Meeting Summary

FISH WORK GROUP

Monday April 20, 2020

WebEx

Monday, April 20, 2020: 9:30 AM

Participants

Core members: Kyle DeJuilio (YTFP), Steve Gough (USFWS), Brandt Gutermuth (USBR/TRRP), George Kautsky (HVTFP), Ken Lindke (CDFW, coordinator), Seth Naman (NMFS)

Other participants: Justin Alvarez (HVTFP), Taylor Daley (USFWS), Mary Claire Kier (CDFW), James Lee (USBR/TRRP), Oshun O'Rourke (YTFP), Eric Peterson (USBR/TRRP), Nick Som (USFWS), Shane Quinn (YTFP)

Action Items Outstanding from Previous Meetings

Action Item 1: Seth will investigate the differences in mainstem Trinity River temperatures between Douglas City and the North Fork Trinity River to inform the next step in reconciling juvenile and adult temperature targets in July.

Action Item 2: Ken will finish draft write-up of the proposed juvenile salmonid habitat target and distribute to work group members for review.

Action Item 3: George and Shane will finish draft write-up of the proposed spring Chinook Salmon harvest target and Ken will distribute to work group members for review.

Action Item 4: Justin will finish draft write-up of the proposed brown trout target and Ken will distribute to work group members for review.

Action Items Outstanding from Previous Meetings

Action Item 3 (29 July): Kyle will coordinate with the physical work group to incorporate the concepts of proposed target 2.2 from his juvenile food production presentation into targets being developed by the physical work group.

Summary of Meeting by Agenda Item

Juvenile and adult salmonid temperature needs: compatibility across targets

Seth presented a time series of summer river temperatures with the new juvenile rearing temperature target range (13.5-16° C) at the North Fork and the relevant component of adult spring Chinook holding temperature target (60° F, 15.6° C) at Douglas City, showing that these two targets overlap for the entire month of July. Between 15.6° C and 16° C, temperatures would appear to violate the adult target while complying with the juvenile target. Seth noted the vast majority of juvenile Chinook Salmon have already migrated downstream of the North Fork by 1 July, and offered one solution for the incompatible targets would be to end the juvenile target on 30 June. Also, the adult target at Douglas City is a lower temperature than the proposed juvenile rearing target, so any juveniles remaining in the upper river, including other species that are present year-round, would still be protected. Kyle noted the adult target is at Douglas City while the juvenile target is at the North Fork, and river temperatures in July increase moving downstream. If the warming between Douglas City and the North Fork is typically greater than the difference between the targets, the targets may be compatible. Seth agreed to investigate the differences in temperatures between the two locations in July. If the typical temperature difference is equal to or greater than the difference between targets, then there's no conflict and the juvenile target will remain as originally proposed. If the difference is less, the juvenile target will be moved back to 30 June.

Seth noted the real conflict is with juvenile outmigration temperature targets at Weitchpec, which are self-imposed by the program and not regulatory. In previous work group discussions, we've recognized the need to revisit these targets. Kyle explained the original justifications for the Weitchpec targets were to provide optimal/suitable temperatures for smoltification as late in the year as possible under the assumption that increased rearing time would prolong the growth period and result in larger fish at outmigration. He also noted that a lot of the justification for temperatures that are optimal for smoltification was based on hatchery studies because little else was available at the time. While the group agreed that larger fish at outmigration confers a survival advantage, all else being equal, there seemed to be little evidence that delaying outmigration by keeping the river colder would lead to increased growth. To achieve the targets at Weitchpec, the entire river upstream must be colder, which negatively affects growth. Kyle also noted the Program has been moving away from the Weitchpec targets for at least 10 years, citing the cessation of the 2,000 cfs bench prescribed in the ROD. Group discussion ensued on rethinking the juvenile salmonid outmigration targets (aka the Weitchpec targets). Ken pointed out that if you move the compliance point too far upstream you risk creating unsuitably high temperatures downstream that could act as a thermal barrier to migration. In contrast, if you have it too far downstream, like it is now, you have to create unsuitably cold temperatures upstream to comply with the target. Ken suggested leveraging the Klamath and Trinity River RBM10 models to develop a target that is some function of the Klamath River temperatures during outmigration. For example, temperatures at Weitchpec should be within some range of the Klamath temperatures during outmigration at that location so that thermal shock from entering the

Klamath is minimized. Kyle agreed to start a subgroup to re-evaluate the outmigration temperature targets, and he was joined by Taylor.

