

## MEMORANDUM FOR THE RECORD

Subject: Draft minutes for the 01 May 2018 Willamette Fish Facility Design Work Group meeting.

The meeting was held in the Lobby Conference Room at Block 300 US Army Corps of Engineers in Portland, OR (NWP). In attendance:

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On the phone: Kelley, Richards, C. Walker, Spear, Dishman, and Malone called in.

## Meeting Purpose:

Finalize previous meeting notes. Provide an update on status of active design projects. Discuss with the Team the technical specifics of passing fish via the Cougar Floating Screen Structure.

All documents related to this meeting can be found at:

[http://pweb.crohms.org/tmt/documents/FPOM/2010/Willamette\\_Coordination/Willamette%20FPT/](http://pweb.crohms.org/tmt/documents/FPOM/2010/Willamette_Coordination/Willamette%20FPT/)

1. Final decisions made at this meeting.
  - 1.1. April meeting minutes were approved.
2. Updates on active design/construction projects
  - 2.1. Fall Creek AFF – Richards says several fish have entered ladder, is working well. Going through final punch list for contractor. 11 adult NOR winter steelhead, 197 coastal cutthroat, 49 rainbow, 5 whitefish, 1 sucker, 1 spring Chinook. Additional work needing to be done: will know more on Thursday after field trip. **ACTION ITEM: Richards will email fish-related contractor punch list to Khan once she has it.**
  - 2.2. Foster DSP – Khan says new fish weir is in. Low reservoir study complete. Stopped weir ops yesterday to fill reservoir to summer elevation. Will start the high pool study on May 8 and weir will open then.
  - 2.3. Detroit Temp Control and DSP – Fortuny says will have 60% DDR for FSS out for review out in June. 90% DDR for selective-withdrawal structure out mid-August. **ACTION ITEM: Fortuny will provide an update on the 60% DDR for the FSS at the June meeting.**
  - 2.4. Cougar DSP – Fielding provided power point. Wants finalization on items to move forward.
    - 2.4.1. Fish numbers – Spreadsheet was Fielding’s effort based on literature to estimate daily maximum, to size FSS appropriately. Started with fry estimate based on the number adults placed above CGR, redds and fecundity. Used Downey and Smith for fry survival. 10% number in spreadsheet is estimate of low day, 30% is estimate of high day for what would be collected. Jundt asked how many times/day the estimate assumes fish are worked up. Fielding said assumes 24 hr/daily maximum. Griffith said also depends on size of truck. Fielding said used NMFS holding criteria to estimate size of tanks needed. Used Pierce’s PFFC catch data for weights. Bottom line: 1,000 gal tanks on FSS would be adequate for largest numbers of fish. 750 gal tank on amphibious vehicle (AV). Factored in temperature in tank sizing (reduce holding 5% for each degree). Are these numbers OK with group? Mean/median fish weight increases through year, Oct is highest. Ziller asked how many tanks? Six 1,000 gal tanks. Malone asked if have cutoff of 2 tanks per side vs 3 is that cost savings? Souders said minimal cost savings. Other infrastructure still there, so one extra tank per side wouldn’t have significant impact on footprint or cost. Griffith said size of holding tank matches transport tank size fairly well. Fielding worried that 750 or 500 gal tank on FSS would increase the number of trips significantly. Griffith said this assumed healthy fish, the max estimate of fish is conservative. Ziller said that only have 80 lbs of fish in spring. Jundt said 1000 gal tank isn’t actually that big (around 5x5x5). No harm in

hauling less fish in larger tank. Fielding would rather hold few fish in larger tank, than have density issues in fall. Griffith said assuming naval architect will require bulkhead between the two sides of the FSS, so at low flows will need 3 tanks to accommodate one day's catch. Won't be able to transfer fish from one side to other of FSS.

Piaskowski asked would 4 tanks be sufficient, Fielding said not if get a lot of fish.

Griffith said we'll revisit this topic if naval architect deems necessary.

