

MEETING NOTES

**SOUTH CAROLINA ELECTRIC & GAS COMPANY
SALUDA HYDRO PROJECT RELICENSING
Instream Flow/Aquatic Habitat Technical Working Committee
Instream Flow Workshop
SCE&G's Lake Murray Training Center
December 11-13, 2007**

Final CSB 2-20-08

ATTENDEES:

Ron Ahle, SCDNR	Dick Christie, SCDNR
Gerrit Jobsis, American Rivers	Alan Stuart, Kleinschmidt Associates
Shane Boring, Kleinschmidt Associates	Kevin Nebiolo, Kleinschmidt Associates
Steve Summer, SCANA Services	Brandon Kulik, Kleinschmidt Associates
Jeni Hand, Kleinschmidt Associates	Hal Beard, SCDNR
Mike Waddell, Trout Unlimited	Matt Rice, American Rivers
Gerrit Jobsis, American Rivers	Amanda Hill, USFWS
Mark Giffin, SCDHEC	Randy Mahan, SCANA Services
Bill Argentieri, SCE&G	Scott Harder, SCDNR
Prescott Brownell, NMFS	

ACTION ITEMS

- Develop habitat duration analysis utilizing inflow data.
Kevin Nebiolo, Shane Boring, Brandon Kulik
- Perform a dual flow analysis for selected species/lifestages.
Kevin Nebiolo, Shane Boring, Brandon Kulik
- Develop 80% WUA summaries for the guilds and stand-alone species/lifestages.
Kevin Nebiolo, Shane Boring, Brandon Kulik
- Incorporate the following edits to the IFIM data report:
Brandon Kulik, Shane Boring
 - Add explanation of channel index.
 - Paragraph summarizing WUA for full flow range (for each study site and for whole river).
 - Add explanation regarding how flows were split around side channels.
 - Add discussion of rationale for why various guilds were run at study sites.
 - Incorporate additional guild runs from workshop into report.
 - Add text/figures summarizing pool ADCP profiles.

NEXT MEETING

**Instream Flow Workshop
January 23, 24 & 25, 2008
Lake Murray Training Center**

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These notes serve as a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

December 11, 2007

Shane Boring opened the workshop at approximately 9:30 AM. Shane noted that the first day of the workshop would focus on (1) review of the scoping and field execution phases of the Saluda IFIM study; (2) review of the draft Saluda PHABSIM report; and (3) providing TWC members with an opportunity to provide comments on the draft. It was also noted that, if time permitted, it would be worthwhile to begin prioritizing species/life stages in effort to reduce data to a point that a flow recommendation can begin to materialize.

Following introductions, the group reviewed the Saluda IFIM study goals, which were developed by the TWC during the scoping phase of the study and include:

- Identify a minimum flow for the Lower Saluda River (LSR);
- Determine flows needed for target species and lifestages, as well as the downstream floodplain;
- Determine the range of flows acceptable to meet these criteria;
- Determine how project operations affect these flows;
- Mimic the natural hydrograph of the LSR; and
- Consider impact of providing these flows on Lake Murray.

TWC members provided no additional comment or concerns regarding the study goals.

Brandon Kulik then presented an overview of the Saluda IFIM process which included review of the scoping phase of the study, site reconnaissance and transect selection, PHABSIM modeling, and resulting data report. Brandon noted that the draft report, distributed to the TWC prior to the meeting, is a data report only and is merely intended to document the data collection, PHABSIM modeling, and resulting Weighted Usable Area (WUA) calculations for target species at the various study sites. He added that the data report makes no effort to prioritize certain species and/or lifestages, nor is it intended to make flow recommendations. Brandon noted that development of management priorities and resulting flow recommendation would be the function of the TWC. Brandon's presentation is available online at <http://www.saludahydrorelicense.com/documents/PHABSIMTWCreview.ppt>.

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Following Brandon's presentation, Alan Stuart noted that it was his desire to come away from the workshop with at least a preliminary flow recommendation that could then be forwarded to the Operations TWC. He added that the Operations TWC would utilize the Operations Model to evaluate the feasibility of the recommended instream flows relative to other operational targets (i.e., lake levels, recreational flows, maintenance of summer striped bass refuge habitat in Lake Murray). Gerrit inquired as to whether the flow recommendations developed by the Instream Flow TWC would go directly to the RCG or vice versa. Alan explained that the recommended flows would be sent to the RCG only after they have been further refined through the operations model and the Instream Flow TWC.

