Cooper Lake Project (FERC No. 2170)
Technical Meeting of the Cooper Creek Instream Flow Review Team,
and the Relicensing SWG Fish Habitat Working Group
January 10, 2005

Meeting Summary

Attendees:

Stuart Beck (R2 Resource Consultants) *
Margaret Beilharz (USDA Forest Service [USFS]) *
Dave Blanchet (USFS)
Phil Brna (USFWS)
Karen Demsey (Long View Associates) *
Jim Ferguson (Alaska Department of Fish and Game [ADFG])
Jason Kent (HDR)
Joe Klein (ADFG)
Jan Konigsberg (Natural Heritage Institute)
Larry Peltz (NOAA Fisheries [NMFS])
Gary Prokosch (Alaska Department of Natural Resources [ADNR] – Water Resources Div.)
John Morsell (Northern Ecological Services) *
Sally Morsell (HDR) *
Dudley Reiser (R2 Resource Consultants) *
Robert Ruffner (Kenai Watershed Forum) *
Rob Spangler (USFS) *
Burke Wick (Chugach Electric Association [Chugach])

* by phone

Agenda:

- Overview of changes in final habitat model
- Overview of changes in final study report
- Review of results of new temperature modeling
- Discussion

Overview of Changes in Final Habitat Model

Jason Kent (HDR) briefly reviewed the changes made to the Cooper Creek habitat (PHABSIM) model, noting that the changes had primarily been to address review comments by R2 Resource Consultants (on behalf of the USFS). Jason explained that the final changes to the model had not appreciably changed the modeling results; there were small percentage changes in the habitat values, but the predicted relationships between the existing scenario and the alternative flow scenarios had not changed. He explained that the changes were largely to the results for the reach upstream of the Stetson Creek confluence, and all changes pertained to fry habitat (for all four species of interest) in riffle-cobble and riffle-boulder habitat. In this reach, the final model changes resulted in a greater amount of predicted fry habitat for the existing condition, and an increase in the amount of fry habitat for the "30 out" flow scenario relative to the "10 out" scenario.

Overview of Changes in Final Instream Flow Study Report

Jason Kent explained that the final report had been modified to reflect the changes in the habitat modeling results described above. Other changes to the report included:

- Addition of an acknowledgements section
- Addition of summaries of the Cooper Creek Streamflow and Water Quality Study and Cooper Creek Fish Resources Study
- Modified climate analysis, which emphasized Cooper Creek data (while acknowledging the period of record is short), rather than data for other streams

Review of Temperature Modeling Results for New Flow Scenarios

Jason Kent explained that he had been assigned the task of modeling temperatures that would be associated with flow scenarios involving only releases from Cooper Lake Dam (with no diversion of Stetson Creek). The requested modeling scenarios were releases from the dam of 5 cfs, 10 cfs, 25 cfs, 50 cfs, and 75 cfs. The results had been presented in a memorandum that had been distributed earlier in the week (see attached memorandum).

Jason explained that Figures 1 and 2 in the memorandum compare the modeling output for the five new scenarios to the existing scenario, with the spawning periodicities and range of optimal spawning temperatures for the four species of interest overlain on the temperature graphs. Figure 1 shows the results for immediately above the Stetson Creek confluence, and Figure 2 shows results at the mouth of Cooper Creek. Jason noted that there was some overlap in the coho salmon and Dolly Varden temperature/periodicity blocks that was difficult to see but discernable on color printout of the graphs.

Jason continued with review and explanation of the figures in the memorandum. Figures 3 and 4 depict the average monthly differences in temperature between the existing condition and flow release scenarios. Jason noted that these graphs suggest there is an "inflection" point, or a point of diminishing returns of temperature gains with increasing flow releases, but noted that determination of such trends was not part of the requested modeling.

Discussion

<u>New Temperature Modeling:</u>

Joe Klein (ADFG) commented that the habitat and temperature modeling conducted for this study had been very helpful, and that the new temperature modeling graphs were also very instructive. Joe stressed, however, that while these graphs depict only the optimal temperature ranges for spawning, it is important to consider the upper and lower *limits* of spawning as well; for example, fish in other systems are able to spawn above the optimal temperatures shown in these graphs, and therefore, temperatures falling outside the optimal range should not necessarily be considered a limitation. Rob Spangler (USFS) and Larry Peltz (NMFS) agreed. Dave Blanchet (USFS) identified Grant Creek, Crescent Creek, Juneau Creek and Daves Creek as examples of Kenai River basin streams where chinook salmon are doing very well despite higher than "optimal" spawning temperatures.

Jason Kent noted that the optimal temperature ranges shown on the charts were developed by the Instream Flow Review Team during a meeting to develop habitat suitability criteria for the

modeling and through follow-up email communications. (He referred the group to Table 7 in the final Instream Flow Study report.) Joe Klein and Phil Brna (USFWS) suggested it would be helpful to add the upper and lower limiting temperatures on the new temperature charts.