**CONCLUSION: Fielding will move forward with current plan of six 1,000 gal tanks on FSS.**

- 2.4.2. Fish disposition – Fielding said USFWS commented on bull trout size, he'll need to figure that out. Jundt said it could be adaptive. Askelson said it's important to know if you need to separate out sculpin/dace, need to know now to design. Griffith said the only fish not going to tailrace right now are fallback adult Chinook and bull trout during spawning season. This question is really important when considering components of facility. Want to avoid needing 3 different separators. Want to get fish through facility and into holding as quickly as possible. Mullen asked if the small numbers for some fish are based on PFFC numbers. Pierce said has seen an adult swimming around control tower, so some are going downstream. Fielding: all fry, parr, smolt Chinook are currently going downstream. Adult Chinook to head of reservoir. Juvenile bull trout are going downstream, adults collected from Oct - Feb are going back to the head of reservoir. Rainbow and cutthroat trout, mountain whitefish going downstream. Nonnative fish that are subsampled would not be transported but rest would be. Dace/sculpin moved to below dam, same with nonnative fish. **ACTION ITEM: Fielding will redo the table and include description of why dace, sculpin, nonnative fish not separated out on spreadsheet and send it back out to the group.**
- 2.4.3. Trying to minimize stress to Chinook. Fielding will add column for subsample – do we put subsampled fish downstream? Pierce said subsampled nonnative fish won't go back into the water. Griffith said what we do with subsample is easy to change, column C is much more important to the design. Askelson said if moving all fish in tanks downstream, do you just add subsample to that and move all downstream. Ziller asked what are we talking about for subsample, Fielding said will be 1%. Will be based on size of subsample tank. Ziller, Malone both said send subsampled fish down. Jundt agrees. **CONCLUSION: Subsampled fish will be sent downstream.**
- 2.4.4. Facility operational range (pool elevation) – 1690 to 1532 would be fishing range, sometimes pool goes to 1528 (would not have full fishing depth). 1516 is limit of power production. Fielding wants folks to be aware that 1528 would be lower limit of FSS. Jundt asked how often pool goes to 1516. Britton said is very rare. Griffith said need to factor in passage conditions at that level. Jundt said need to factor in ballast when change elevation, Griffith said the ballasting system is pretty quick/dynamic, Souders agreed. Budai said PDT just brought on architect and they'll let us know if ballast is an issue. Piaskowski asked what time of year would we expect to get below 1532. Pierce said in the past it was due to construction, also a study. These were

planned. Ziller doesn't remember any instance in last 20 years. Ziller asked if went to 1516 what would need to happen. Fielding said would need to de-ballast. Souders said would be out of the water. Souders said we can't remove that much of the dam, would have to remove FSS. Sedey said would cost a few hundred thousand dollars. Griffith said maintenance would be de-ballasting in-place. Mullen said going to 1516 is avoidable, wouldn't just be drought-induced, and would have to be something additional. Ziller asked if design of the FSS has always been this wide. Pierce said any design would have required excavating rock, otherwise would have to put FSS further in front of the tower. Griffith said this design optimized for geometry there. Narrower doesn't get you much, would still have to excavate, and would still be way out in front of the tower. Budai said this design put FSS entrance next to tower. Ziller asked about perching FSS at set elevation. Britton said it's rare would ever have to remove FSS, cheaper to do that in rare events than build something for it to sit on. Budai said pedestal would be in way of servicing tower for debris issues. Askelson said would be really hard to design something that actually sat on a pedestal, back of FSS is also really deep to where penstock intake is. **CONCLUSION: Current FSS operating range of elevation 1690 to 1532 is fine.**

