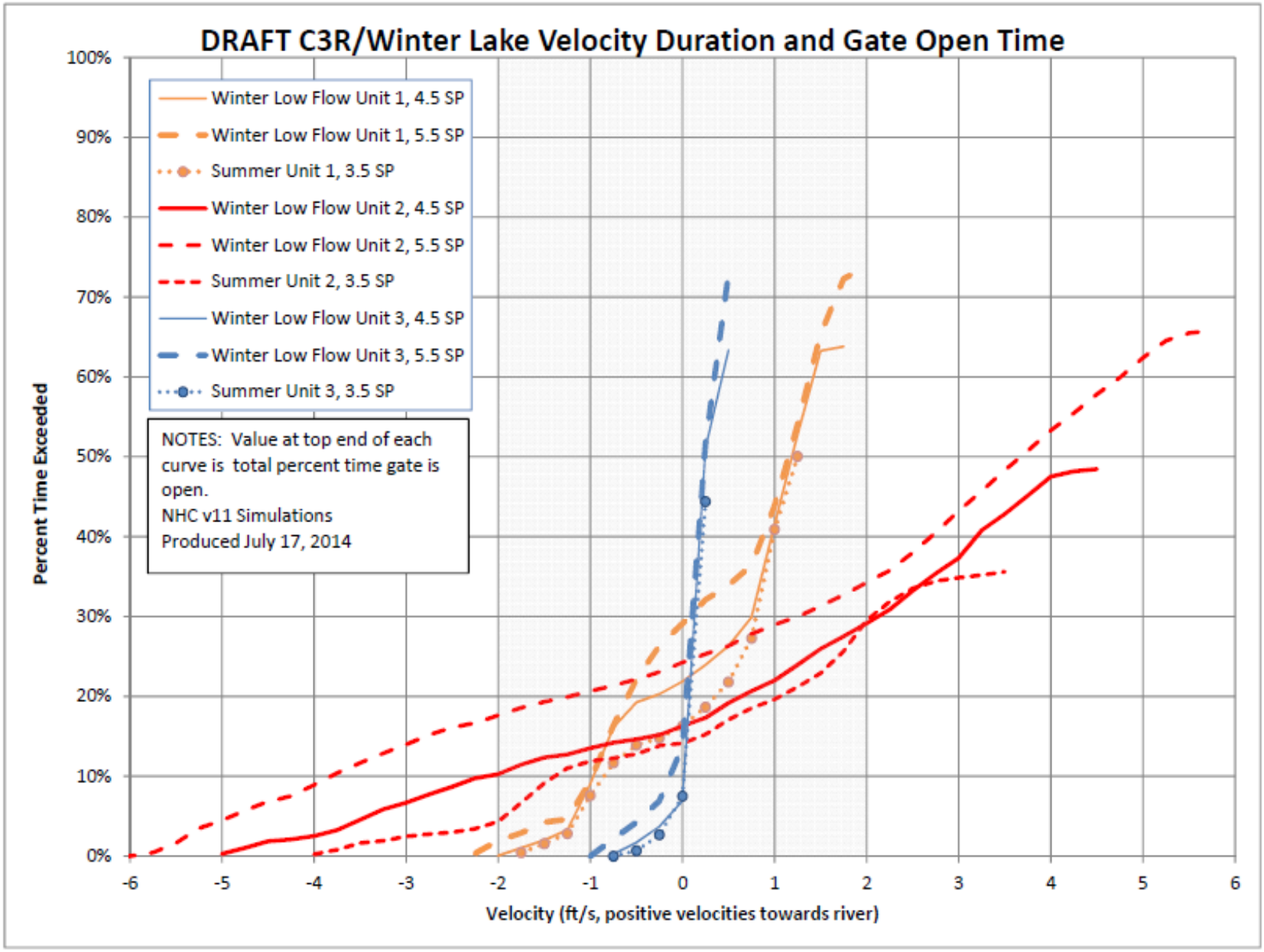
7.17.2014

>> Attached is the new velocity duration curves Fred. Please send me the meeting login notice when you get a chance.