40-mile terrain for SRH-2D: when and why do we need a new one?

Ken initiated the discussion by sharing information from Josh Boyce (USFWS). The habitat team is developing a proposal for creating a 40-mile habitat model in 2021 and there have been enough changes to the river since 2016 that it would not be worth pursuing this project without a new terrain. Kyle offered that we'd be happy to weigh in on the need for a new terrain, but it should really be up to the Design work group to recommend an appropriate time and spatial scale to redo terrains for the Program. Ken reiterated that all work groups are being asked to provide this input. Kyle also noted that the habitat team collects data to supplement as-built surveys at an approximate cost of $100,000 per site, so doing this for one site per year costs about the same as doing a new 40-mile terrain every five years. If funds are limited, the design work group should consider whether the supplementary data collection could be foregone and replaced with 40-mile terrains on a less frequent basis (e.g., 5 years). Kyle also noted that there are several recent or current projects that have used the 2016 terrain (e.g., off-channel fish growth, macroinvertebrate drift), and that future projects would benefit from a new terrain. Ken reminded the group that we need to provide specific justification for the need for a new terrain and the consequences of not obtaining one, so this would only include studies that are currently planned. No other need for a new terrain was expressed.

What juvenile salmonid physical habitat method should be used programmatically, e.g., WUA, Capacity, wetted area?

The conversation started with Ken describing Weighted Usable Area (WUA), what variables are used (depth, velocity, distance to cover), and how it is calculated. He then summarized critiques of WUA, largely derived from Railsback (2016). WUA doesn't have a clear biological meaning (e.g., carrying capacity), it assumes all input variables act independently and have equal weight in determining habitat value for fish. In addition, it does not account for imperfect detection when collecting field data to develop habitat suitability curves for each input variable, so suitable habitat that is unoccupied for other reasons (e.g., there was no spawning in the area) is assumed to be unsuitable, among other issues. Ken then turned the conversation over to Nick to describe Capacity.

Nick started by asking if there was any debate within the work group on whether Capacity is better than WUA and should be the habitat method of choice for the Program. Seth pointed out that neither WUA nor Capacity account for the important habitat variables of temperature and food availability, both of which interact with physical habitat to determine habitat suitability. Ken and Nick responded that both models are only intended to represent physical habitat. The S3 model accounts for all three components of habitat (physical, temperature, and food), but it isn't

a habitat model, per se. We don't currently have a stand-alone habitat model that accounts for all three components. Brandt noted that regardless of the method that we use, he and others need to be able to clearly explain it in layman terms to members of the public and in a regulatory context. He understands WUA, but would need to get up to speed on Capacity if the Program adopts it going forward. Kyle pointed out that because the Capacity model essentially provides an estimate of fish if all suitable habitat was fully saturated, it results in unrealistically high values. Nick replied that even though the output is in terms of number of fish, it should be viewed as an index for the reason Kyle described. Nick then described the Capacity method, including that the model and field observations account for imperfect detection, site selection for field observations explicitly included the full range of depth, velocity and distance to cover conditions available in the study area, presence/absence and abundance of fish across time and space is accounted for (e.g., accounting for suitable habitat that is unoccupied for other reasons), and the model allowed the data to determine the relative importance and interaction among depth, velocity, and distance to cover in determining habitat suitability. Notably, the model indicates that depth does not appear to be a strong predictor of suitability.

Ken brought the conversation back to Kyle's point about habitat saturation. If field observations were collected when habitat was not saturated, thus suitable habitat was observed with little to no fish present, and model output essentially describes full saturation, is there a mis-match between data input and model output that is of concern? Nick responded that the model explicitly accounts for this phenomenon in the zero-inflation component of the model and random effects on time and distance to Lewiston Dam.