Brandon then enquired as to whether the group had comments/question on the draft IFIM data report. Scott Harder noted that an explanation is needed in the text regarding how water levels were monitored to ensure stable conditions during data collection (i.e., staff gages). Scott also asked that language be added further explaining rationale of the calibration flows and associated Velocity Adjustment Factors (VAFs). Amanda noted that she would like to see WUA data expressed as percentages, possibly broken down by study site and/or species. Prescott Brownell asked for an explanation of the "channel index" and requested that it be more clearly defined in the report.

Dick asked Brandon how comfortable he was with the data collected. Brandon noted that overall he was very confident, adding that he and Scott Harder had consulted on specific hydraulic nuances at certain sites and had conducted sensitivity tests where necessary. There were a couple of isolated trouble sites in the model; Brandon specifically noted that 3 transects had originally been delineated at the Toenail Rapids area; however, the lowermost of these (transect 19) proved problematic. He added that the water surface elevations at transect 19 consistently uncoupled from transects 20 and 21 in the model, likely due to a downstream hydraulic control backwater effect. After unsuccessful attempts to resolve the hydraulic issues, he modeled this site with the two remaining transects, which had very strong hydraulics. He also noted that data collection was not possible at the proposed high gradient shoal transect just downstream of Millrace Rapids, noting the velocities and water depth made this area too dangerous for field crews to wade and that modeling data would likely not have been reliable.

Hal Beard expressed concern that no model results were included for striped bass, with the exception of the zone-of-passage assessment for Millrace Rapids. He reminded the group that striped bass are one of the most important fishery resources in the LSR. Specifically, Hal noted that recent telemetry studies by SCDNR suggest that the LSR is a major thermal refuge for Santee Basin striped bass during the hot summer months, with as many as half of fish tagged utilizing the LSR. Gerrit explained that the only criteria identified during the scoping phase of the study for riverine striped bass was for passage (i.e., no criteria for velocity, substrate); therefore the group had decided to examine striped bass only for zone-of-passage. Gerrit added that the current study zone-of-passage results are fairly consistent with the previous LSR IFIM study (Isely et al., 1995) (1200 – 1300 cfs). Gerrit noted that flows for striped bass passage should be directed to periods when they

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would occupy the LSR, adding that they are not present year-round. Steve Summer proposed that it might be possible to meet fish passage flow needs using pulsing rather than a sustained flow. Hal noted that the striped bass likely move into the LSR during a very short period in the spring; therefore the flow would need to be targeted to this period. Alan noted that SCDNR telemetry study would be important for defining when striped bass enter the LSR. Amanda noted that temperature would also be an important determinant of when they enter the system. Hal indicated that he would contact Jason Bettinger to obtain study results during the lunch break. It was also agreed that Brandon would obtain striped bass SI criteria (Crance 1985) and model runs and pools.

Following the break, Hal indicated that he had spoken with Jason Bettinger regarding the striped bass telemetry studies in the basin and had learned the following:

- A total of 34 striped bass have been tagged in the Congaree, with a little over 50% of these utilizing the LSR during summer;
- Peak movement into the LSR appears to be during month of April (April 21 and 22nd during 2007 and 2006); and
- Fish appear to move out of the LSR during a short time period (September).

Hal indicated that he would get more detailed information from Jason (i.e., diurnal patterns, size classes tagged) and forward to the TWC at a later date.

Ron Ahle noted that not all guilds were run at each study site and asked for an explanation of the rationale for deciding which should be run at a given site. Brandon noted that guilds represent overall use of a habitat type rather than a species group. Therefore, certain guilds intuitively are not going to be applicable at certain sites and thus are not going to drive the model. For example, deep slow species would not inhabit a riffle or shoal site. Dick, Ron and others noted that most IFIM processes they have been involved in have run all guilds at all sites. Dick added that SCDNR would likely want to see some additional runs at specific sites for certain guilds. Ron asked that the explanation provided by Brandon be included in the report.

Shane noted that, once everyone is comfortable with the data report, the next step would be to begin reducing the data. Brandon noted that this would likely involve prioritizing certain guilds and/or lifestages. It was suggested that this process begin with the trout data. The TWC subsequently engaged in an interactive session during which the study sites and associated flows that provide $\geq 80\%$ of maximum WUA for various trout lifestages were summarized (Table 1). This was facilitated through an interactive database operated by Kevin Nebiolo.