- 2.4.5. Sorting target size – Fielding: 200 mm is likely cutoff for collecting juveniles. Anything larger would go into adult tank. Question: how big make separator bars. Jundt asked if could think about it. Griffith said if we're landing on one separator, have a little bit of time to determine spacing. We can adjust spacing after operating, and look to other collectors to get good idea. Adjustable bars not ideal, better to have easily manufactured bars. Jundt said it's important not to get predators mixed with juveniles. Griffith said may still get handful of juveniles in adult tank, but would be infrequent. Don't want to space bars too big and get a lot of debris in juvenile system. Maybe between Jan and June have one size, then change out later in year. Fielding asked if different bars would require changing geometry of separator. Souders said no. Khan asked if PDT was already considering interchangeable bars, Fielding said yes and no. Souders said it was on the radar, they weren't considering it, but isn't a big deal. Griffith said biggest deal is keeping debris out of juvenile tank. Need minimum of one separator, wouldn't go with more than one, and doesn't think we need it. Can be successful with one and minimize stress on Chinook. Going to get some juveniles that aren't separated, but is cost of business. Reis asked if possible to put something in holding tank where juvenile fish could take refuge. Jundt said is marginally useful. Is a pain to have that secondary area. False floor? Fielding said will be draining from bottom, so do you have to remove the false floor first. Pierce said separating fry from smolt Chinook (predation issues) not worth it in holding tank since transported together. Ziller said interchangeable bars may change on yearly basis because fry will grow differently year to year. Fielding said current plan is 200 mm. **CONCLUSION: One separator in FSS design, will design separator bars for 200 mm to start but will design bars to be easily changed in the future, perhaps multiple times a year if necessary.**

- 2.4.6. Transfer and handling discussion – Malone asked if fry and bigger fish would both be released below, Fielding said yes. Ziller asked why drain from bottom, Fielding said flume is beneath holding tank. Ziller asked if drains from side of bottom of the tank, Souders said yes. Griffith said will have flushing flow too, trying to avoid crowding, will be more controlled flow, won't have huge head when it drains. Souders said corners of tank will be rounded, that way added flushing flow will create eddy. Fish will be transferred to transport tank water-to-water. Pierce pointed out no handling through entire trip. Ziller said fish will be held, then flushed to flume, then put in another tank, then flushed into another tank. Isn't handling, but is a lot for a fish. Malone asked what was fish survival on PFFC, Pierce said survival great until October, when fish had most copepods. Budai said water temp was higher. Pierce said is condition of fish, gills are corroded. Jundt asked weren't PFFC fish touched, too? Pierce said with a net. Griffith said Ziller had excellent point, PDT is trying to come up with trap-and-haul (TAH) system that minimizes handling. Asked if the pod system design had issues with craning and such, Souders said it's pretty difficult on a floating vessel. Budai said Pierce wanted tanks lower, Pierce said lower was to avoid needing a fish pump to move fish from holding tanks to AV. Askelson asked if moving fish from holding tanks could be gradual drawdown over period of time, Fielding said yes. Griffith said would need to be refined. Budai said even though tanks designed to hold fish for 24 hrs, that would be maximum and ideally you're moving fish as fast as they're coming in. Piaskowski said question seems to be about minimizing stress. Agrees with Ziller's concern about fish held in tanks and having to transfer multiple times. High copepod infection rates on these fish, so any additional stress could elevate mortality. Is there any way of eliminating/reducing stress with fish transfer process? Any way to eliminate links in chain? Fielding said is gravity-fed system, by the time get to where fish are being held they're in the belly of the system. It's either pick them or pump them, and he was told by NMFS to never pump them. Griffith said they're open to ideas to minimize stress on trap-and-haul (TAH) design. Piaskowski suggested talking through TAH design again with the mind to minimize stress.
- 2.4.7. TAH design discussion – Ziller asked if have to make two separate trips to dam with AV for small fish and for big fish. Fielding said were planning to make one trip with two separately sized tanks on the AV. Griffith said both would be conveyed to AV in same manner. Fielding said considering FSS design not sure what you could do to reduce stress. Pierce said could route fish directly to transport hopper. Fielding said what if you had a huge slug of fish, Pierce said you'd have to have redundant transport hoppers, 4 minimum. Hard thing is that all fish are being collected at back of facility, AV is at the front. Griffith said elevation is the killer. Griffith said important message to convey to group is do you see anything that means we need to stop moving down this path or does this seem like a feasible path under TAH. Malone asked what survival would be in Oct. Fielding said isn't fair question, PFFC is smaller, fished a lot shallower, PFFC holding tank is smaller. Griffith said may be collection bias with PFFC as well. Pierce said holding temperature in PFFC was also higher, FSS will be lower. Piaskowski asked group if they believed this would achieve 98% survival.