George asked that someone clearly state the action that is being requested for this topic, and Ken explained that we should make a recommendation from the Fish work group as to what habitat method should be used across the Program going forward. Ken added that several methods had been used in the past (e.g., WUA, categories of total or optimal habitat), and using a single method would streamline design, planning, permitting, etc. and make retrospective comparisons easier in the future. George pointed out that we have past data that needs retrospective analysis and asked how we would accomplish that if we changed our methods. Ken, Nick, and Kyle explained that all methods used to date, including Capacity, use the same input data from SRH-2D, so there's nothing precluding us from calculating any method if the need arises. Kyle also pointed out that the only SRH-2D model that is widely understood to provide suitable data is the 2016 terrain, and any method can be used on these data.

There was no objection to recommending Capacity as the method to use programmatically from now on, and Ken agreed to prepare a memo providing this recommendation from the Fish work group.

Agenda items for next fish work group meeting

The group reviewed the annual work plan developed by the work group on 10 October, 2019. Including the few unaddressed tasks from that list, the work group agreed to include on the agenda of our next meeting the following topics:

- Continue targets refinement and development
- Future management of Hamilton Ponds, contingent on the COVID-19 stay-at-home order being lifted so we can do a site visit
- Reconsideration of juvenile salmonid outmigration temperature targets, contingent on progress made by that subgroup

Seth suggested we start working on plans for Hamilton Ponds asap. It will take us awhile to develop recommendations, and if we wait too long CDWR will likely take their own actions because they own and manage the property. Kyle said if we're going to do a site visit, as many people as possible should snorkel the ponds. Brandt noted that Todd Buxton is working on a sediment management analysis that includes fine sediment delivery to the mainstem Trinity River from Grass Valley Creek. We should consult Todd as to whether enough information is available from that analysis to inform our discussion, and if not we should wait until the information is available.

Stream Salmonid Simulator (S3): utility for hydrograph evaluation and other TRRP needs

Kyle led the discussion, which started by explaining that in recent years S3 model results have shown very little distinction between ROD hydrographs and proposed hydrographs. Comparisons this year between ROD, proposed, and scaled natural hydrographs did show a difference for scaled natural flows, which indicates that the model can resolve differences in hydrographs. However, the timing and magnitude of flows in ROD hydrographs and proposed hydrographs are so similar that they're essentially indistinguishable in S3 output, and the group should reconsider whether hydrograph selection is a good use of S3. Nick questioned whether folks thought differences between ROD and proposed hydrographs were large enough to elicit a real population level response. People generally agreed that they were not. Nick added that if we don't expect a real response in the population, then we certainly shouldn't expect a response in S3 outputs.

Kyle continued by asking, if we don't think hydrograph selection is a good use for S3, what else should we prioritize S3 for? Nick suggested extending the model to Weitchpec as an important task that needs attention. Ken asked if a better use of modelers time would be training others to format S3 input data to free modelers' time up to run more scenarios. He added that the ultimate goal is to get more mileage out of S3 for the Program. This has been a challenge because there are so few people that can run the model and they have limited availability. Nick agreed that this would be good and added that we should expect an R package to be available soon. That will

make the model publicly available for anyone to run. Nick also offered to hold a training on model input data formatting, and Ken agreed to coordinate and schedule that training.

Kyle also pointed out a consistent pattern observed across years that S3 predicts more fish and higher biomass in drier years, as shown, for example, this year when comparing ROD and recommended hydrographs between dry and critically dry release volumes. While it isn't appropriate to directly compare water year types in this way because the underlying water and atmospheric temperature models are different between water year types, the consistent pattern appeared concerning. Nick offered an explanation. First, the model is only to the North Fork, so we're only looking at emigration from the upper river and not total Trinity River production. Spawner abundance in recent years has been so low that density-dependent survival and movement of their progeny are not at play, so survival, growth, and movement is largely driven by temperature. Less water results in warmer temperatures, which increases growth and leads to earlier emigration. Emigration is driven, in part, by growth. So, fish in the model are growing faster, faster growth leads to earlier emigration, earlier emigration means lower residency time, and lower residency time leads to higher survival. The faster growth and increased survival results in higher biomass and more fish in lower water years. Noting again that the model is only to the North Fork, Nick added that the result may be different if the model was taken all the way to Weitchpec.