Meeting attendees suggested that, for further progress to be made on further reducing/prioritizing the study data, management goals for the LSR need to be clearly defined. Alan proposed that the group break to allow agency staff and NGO representatives to caucus regarding what they feel are the highest priority management goals. Agency and NGO staff caucused for the remainder of the

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meeting. After which, it was agreed that goals would be summarized at the beginning of the 2nd day of the workshop (December 12). The session adjourned at approximately 3:00 PM.

December 12, 2007

The session opened at approximately 9:00 AM. The group began by reviewing the LSR management goals developed by the agencies and NGO's during their caucus at the previous day's session, which included:

- Maintenance of a balanced indigenous aquatic community for the LSR, specifically to provide flows that represent 80% of maximum WUA for all species.
- Since the LSR is ecologically important to the Santee Basin striped bass fishery (as summer thermal refuge); should pay special attention to summer flows in the LSR.
- Provide flows that maintain and enhance the LSR trout fishery, particularly as it pertains to improving holdover from year to year and maintaining and enhancing trout growth in the LSR.
- Maintain option of implementing flows for shortnose sturgeon, if they are found to inhabit the LSR during the life of the license (See discussion below by P. Brownell, NMFS for additional detail).

Regarding shortnose sturgeon, Prescott Brownell noted they historically occurred in the Saluda River. He acknowledged that, while the species has not been documented in recent history in the LSR, the LSR remains open from a passage standpoint and thus can't be excluded as potential habitat. As such, Prescott noted that the NMFS would like to "keep the door open" to making flows for sturgeon a management goal if in the future they are found in the LSR. He added that considerable research is being conducted on the movements and habitat requirements of sturgeon, and that as new information emerges, we may be able to target flows that would make the LSR more favorable for sturgeon.

Prescott suggested that an analysis of project operations relative to the historic hydrograph might be useful for providing a perspective from which to build our management objectives for target guilds and species. Bill Argentieri noted that it was his understanding that examining pre-dam conditions was not part of relicensing. Prescott noted that NMFS would like to examine historical flows (hydrograph) on a seasonal basis and explained that they do not want to mimic pre-dam conditions, but would like to use historical flows as a baseline to compare to current flows. Gerrit Jobsis noted that it is important to evaluate historical flows to figure out if habitat is currently enhancing with the flows that are being provided and to also figure out how to enhance fish communities by seasonally mimicking historical flows. Gerrit suggested that a habitat duration analysis would likely be suitable for this purpose. Alan noted that the hydrographic period of record for the LSR is likely too short to allow for a thorough habitat duration analysis. He added that a longer period of record was extrapolated as part of the Operations Model and enquired as to whether this dataset would be

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suitable for the analysis. The group agreed that dataset was adequate and Kevin Nebiolo of Kleinschmidt was charged with developing the habitat duration analysis prior to the next meeting.

The group then turned its attention back to the rationale used for choosing guilds that were run at each study site. Ron Ahle noted that the paragraph summarizing the full range of flows was missing and asked that it be added. He added that the flows should be summarizing for the entire river, as well as a comparison of the upper river and lower river. The agencies caucused to discuss additional guilds that should be run for various study sites. The agencies agreed that the following additional guild categories should be run:

- For every shallow-fast habitat site, a deep-fast guild should be run using northern hogsucker criteria (spawn, juvenile, fry).
- For Shandon, a shallow-fast guild should be run using the generic guild criteria.
- Run the generic shallow-fast guild curve for all study sites.

The group then discussed modeling results for striped bass, which were requested the previous day. Brandon noted that he ran the PHABSIM model using the Crance criteria for the two deep run study sites (Reach 2 run and Reach 4 run). Brandon noted that, just as the SI criteria would suggest, PHABSIM results suggested that WUA is optimized at depths greater than or equal to 6 ft (i.e. strippers limited by depth in shallow sites). Shane then reviewed the two pool transects (below Saluda Dam and below Millrace Rapids) for which data were collected in coordination with the SCDNR using ADCP technology at each of the three calibration flows. Shane reminded the group that only bed profile and water surface elevation data were included, and as such, the pools were not part of the PHABSIM model. Both pools provide suitable depths for striped bass at the full flow range of interest. Shane noted that they would incorporate this information in the IFIM report.