Flow "Optimization" Exercise by R2 Resource Consultants:

Dave Blanchet stated that the USFS had asked R2 Resource Consultants to review the new temperature modeling results and attempt to develop some flow optimization possibilities based on flows and temperatures on a monthly basis. The resulting graphs had been distributed to the Instream Flow Review Team the previous day. (See attached graphs.)

Stuart Beck (R2 Resource Consultants) explained that R2 had taken the final habitat modeling results plus the new temperature modeling results and from this information had compiled three sets of graphs: 1) average temperature habitat suitability for different species and lifestages with varying flow – upstream of the Stetson confluence; 2) average temperature habitat suitability downstream of the Stetson confluence; and 3) composite weighted usable area (WUA) curves. He explained that for the temperature analysis, they converted the recent temperature modeling output into a "temperature habitat suitability index." For this index, the optimal range for a given species/lifestage was assigned a value of 1, all other temperatures within the upper and lower temperature limits were assigned an index value of 0.5, and temperatures outside the upper and lower limits were given a value of 0. He noted that the lifestages evaluated did not include incubation.

Stuart first reviewed the analysis for rainbow trout spawning for the month of May, in the Alluvial Reach. He noted that in terms of temperature, there is no improvement in temperature suitability up to a 10 cfs release; thereafter, there is a steady improvement that starts to level off at a flow release of about 50 cfs. Stuart noted, however, that the WUA curves indicate spawning habitat in this reach peaks at a flow of about 70 cfs — which is very close to the median May flow for this reach of 69 cfs. Stuart summarized that the results of this analysis therefore indicate that while flow releases would improve temperature conditions for rainbow trout spawning in the Alluvial Reach, they would result in a decrease in physical spawning habitat in this reach (i.e., the temperature and habitat suitability with flow releases would tend to offset each other to some extent).

Continuing with review of the results for rainbow trout spawning in the month of May, Stuart explained that in the Stetson Reach (upstream of the confluence) there is a large increase in habitat suitability going from no flow release to a release of 5 cfs, and then less improvement after that. He noted that the WUA chart indicates that rainbow trout spawning habitat in this reach peaks at about a 20 cfs release. Stuart noted that considering the upstream and downstream results, this analysis suggests there is the possibility to improve conditions for rainbow trout spawning during May in the Stetson Reach but not the Alluvial Reach.

Stuart also stated that if flows are to be released for spawning, there would also be the need to provide flows sufficient to keep eggs wetted throughout incubation. He noted that the situation is more complicated for coho salmon, chinook salmon, and Dolly Varden incubation because there is freeze-up and icing during the incubation period. Stuart explained that as a rough rule of thumb, flow during incubation should be at least 2/3 of the flow for spawning. He also noted that cumulative thermal units are another factor that needs to be considered in developing a flow regime.

Stuart also reviewed the graphs corresponding to potential flow releases in July, when chinook spawning is occurring. Stuart pointed out that the WUA graphs indicate the area of physical habitat in the Alluvial Reach continues to increase with increasing flow releases, whereas in the Stetson Reach, it peaks at around 40–50 cfs. The temperature analysis suggests that in the Alluvial Reach there is a big improvement in thermal conditions from 0 to 10 cfs release from dam, peaking at a release of around 25 cfs. At flow releases greater than about 25 cfs, the thermal regime for chinook spawning decreases because the water becomes too warm. Stuart summarized that based on this analysis, there is the potential to improve conditions for chinook spawning in the Alluvial Reach. He noted that there are also opportunities for habitat improvement in the upper and lower reaches later in the summer (when coho salmon and Dolly Varden are spawning).

The group discussed the information and asked clarifying questions about R2's analysis. Stuart Beck pointed out that the Dolly Varden temperature suitability curves in particular highlight the fact that a lot of potential spawning occurs outside the narrow "optimal" temperature range.

Cumulative Temperature Units:

Jan Konigsberg (NHI) commented that under existing conditions in Cooper Creek, temperature suitability as shown in R2's analysis is all above a value of 0.5; based on this, it seems there should be some spawning by all four of these species under current conditions.