some observations:
Units 1 and 3 stay within +/- 2 ft/s second all the time. Open time is near or exceeds 50% under all the scenarios.
Unit 2 velocities have much greater variation, same as previous analysis. Open time ranges from 36% with summer 3.5 setpoint to 65% for winter 5.5 setpoint. I have a 50 foot wide channel through all of unit 2 but we still see quite a bit of dampening inside. figure below shows a profile all Unit 2 water levels over the two week winter low flow period. on the left you can see the river level varies between 1 and 8 during this time. Just inside the gates the water level varies between 1.3 and 5. This is with the setpoint at 5.5, but with gate throw and gate slam it never quite gets there before closure. In the upper half of Unit 2 water levels only vary between 2.7 and 4 feet or so. I think you could run unit 2 with no gates at all and it would be similar to this during low flow.

- Vaughn


Alt4_Winter_NHC11_5.5SP
Geom: TT_Alternative No Levees11 Flow:
Elevation (ft)
15
10
5
0
-5
-2000
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)


DRAFT C3R/Winter Lake Velocity Duration and Gate Open Time
Percent Time Exceeded
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
Velocity (ft/s, positive velocities towards river)
Winter Low Flow Unit 1, 4.5 SP
Winter Low Flow Unit 1, 5.5 SP
Summer Unit 1, 3.5 SP
Winter Low Flow Unit 2, 4.5 SP
Winter Low Flow Unit 2, 5.5 SP
Summer Unit 2, 3.5 SP
Winter Low Flow Unit 3, 4.5 SP
Winter Low Flow Unit 3, 5.5 SP
Summer Unit 3, 3.5 SP
NOTES: Value at top end of each curve is total percent time gate is open.
NHC v11 Simulations
Produced July 17, 2014

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7.07.2014

Aaron and Greg: I am close to producing new velocity duration data for the revised project design under winter low flow, high set point conditions. I have been adjusting the gate control rules to better simulate how the MTRs actually operate and have a question regarding which velocities to calculate.

The MTRs will go from fully open to fully closed over about a two foot range in interior water level. As they begin to close the culvert dimensions still govern inflow. As the gates close further they begin to control the flow, not the culvert. At this point hydraulically the highest velocities will be right at the gate where the flow is constricted, then immediately dropping off as flow expands in the culvert.

Is fish passage more a question of the higher, but very short length gate velocity?, or the lower, but full length (~60ft) culvert velocity? Kind of a burst swim speed vs. endurance swim speed question for juveniles. I can calculate either, just looking for guidance no which one is better.

thanks, Vaughn

Vaughn Collins, P.E. | Senior Engineer

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01.10.2014

Hi Leo and Mr. Messerle,

Those are great questions and I will do my best to explain them in terms of fish passage and tide gates:

How many of the "extreme tides" would we expect to see in a year?: A lot of factors contribute to the occurrence of an extreme tide, which I will characterize with two scenarios: 1) a very high tide caused by the moon phase combined with a river stage at its normal high but not a flood event 2) a very low tide caused by moon phase combined with a river stage at its normal low but not a drought stage. As far as their occurrence frequency, in my opinion, the main contributing factors would be probability the described moon phase and river stage conditions occur at the same time. Moon phases obviously run on a set schedule by day/month/year, while river stage variations run by season. My guess (not having run any numbers just going from my observations from previous tide gate design I have performed)

extreme tide conditions usually do not occur every year. I will note that careful consideration would have to be given by ODFW if it is appropriate to expect fish passage through a tide gate during an extreme tide. I would suggest the design tidal cycle would only consider the normal higher high tide stage down to the normal lower low tide stage, with those numbers being calculated over a reasonable period of years and outlier tide stages being excluded from the analysis. This would mimic the approach that we follow to calculate fish passage flows.