Shane noted that, on the previous day the group had summarized flow for each trout lifestage that provide 80% or more of optimal WUA, and suggested that the group attempt to further refine potential use of this data. Alan Stuart suggested that, if flows are targeted seasonally for specific trout lifestages, the group needed to agree on when these lifestages would potentially occur (i.e. seasonality). After some discussion the group agreed that the following seasonal periods were reasonable for the considering known conditions in the LSR:

Lifestage	Brown Trout	Rainbow Trout
Spawning	October – February	January - March
Fry	February – May	March - June
Juvenile	March - October	January - July
Adult	Year-round	Year-round

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The session adjourned at approximately 3:00 PM. Attendees agreed that the following day's sessions would begin with a summary of the results of the additional PHABSIM runs for guilds.

December 13, 2007

The session opened at approximately 9:30 AM.

The meeting opened with a brief review of results from the additional PHABSIM guilds runs that were requested the previous day. Specifically, Brandon showed that the shallow-slow runs performed at most selected sites provided additional information, however, at the Reach 2 run, the shallow-slow results were less useful as the only significant habitat occurred at a narrow strip along the stream margin, regardless of the flow increment, and at high flows, in the forested riparian areas that became flooded.

The group briefly discussed the habitat duration analysis requested during the previous day's session. Gerrit noted that he had looked at the inflow data used by Jon Quebbeman (Kleinschmidt) to estimate historic flows for the LSR and agreed that the data, in his opinion, would be suitable for application to the habitat duration analysis. Group attendees agreed. It was agreed that Kleinschmidt would develop the habitat duration analysis and distribute results to the TWC prior to the next meeting.

The group then briefly discussed the need for a dual flow analysis. Brandon noted that the dual flow analyses typically assume that the high flows occur on a relatively frequent basis (i.e. daily, as is the case with peaking operations). Bill A. noted that this analysis likely is not applicable to Saluda, which is currently operated sporadically for reserve capacity and thus does not pulse the river frequently. Several attendees noted that a 50 year license is being pursued for the project and that operations have the potential to change during life of the license. After additional discussion, the group agreed that a dual flow analysis would be useful to provide a protective recommendation in the event that Saluda operations should some day be changed to peaking.

Noting that certain species are more susceptible to high flows (macroinvertebrates and fry and juvenile fish), Amanda Hill recommended that the group clearly define the species/lifestages to be included in the dual flow analysis. The group subsequently agreed that the following species/lifestages should be included in the dual flow analysis: rainbow trout, brown trout, macroinvertebrates, and the shallow-fast guild. Both Amanda and Brandon noted that areas closer to the dam would also be more susceptible and suggested that the group refine the area for which the analysis is to be performed. The group agreed that all of Reach 1 study sites, as well as the Oh Brother, and Ocean Blvd. sites should be assessed.

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The group then discussed the need to identify the flow range that provides 80% of optimal WUA for the guilds (similar to what was done during the meeting for trout lifestages). The group reviewed the lifestages/guilds and agreed that "80% WUA" tables were needed for the following:

Study Site	Guilds/Lifestages Requested
Shandon	Shallow fast, shallow slow
Reach 4 Run	Shallow slow, deep fast, deep slow
Ocean Blvd.	Shallow fast
Oh Brother	Shallow fast
Corley Island Main Channel	Shallow fast
Corley Island Side Channel	Shallow slow
Reach 2 Run	Shallow slow, deep fast
Sandy Beach	Shallow slow, shallow fast
Point Bar Run	Shallow slow, deep slow
Toenail Riffle	Shallow slow, shallow fast

In closing, the group reviewed the major data deliverables needed for the next meeting. The group agreed that the following additional analyses should be performed:

- A habitat duration analysis utilizing the historic hydrograph (developed from inflow data) and project operations data.
- A dual flow analysis for species/lifestages and study sites discussed above.
- 80% WUA summaries for the guilds and stand-alone species/lifestages, with WUA for stand-alone species weighted according to mesohabitat ratios.

The workshop closed at approximately 2:30 PM. The TWC agreed that a follow-up workshop would be held January 23-25th, 2008, at the Lake Murray Training Center.