Larry Peltz stated that he had made the same observation and had conducted a separate analysis to try to understand what other factors might be limiting spawning use of Cooper Creek. Larry noted that he had sent out to a few people in the group an Excel spread sheet showing the results of his analysis. (See attached spreadsheet.) He explained that ADFG had collected daily temperature data on the Kenai River in 1998–1999, including on Cooper Creek and Crescent Creek. Observations at the same time indicated that chinook spawning occurred in Crescent Creek but not in Cooper Creek. Larry explained that he used the daily temperature data from these two creeks and made three basic assumptions for his simplified analysis: 1) all chinook spawn in both creeks spawn on July 20 [representing a mid-point or peak in chinook spawning]; 2) the eggs hatch upon achieving cumulative temperature units (CTUs) of between 475 and 525 [based on hatchery data]; and 3) emergence occurs at 880 to 1,000 CTUs [based on hatchery data]. Larry pointed out that under these assumptions, in Cooper Creek eggs hatch about 10 days later than in Crescent Creek (in September); by October, Cooper Creek is 220 CTUs behind Crescent Creek. He noted that all CTUs are essentially accumulated before November (not in winter or spring). As a result of the lag in CTUs, emergence would not be until June or mid-July in Cooper Creek (6 to 7 weeks later than in Crescent Creek), whereas the conditions they need to survive are probably not available after May. Larry stated that this analysis is very instructive because it shows that incubation — not spawning — is the likely limiting factor. He noted that observations of the small coho fry in Cooper Creek are consistent with this hypothesis.

Larry then explained that he used the results of Jason Kent's recent temperature modeling runs of flow release scenarios to try to estimate what flow releases from the dam it would take to provide enough CTUs in Cooper Creek to mimic emergence timing in Crescent Creek. He summarized that the results suggested that with flow releases of 10 cfs July 10–19 and releases of 25 cfs July 20 – September 30 (and with no diversion of Stetson Creek), it would be possible to make spawning and incubation successful for chinook in Cooper Creek. Larry noted that he did not

bother evaluating potential conditions in the Stetson Reach because the chinook would not have gone that far upstream through cold water to spawn there.

Dave Blanchet commented that records indicated that chinook did spawn in Cooper Creek for the first few years (approximately 1 life cycle for chinook) after the dam was constructed, but not thereafter. Larry Peltz speculated that this was most likely because the progeny did not survive to complete the lifecycle (because they were too small to outcompete everything else in the Kenai River), effectively ending the chinook run into Cooper Creek. Bill Hauser (Alaska Flyfishers) agreed that fry will not survive if they are not big enough when they outmigrate.

Larry Peltz pointed out that his analysis was just a model like the temperature model; there is nothing special about the numbers used in this model (10 and 25 cfs flow releases), because fish will adjust within a range of temperatures. Larry also noted that his analysis only considered chinook, because this is his focus. He added that he was not sure there was any practical solution that would help rainbow trout in any case.

Jason Kent cautioned that both Stuart Beck's and Larry Peltz's analyses were based on 2003 temperature data (the data set used to construct the SNTEMP model). Jason reminded the group that the climatologic analysis added to the instream flow study report showed that 2003 was a year of abnormally high air temperatures (based on a 40 year record) and low flows (based on a 7 year record); therefore, any temperature results from these analyses could overstate the effectiveness that might be achieved in an average year. Jason noted that conditions will naturally vary year by year, but that the effect of using 2003 temperatures is just something that should be kept in perspective. Dave Blanchet added that based on USFS and ADFG data temperatures from April to May in 2003 were a peak of record, but from June through August, temperatures were above average but not extremely so; there was greater variability in the fall of 2003. Dave concluded that 2003 temperatures were elevated from the rest of the record, but overall not by more than a degree. Stuart Beck stated that his review of air temperatures indicated that July and October 2003 were exceptionally warm.

Phil Brna commented that even with the potential temperature variability, the sum of these analyses indicate that it is technically feasible to improve chinook spawning/incubation in Cooper Creek through a flow release from the dam alone. Phil also pointed out that with any flow mitigation there would be a need for monitoring, so that if the fish do not respond right away it can be considered whether something else needs to be done.

Larry Peltz agreed to distribute his analysis to the rest of the Instream Flow Review Team / Fish Habitat Working Group.

Next Steps:

Burke Wick (Chugach) stated that he hoped the group felt there was sufficient information now to move ahead toward deciding what should be done. He noted the relatively short time remaining before the FLA needs to be filed. The group indicated that there was now sufficient information and that there were no further requests for modeling runs or data presentation.

The group discussed at length possible outcomes of the relicensing decision making regarding Cooper Creek flow mitigation, but ultimately agreed that this discussion would be more appropriate at a meeting of the full Settlement Working Group.

Closing:

Jason Kent agreed to send Larry Peltz the temperature modeling output (Attachment A in new temperature modeling memo). Margaret Beilharz (USFS) requested a copy of the new habitat time series spreadsheet from R2.

Dave Blanchet thanked Jason Kent for his patience in addressing the group's comments on the instream flow study through the various review steps. Jason thanked everyone on the Instream Flow Review Team for their participation in the study, noting that the study would not have been possible without their involvement.

The group decided that it would not be necessary to meet again the following Tuesday, as had been planned.

The meeting adjourned at approximately 1:30 p.m.