What is the definition of a flood event?: Flood events are easier to characterize by number than by physical description. Engineers can calculate river flows that are associated with different storm year reoccurrence intervals, i.e. the 100-yr storm, the 50-yr storm, etc… The most common way we characterize the high fish passage design flow would be quasi-equivalent to the 1.2-yr storm event. The issue with comparing fish passage flows to storm flows is the method of calculation is completely different so you can end up with conflicting numbers however both were calculated correctly. An example would be if the engineer calculated a high fish passage design flow of 120 cfs for a river and then calculated the 1.2-yr storm event at 150 cfs or possibly 110 cfs. There are a lot of factors in predicting storm flows, so I expect a high margin of variation on that number, that is why we have engineers calculate the fish passage flows because they have a lower margin of variability. The ending conclusion would be if the engineer calculates the fish passage flows as outlined in the fish passage criteria, they will most likely not be designing to a flood stage river event.

The upstream definition of passable is? My sense would be that un passable would mean no water?: The definition of being passable upstream (in terms of tide gates and the supporting pipe) would be at least 1'-0" of depth during low fish passage design flow, an average water velocity of 2 feet per second or less during high fish passage design flow, an average velocity of 8 feet per second or less at the tide gate door constriction, an 6 inches of water surface drop or less measured from the water surface elevation in the supporting pipe to the water surface in the river outside the tide gate. With that being said, ODFW realizes that in many cases meeting all of these criteria can be a difficult, and we encourage discussions so ODFW can be involved in the project early and help address challenging design conditions. You are correct, the lack of water falls under the condition of unpassable, however a fishway may have water and still be considered unpassable by the criteria.

I concur with your sentiments, the cost for the project should always be a consideration in the project development and be balanced with the expected performance of the tide gate project. ODFW shares the same desire to establish a standard approach that can streamline the tide gate design process so project owners can implement tide gates in a manner that meets the needs of the tide gate owner and fish passage. We always encourage any opportunity to work with those interested in the development of tide gate technology to try and achieve this goal.

Please do not hesitate to ask more questions, this is a great discussion!

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4034 Fairview Industrial Drive SE

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"It's unwise to pay too much, but it's worse to pay too little. When you pay too much, you lose a little money, that's all. When you pay too little, you sometimes lose everything, because the thing you bought was incapable of doing the thing it was bought to do. The common law of business balance prohibits paying a little and getting a lot – it can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run, and if you do that you will have enough to pay for something better." – John Ruskin

From: Leo [mailto:nehalemmarine@gmail.com]
Sent: Friday, January 10, 2014 7:08 AM
To: F. Messerle; Ryan McCormick
Cc: Greg Apke
Subject: Re: Fish Passage & Tide Gate Question

Fred, I will forward this to Ryan. These are good questions and it seems I don't have a clear understanding either. Good Morning, Leo

From: F. Messerle
Sent: Friday, January 10, 2014 6:54 AM
To: Nehalemmarine@gmail.com ; LEO KUNTZ
Subject: RE: Fish Passage & Tide Gate Question

Leo,

I'm just a simple farm boy, but I do have a couple of questions.

How many of the "extreme tides" would we expect to see in a year?

What is the definition of a flood event?

The upstream definition of passable is? My sense would be that un passable would mean no water?

There needs to be a balance point between the extremes of the tidal range and the cost associated with reaching compliance at the edges.

I think you are spot on with the idea of standard plans, backed up with a credible formula. We are spending way way too much custom designing each individual tide gate installation to cover everybodys butt.