Ken asked whether this phenomenon has been observed in the Klamath River, another place S3 is used. Nick and Kyle responded that questions being answered by S3 on the Klamath are substantially different and don't lend themselves to addressing this type of a scenario. The group agreed that we should reconsider the use of S3 for hydrograph selection, but Nick added that it could be beneficial to continue showing the contrast between ROD/recommended hydrographs and scaled natural hydrographs. This would give us and the TMC an annual reminder that significant changes to flow management, such as synchronizing dam releases with tributary flow events, could provide substantial benefit to juvenile salmonids. The group generally agreed that S3 is not particularly useful for hydrograph selection between ROD and proposed alternatives, but that it could be used as Nick suggested. No clear recommendation to continue or discontinue the use of S3 was developed, but the group will reconsider next year before hydrograph modeling begins.

Means objectives and targets: review of progress to date

Ken shared a spreadsheet tracking progress on targets development. Of the 16 objectives for which the workgroup has pursued targets, 8 have been completed, 3 are in progress (see below), 2 are established but are in need of revision, and 4 have not been started. One of the established targets is also in progress for revision, so it's in both categories.

Means objectives and targets: update on juvenile flow-to-habitat target

Ken shared the progress he and Aaron Martin (YTFP) had made recently, but he did not have a write-up to share. Development of a target for the entire 40-mile restoration reach is on hold awaiting the results of a habitat report that's in progress. The restoration site-specific target is based on increases in area under the curve of the flow-to-habitat relationship compared to pre-construction conditions and was updated as follows: it will be based on the design condition, not the as-built condition, the site will maintain 80% of the gain in AUC over the long term, and long term will be defined as 10 years. These were the three outstanding issues with the target as presented in previous work group meetings. Ken will complete the write-up and distribute it to work group members for review.

Means objectives and targets: spring Chinook Salmon harvest

George shared a draft write-up with the group and explained that the spring Chinook harvest target was developed using the same conceptual approach as the fall Chinook harvest target. By starting with the spring Chinook escapement targets for natural-origin and hatchery-origin adults, one can back calculate the number of adults that would have to have been alive to achieve escapement targets and provide full harvest opportunity. Full harvest opportunity was defined as the maximum allowable spawner reduction rate defined by the Pacific Fishery Management Council, and George used the fall Chinook reduction rate as a surrogate. George will finish the write-up with help from Shane and distribute to work group members for review.

Means objectives and targets: brown trout

Justin gave an update on this target. He has been working on incorporating comments from the last fish work group into the write-up. These updates included explanations on why the 35 cm size limit was selected and how the numeric targets were derived. He will finish the write-up and distribute to work group members for review.

Means objectives and targets: provide thermal regimes to promote spawning success of spring and fall Chinook Salmon, aka, pre-spawn mortality

Kyle did not have a write-up to share, but he described the concepts that he and Steve had been working on. There is a pre-spawn mortality analysis included in the adult synthesis report that is in progress, which will be used to inform the target. Pre-spawn mortality has generally been below 10% in all years except a few pre-ROD, but these occurred in high abundance years. They propose to define the pre-spawn mortality target in terms of abundance so the numeric target could be higher in high abundance years. The rationale provided was that during large runs thresholds for other density dependent sources of mortality (e.g., redd carrying capacity and superimposition) may be reached that ultimately limits juvenile production. Ken noted that the target shouldn't be so high, even in high abundance years, that we would meet our target when there is a very high number of dead fish (i.e., a fish kill). Kyle added that it isn't clear what level of mortality would be defined as a fish kill, and that fish kills often happen in a different time and space (i.e., earlier and downstream of spawning locations) than what we're generally

concerned with for pre-spawn mortality. He reiterated that if enough females make it to the spawning grounds to saturate spawning habitat and/or reach juvenile carrying capacity, those earlier deaths would not be a limit on juvenile production. A write-up will be completed when the analysis from the adult and juvenile synthesis reports are complete, which will facilitate estimation of adult-to-smolt metrics.

4:00 PM Adjourn