Ziller said not in fall, which is the fish we really need to survive, due to already-stressed fish/copepods. Hardest part on fish is just holding the fish. Fish are already stressed, then you're putting them in a situation where they can't get out. Carl Schreck and others have a ton of data on what causes stress on fish, holding is one of them, we should be doing everything we can do to move fish along without putting them in a box. Askelson said there will be times where continual passage isn't possible. If criteria has to be zero delay that would be really costly and complicated. If we can tease out what a reasonable amount of holding is to make this be functional, without saying zero – or if has to be zero, build case why it has to be zero, but that will increase the cost and complexity. Ziller said it can't be zero, will be times when have to collect fish and put them in a box, time to do that is in spring when stress is really low. In fall, that's time have to treat them with kid gloves, only way to do that is give them a bypass that doesn't put them in a box. We'll have higher mortality on the FSS holding them than passing them volitionally. If have to hold them, then minimize holding. Jundt said the filter back to bypass group would be that these fish may not be equivalent to studies done by bypass group due to delicacy of fish. Would be better not to have two different holding tanks, would ask we think outside the box. Could holding tanks also be hoppers, etc. Souders said is very complicated with amount we have to raise with a floating vessel. Six or more connections from those hoppers into the same flume and out to AV, would be really difficult even with flexible hose. Not sure how you do that. Hoppers located centrally. Piaskowski said seems like a good recommendation to pursue, would limit one transfer. Souders said if every tank is hopper, that's added complexity, how have 6 cranes for 6 hoppers, or two travelling cranes. Still use flume system to AV. From separator, how dump into 6 tanks that can be moved out of way of mechanism dropping them in. Not impossible, but is really complex. Souders pointed out have life support systems, recirculation water, not sure how do that if each is its own hopper. Piaskowski asked is NMFS concerned about reaching survival in fall time period? Jundt said yes. **CONCLUSION: ODFW and NMFS are concerned about meeting survival target with current FSS design due to holding and transfer (stress) concerns for fall fish.** Pierce asked if removing one link in the transfer chain alleviates survival concern? Reis said all of the handling and stress is incremental, anywhere we can take away some of that is better. Fielding said we're taking the best approach for TAH. Griffith said that's true, need to make the case why it's best because the group is saying avoiding the transfer hoppers would be best for fish, need to explain engineering or naval constraints. Or do we look at it and figure something out. Piaskowski said agrees with Ziller, no handling is best, but minimizing handling would reduce stress. Britton said engineering team will look at reducing one transfer, evaluate it, then report back. Souders said it's a trade-off with complexity. If it's a really big deal, we can go through a lot of extra effort to make that happen. If we go through all the effort and we end up in the exact same gut feel position by doing all that effort, then we've added a lot of complexity, failure points and we're not in a better situation. Piaskowski said the group is saying it is a serious concern, so we should look at it. Khan asked Souders to look at it. Budai said if trying to minimize number of times fish are moved, is it better to keep fish in one tank (no hopper, flume)? Ziller

said transfer is a pretty brutal experience, so yes. Doing it three times is tough on a fish. At some times of year, won't be a huge deal, but in fall will be. **ACTION ITEM: PDT will go back and re-evaluate a way of reducing fish transfers.** Khan can send out an update or phone call if needed.