Fred

From: Ryan McCormick [mailto:ryan.l.mccormick@state.or.us]
Sent: Thursday, January 09, 2014 3:41 PM

To: Greg D Apke; Leo
Cc: Fred Messerle; Greg D Apke; ken.j.loffink@state.or.us; Don Porior
Subject: RE: Fish Passage & Tide Gate Question

Hi Leo,

I am excited to learn more about Don's model and dig into the updates! Here are the clarifications that you requested:

1. In terms of fish passage, tide cycle is the tidal rise and fall that occurs over the course of time that fish are required to pass. This is usually best achieved by taking into account the regular change in tidal range that occurs through a year. I don't quite understand what you are asking in your second inquiry "How much of a average day would be a "tidal cycle"? If we apply the door openness criteria to the day, the tide gate door would need to be open 12.24 hours, i.e. 51% of a day, to meet the criteria, however we would want the analysis to consider an entire year of tidal fluctuation.
2. Stream flow range is bound between the normal yearly high stream flow and the normal yearly low stream flow. This range does not include flood events. I will try and track down an example how this is calculated and pass it along.
4. To meet fish passage criteria, you would have to install the invert elevation of the supporting pipe to be 1'-0" below the lowest tide of the year. As you clearly stated, this could result in a tide gate installation that is not very functional. In this instance, you would work directly with Greg, Ken or I to discuss the project and we could develop defendable reasoning as to why the depth criteria should be waived under certain circumstances. As you know from working with our group, we try to exercise as much flexibility as possible to produce a successful project but meet passage criteria where reasonable.

All good questions, and thanks for the inquiries! Your goal of turn-key plans is a good one and we look forward to working with you to reach that result.

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to add something for the risk you run, and if you do that you will have enough to pay for something better." – John Ruskin

From: Leo [mailto:nehalemmarine@gmail.com]
Sent: Thursday, January 09, 2014 9:53 AM
To: Ryan McCormick; Greg D Apke
Cc: Greg Apke; ken.j.loffink@state.or.us; Fred Messerle; Don Porior
Subject: Re: Fish Passage & Tide Gate Question

Thank you Ryan, Even after all these years I still have a hard time getting my hands around this completely. I recently got a little demonstration of Dons new model and it was very impressive. My hopes are to have the model address the criteria as much as possible.

Please clarify #1 below:
What is the meaning of "tide cycle"?? How much of a average day would be "tidal cycle"???

Please clarify #2 "stream flow range". Perhaps you could use a example.

#4: tidal areas are highly dynamic and extreme tides do not occur often. Does this mean we have to design 1 foot below the lowest tide of the year?? This is not going to work very well because the installation will wind up being unserviceable and be in a improper location for the bulk of the tides.

Sorry to be a pain but we would like to be able to produce turn key plans as much as possible.
Leo

From: Ryan McCormick
Sent: Thursday, January 09, 2014 9:21 AM
To: Greg D Apke ; Leo
Cc: Greg Apke ; ken.j.loffink@state.or.us
Subject: RE: Fish Passage & Tide Gate Question

Hi Leo,

I want to piggyback on the information from Greg on the criteria. Here is a quick summary of the required hydraulic performance for a tide gate to meet the current criteria:

1. The tide gate has to be open 51% of the tidal cycle
2. During 90% of the stream flow range (evaluated at both the creek upstream of the tide gate and the stream/river downstream of the tide gate) and any overlapping time frame of the tide gate openness, the tide gate needs to have a max average velocity across the restricted door opening of 8 fps and the supporting pipe needs to have a max average velocity of 2 fps. The exception is times when the channel upstream of the tide gate is not passable, the tide gate and supporting pipe do not need to meet criteria. The conclusion of the passability of the upstream channel would ultimately fall upon ODFW after analyzing the information submitted by the project applicant.
3. The max water surface elevation drop across the tide gate cannot exceed 6 inches.

4. The min water depth in the supporting pipe is required to be 12 inches if adult fish are present and 6 inches if only juvenile fish are present.

Hopefully that clarifies the current criteria and how it applies to tide gates.

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From: Greg D Apke
Sent: Thursday, January 09, 2014 8:47 AM
To: Leo
Cc: ken.j.loffink@state.or.us; Ryan McCormick; Greg Apke
Subject: Fish Passage & Tide Gate Question

Leo, I apologize for my delayed reply… Frankly I opened this email a while back and forgot to circle back to it and get you a reply. I hope you understand.