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Table 1: Summary of Flow Providing 80% or More of Maximum WUA for Trout Lifestages

Brown Trout - Fry	
Location	Flow (cfs)
Shandon Rapids	400-700
Oh Brother Rapids	500-1000

Rainbow Trout - Fry	
Location	Flow (cfs)
Shandon Rapids	300-800
Oh Brother Rapids	400-800
Toenail Rapids	500-1000

Brown Trout - Spawning	
Location	Flow (cfs)
Shandon Rapids	700-2000
Toenail Rapids	800-3000

Rainbow Trout - Spawning	
Location	Flow (cfs)
Shandon Rapids	1200-3000
Oh Brother Rapids	1400-10000
Toenail Rapids	800-2000

Brown Trout - Adult	
Location	Flow (cfs)
Shandon Rapids	1400-10000
Oh Brother Rapids	2000-6000
Toenail Rapids	1600-4000
Point Bar	600-1800
Reach Two	300-900

Brown Trout - Juvenile	
Location	Flow (cfs)
Shandon Rapids	400-4000
Oh Brother Rapids	800-3000
Toenail Rapids	800-2000
Point Bar	300-1000
Reach Two	300-900

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Table 2: Transect Guild Assignments by Study Site

Study Site	Final ID	Mesohabitat	Guild Representative	REACH
Toenail	21	glide-run	shallow-fast	1
Toenail	20	riffle/run	shallow-fast	1
point bar	18	run	deep slow	1
Sandy Beach	17	glide	shallow-fast	1
Sandy Beach	16	shoal	shallow-fast	1
Sandy Beach	15	riffle	shallow-fast	1
Corley	14	glide	shallow-slow	2
Corley	13	glide	shallow-slow	2
Corley	12	run	deep fast	2
Corley	11	glide	shallow-fast	2
Corley	10	riffle	shallow-fast	2
Ocean Boulevard	9	glide/shoal	shallow-fast	3
Ocean Boulevard	8	run	shallow-fast	3
Ocean Boulevard	7	shoal	shallow-fast	3
Oh Brother	6	riffle	shallow-fast	3
Oh Brother	5	riffle	shallow-fast	3
Oh Brother	4	riffle	shallow-fast	3
Riverbanks Zoo	2	run	deep fast	4
Shandon	1	glide	shallow-slow	4

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Figure 1: Bed Profile and WSEL's at Pool transect Adjacent to Riverbanks Zoo

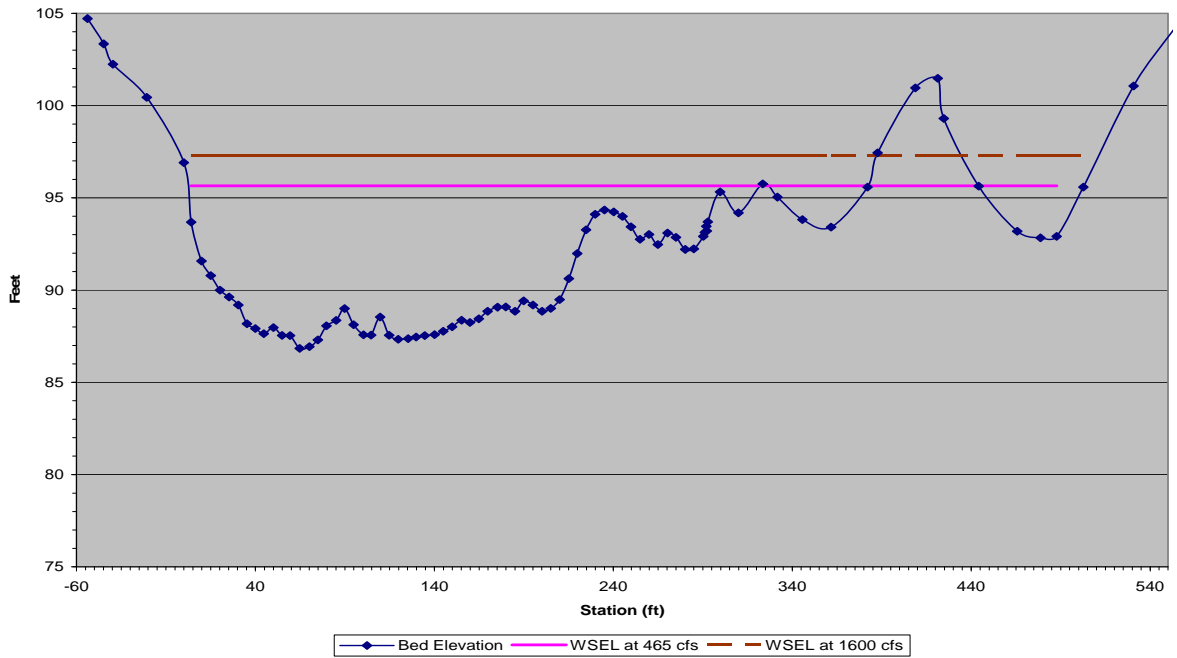


Figure 2: Bed Profile and WSEL's at Pool Transect Downstream of Saluda Hydro Dam