2.4.8. Release location – Would release in tailrace near adult facility. Temperature difference with forebay there is minimal. Malone said Yakamas only release at night. Cowlitz release into ponds. NOAA has criteria for release/sec. Fielding said survival is for collection to release. Malone asked who keeps track of mortality after release. Griffith asked if post-release mortality for Yakama was due to predation, Malone said yes. Velocity dropped off right after release location, fry piled up along bank. Fielding said they still have to look at release location, that will be discussed further in the future. Budai said can even drive into water at adult facility. Fielding said they still need to do a field trip. Ziller said we have rainbow trout (predation) to consider. Khan said we can circle back to release site at next meeting. Griffith said NWP isn't considering any big acclimation facility since temperature isn't a concern. Khan said more information will come in June. **CONCLUSION: Release location topic will be revisited.** Askelson said it'd be important to consider project operations, whether point of release is upstream or downstream of RO/powerhouse confluence. Jundt will talk with folks using stress release ponds, will do more research. Eppard said would be good to have a list of criteria for consideration. **ACTION ITEM: Fielding will get list of fish release requirements from Jundt.**

2.5. ODFW piped bypass concept presentation by Jeff Ziller – Ziller pointed out that in original get-together with PDT there were 3 alternatives that included bypass. Those didn't move forward, a lot had to do with cost. Didn't know if FSS-TAH would meet criteria, but was best idea at the time. Additional information has come out (Clackamas, stress studies). We may be going down road that doesn't get us replacement. Work by Kock (USGS) indicates TAH doesn't come close to the success for the Clackamas system, which has a 7 mile ride down pipe with high survival rate. Did use guide nets which increases collection rates. Nets aren't full exclusion, are just to keep fish from spillway because survival there is poor. Smaller net close off voids behind collector. Fielding asked if there's a reduction of collection when spilling, Jundt said spill is infrequent. Ziller said wild Chinook population in McKenzie isn't increasing. Cougar reservoir has a lot of copepods, poor survival when start handling fish. Mullen asked if it was fall problem or spring fish too, Ziller said fall problem. When fish hit salt water copepods will fall off. Big idea: rather than coming into tanks, have flexible hose that goes into some connection point at dam, through non-pressurized pipe through dam. Key is holding the reservoir at one elevation as much as possible, mainly during the fall period. Surface collector sits at 1532, run fish from there. Key to making it work is to use Cougar reservoir as augmentation during June-Sept. End up at bottom at Oct, fish have free passage then, keep it down there during winter period and just pass inflow. Keep reservoir at same elevation during winter. Jundt said what she heard at the last meeting is that there's a really big budget for O&M with this project, this would help with that. Pierce asked, have to get aggressive with outflows during winter, how do you deal with flows over 1000 cfs going through other outlet.