I've copied the tide gate fish passage criteria into this email (below):

Oregon Administrative Rule (OAR) 635-412-0035
(4) Requirements for fish passage at artificial obstructions in estuaries, and above which a stream is present, are:

(a) fish passage shall be provided at all current and historic channels;

(b) fish passage structures shall meet the criteria of OAR 635-412-0035(2) or (3), except fish passage structures shall be sized according to the cumulative flows or active channel widths, respectively, of all streams entering the estuary above the artificial obstruction; and

(c) tide gates and associated fish passage structures shall be a minimum of 4 feet wide and shall meet the requirements of OAR 635-412-0035(2) within the design streamflow range and for an average of at least 51% of tidal cycles, excluding periods when the channel is not passable under natural conditions.

(5) Requirements for fish passage at artificial obstructions in estuaries, floodplains, and wetlands, and above which no stream is present, are:

(a) Downstream Fish Passage

(A) downstream fish passage shall be provided after inflow which may contain native migratory fish;

(B) downstream fish passage shall be provided until water has drained from the estuary, floodplain, or wetland, or through the period determined by the Department which shall be based on one, or a combination of, the following:

(i) a specific date,

(ii) water temperature, as measured at a location or locations determined by the Department,

(iii) ground surface elevation,

(iv) water surface elevation, and/or

(v) some other reasonable measure;

(C) egress delays may be approved by the Department based on expected inflow frequency if there is suitable habitat and as long as passage is provided by the time the conditions in OAR 635-412-0035(5)(a)(B) occur;

(D) a minimum egress flow of 0.25 cubic feet per second (cfs) at one point of egress shall be provided;

(E) egress flow of 0.5 cfs per 10 surface acres, for at least the first 100 surface acres of impounded water, shall be provided;

(F) all plunging egress flows shall meet the requirements of OAR 635-412-0035(2)(l)(B);

(G) if egress flow is provided by a pump, it shall be appropriately screened;

(H) the minimum water depth and width through or across the point of egress shall be 4 inches;

(I) the ground surface above the artificial obstruction shall be sloped toward the point(s) of egress to eliminate isolated pools; and

(J) an uninterrupted, open connection with a minimum water depth of 4 inches shall be present from the point of egress to the downstream waters of this state, unless another connection is provided as per OAR 635-412-0035(2)(l)(A).

(b) Upstream Fish Passage: a fishway or road-stream crossing structure with or without a tide gate shall be provided during the period determined by the Department if there is current or historic native migratory fish spawning or rearing habitat within the estuary, floodplain, or wetland area impounded by the artificial obstruction.

I've heard nothing from Don Porior in many months and we'd (Ryan McCormick and me) love to hear from him on his new hydraulic model. We can help advocate for the model, but we really need to understand it. We were very supportive and invested the time to meet with Don and understand his model (the earlier version he developed for McDonald Slough) and we think it's prudent to continue the dialog with him.

If you can help facilitate a discussion among us, that would be great.

Let me know when you get wrapped up in California, particularly as it related to Winter Lake and the tide gate design. We need to have a meeting real soon with you and Fred and Steve so we can make progress on our evaluation and input into the design.

Hope you are well and I hope your wife is recovering Leo.

Greg

From: Leo [mailto:nehalemmarine@gmail.com]
Sent: Wednesday, December 18, 2013 11:14 AM
To: Greg Apke
Cc: ken.j.loffink@state.or.us
Subject: fish passage criteria,

Greg, I have been working in some neat habitat in N. California the last several months and kind of out of touch. Don Porior has built a new specific model that really looks great. He will be sharing it with you soon. This question comes up so I am looking for a final answer.

The Oregon criteria states 2fps 50% of the time. My understanding at the time it was written , working with Tom Stahl, that refers to "**of the time the gate is open"**. In other words if the gate is open 60% of the time (6hrs in 10 hrs) the 2fps needs to be met for 3 hours or 50% of the open time. Let me know what your standing is on this. It makes quite a difference when modeling and it also makes the standard pretty difficult to meet at times. I guess we are looking for a final word on it.

Happy Holiday, Leo