Ziller said water that goes through RO still has to go through tower. Over 1000 cfs there could be fish going through there, need to have deflector-type structure to increase survival for fish going through RO. Piaskowski said so the first 1000 cfs would go through FSS, any extra would go through RO but it would need a modification to increase RO survival. Griffith said there's a lot of things to work out. Flood control is authorized purpose and can't eliminate that. Ziller said don't have to raise reservoir unless have flood condition downstream. Griffith said flood purpose doesn't make this alternative infeasible, but need to determine, if have single connection point that can fish over 30 feet, than how often would this alternative not be possible. Need to clearly define what kind of bypass criteria want bypass team to work within. Ziller said was looking at one non-pressurized pipe, could look at minimal pressure. Jundt asked when reservoir stratifies. Pierce said though was ~May. Jundt asked if that would change with this option. Griffith said we need to look at a lot of things when considering an alternative. Budai said the PDT looked at a hybrid option. Griffith said that was different, was using RO at lower elevations. Ziller said Taylor said 1590 was where temperature control ended, may be other ways to have temp control. Pierce said should be some option for temp control with collector, since we'll be modifying tower. Pierce said come October, you would have already have flushed a bunch of fish out. Jundt said if we get most of the fish out, that's a win to her, moving fish out outside of the copepod time period. Khan said Cougar reservoir has been drafted sooner in the last few years, and that isn't a lot different from Ziller's presented rule curve. Mullen asked if that changes how floods are handled, Askelson said the reason we're lower on rule curve is to handle floods when they occur. Ziller said there are very few times when we have floods in Sept, Oct. Most don't occur until Nov. Piaskowski said we can analyze the hydraulics. Could manage operations to try to soften changes that occur due to rain events. Askelson said need to look at exceedances. But that still doesn't tell you how water gets out from year to year. Ziller said with this option, we'll still need trap and haul. May still have stressed fish when storms start coming, but bypass will cover the max stress period. Piaskowski said Ziller is presenting an alternative to minimize handling due to concerns in meeting survival targets with the current alternative. Ziller said the holding portion of the current alternative is where he jumps off the ship. Jundt said if fish never get collected and move out earlier, that's a win as well. Askelson said if we get fish out before they're infected, then do we have to bypass them. Ziller said then you're dumping a bunch of fry. Piaskowski said most fish aren't approaching the dam until later, fish aren't interested in leaving in mid-summer. Griffith said the answer is yes, but peak passage will likely still be in fall, size of fish seems to be trigger of when fish move out. Ziller said bottom line is trying to keep fish from going extinct. This is really important: he hears we'll get volitional passage in the future. He doesn't see that as an option. We should go with the most successful option now, because chance to redo it later is small. A huge amount of staffing is not necessary if we pipe fish out. Size of tanks in spring for fry could be much smaller. Bottom line: you don't hold the fish. If you have to sample fish, do it at the bottom (tailrace). Problem with the TAH, you have to do something with every fish. He doesn't want to change the timeline at all, just want the option to add this piece to the puzzle. Maybe you don't change the design of the AV, but maybe add option for bypass pipe. Add option for real-time passage. Piaskowski asked group, so we don't think we'll meet survival without bypass option, so you're asking Corps to include bypass option. Reis said rather than have to ask for an upgrade later, this would be included in the

original design. Ziller said needs to be designed upfront so it's completely clear. Jundt said it improves design, but needs to be looked at, she's concerned about infected fish in the fall and if that's the primary timing for fish, this then seems to be a good hybrid approach. Piaskowski said ODFW says this needs to be incorporated to meet success, does NMFS think so too, Jundt said she supports it. **CONCLUSION: ODFW and NMFS support incorporating volitional bypass approach into FSS design in order to successfully meet survival target.** Mullen said she thought Clackamas data was preliminary, fish were leaving year-round, passage timing is changing. Neuenhoff suggested having a meeting with high-head bypass, ODFW, and NMFS where objectives are collated. Griffith said bypass is important to look at, but schedule is also important. Jundt asked what Corps support is, Piaskowski said Corps has same fish concerns, but we also have schedule concerns. The Corps team would have other considerations.

2.5.1. Role of WFFDRWG team in bringing topic forward to Steering Team – Reis asked if the group if they thought this option would be worth the extra resources, if so then what is the ask we're putting up to the Steering team? Piaskowski said he thinks the ask is for extra resourcing for bypass option. Jundt said this alternative has come up in the past, the group has liked it, so now if we're being collaborative the question is what is the Corps' view? Khan said so the purpose of this agenda item is to bring this up to the Steering Team as to resourcing, it doesn't slow down PDT. Overall, the group supports the bypass concept. Griffith said to caution group, there's no wiggle room to add stuff like this, adding resources has consequences, have to determine how important this is when considering long-term schedule. Eppard suggested getting commitment from agencies to do this together. Agencies could support by providing resources – engineers, etc. If requires commitment from Steering Team level, then let's do that. That's a place to start. Could to parallel to PDT design without disrupting their process. Piaskowski said he heard concerns about meeting survival criteria. **CONCLUSION: Piaskowski will take message that WFFDWG is concerned about meeting survival criteria to the Steering Team and request resourcing for bypass option.**

### 3. Next steps

#### 3.1. Next WFFDWG (June 5, 2018)