

Action Name: Zone of Peaking Influence Study **Prerequisite Action:** None

Action Description:

Conduct a study to determine zone of peaking influence.

Applicable Hydro Projects/Developments:

Nantahala Project No. 2692, West Fork Project No. 2686 (Thorpe and Tuckasegee developments), East Fork Project No. 2698 (Cedar Cliff, Bear Creek, and Tennessee Creek/Wolf Creek Developments)

I. Objective

To determine how far downstream the peaking operations of the Nantahala, West Fork, and East Fork projects affect streamflow, depth, and temperature.

II. Basis

The basis for studying the zone of peaking influence is that this information is needed to define the parameters and interpret the results of other studies related to project operations, such as water quality, recreation, and instream flow studies.

III. Geographic and Temporal Scope

The peaking influence zone study for the East Fork and West Fork projects will extend from the Tuckasegee powerhouse on the West Fork Tuckasegee River and the Cedar Cliff powerhouse on the East Fork Tuckasegee River downstream on the mainstem Tuckasegee River to Bryson City just upstream of the headwaters of Fontana Reservoir.

The peaking influence zone study for the Nantahala project on the Nantahala River will extend from the Nantahala powerhouse discharge point to the headwaters of Fontana Lake.

IV. Approach and Analysis

This section provides the details of where the depth, flow and temperature will be measured during this study for the Tuckasegee and Nantahala River systems.

Tuckasegee River

Depth measuring devices (“Levelloggers”) will be placed at several locations on the Tuckasegee River between the Tuckasegee and Cedar Cliff powerhouses and the headwaters of Fontana Lake. Tentatively, the Levelloggers will be placed in the following locations on the Tuckasegee River during the test:

- Upstream of the confluence of the West Fork and East Fork with one placed on the East Fork Tuckasegee and the other on the West Fork Tuckasegee.*
- Upstream of the Caney Fork confluence (around river mile 47.1)*
- Above Sylva waste treatment plant (around river mile 36.2)*
- Below Dillsboro Dam, upstream of Scots Creek and USGS gauge (around river mile 31.7)
- Upstream of Barkers Creek (around river mile 27.4)*

- Upstream of Camp Creek and downstream of Bumgarner Branch (around river mile 23.0)
- Upstream of the Oconaluftee River Confluence (around river mile 18.7)*
- Downstream of Ferguson Fields, at USGS gaging Bryson City site (around river mile 12.7)

* Flow measurements will be taken at these sites.

Nantahala River

The Levelloggers will also be placed at several locations on the Nantahala River between the Nantahala powerhouse and the headwaters of Fontana Lake. Tentatively, the Levelloggers will be placed in the following locations on the Nantahala River during the test:

- Upstream of Queens Creek and Winding Stairs Road (around river mile 12.2)*
- At USGS gage (around river mile 10.7)
- Downstream of Blowing Spring (around river mile 8.0)
- Upstream of NPDES discharge in vicinity of NOC (around river mile 5.2)*

* Flow measurements will be taken at these sites.

The Levelloggers will be equipped with a microchip that will have continuous depth recording capabilities. The attenuation of the peak flow (in terms of channel depth) can be determined from the recorded data. The levelloggers will be placed in the river during low flow conditions to ensure that they remain under water during the test. The levelloggers will be placed in pools (above riffles) with similar channel geometries (primarily width). The channel width (measured with a laser range finder) and location (measured with a GPS system) will be recorded. Fluorescent flagging will be placed as close to the logger as practical. A semi-permanent reference mark will be placed and the level logger depth will be measured relative to that reference mark.

In addition to the above, please refer to the *Temperature and Dissolved Oxygen Survey* study for which of the above locations will also be recording water temperature.

V. Schedules and Required Conditions

The field study depth measurements will be targeted to take place between May 1, 2001 and May 25, 2001 during the weekday period. Prior to this period, field reconnaissance visits to the Tuckasegee and Nantahala Rivers will take place to select the proper location for placing the Levelloggers (March/April time period). Pre-selected general site locations recommended by NCDENR/DWR, NCWRC, USFS, and USFWS (see above) will be the starting basis for field placement of the Levelloggers. For the Tuckasegee River test, the Dillsboro project and the Bryson project will need to be off-line and spilling before, during, and after the test in order to eliminate any influence from the Dillsboro and Bryson generating units. The Tuckasegee and Cedar Cliff generating units will be turned on to the maximum hydraulic capacity (maximum gate opening) during a time of no rain inflow from the previous few days and no projected rain inflow during the time after the test. This process will be done for the Tuckasegee and the Cedar Cliff generating units separately and then with the Tuckasegee and Cedar Cliff generating units turned on simultaneously. Tentatively, the generating units are scheduled to be run for five hours for the test. The recorders will record the channel depth response to the peaking operation. For the Nantahala River test, the

Queens Creek project will need to be off-line (but not spilling) before, during, and after the test in order to eliminate any influence from Queens Creek.

The data from the continuous recording micro-chip will be downloaded onto a PC and will be plotted and summarized in a report write-up. The study will be repeated, if necessary, during the October 8-19, 2001, time period of for the Tuckasegee River (depending on weather conditions) in order to determine if a lower flow period influences the results.

The following are the tentative operational schedules designed to support this study.

Tuckasegee River

Sunday April 29, 2001: Do not operate Cedar Cliff, Thorpe, or Tuckasegee Plants after 8 am.

Monday April 30, 2001: Do not operate Cedar Cliff, Thorpe, or Tuckasegee Plants.

Tuesday May 1, 2001: Starting at 6 am, operate Thorpe (21 mw) and Tuckasegee (2.2 mw) at normal maximum peaking loads for five hours only. Do not operate Cedar Cliff Plant.

Wednesday May 2, 2001: Do not operate Cedar Cliff, Thorpe, or Tuckasegee Plants.

Thursday May 3, 2001: Starting at 5 am, operate Cedar Cliff Plant (6.8 mw) at normal maximum peaking load for five hours only. Do not operate Thorpe or Tuckasegee Plants.

Friday May 4, 2001: Do not operate Cedar Cliff, Thorpe, or Tuckasegee Plants.

Saturday May 5, 2001: Starting at 5 am, operate Cedar Cliff (6.8 mw), Thorpe (21 mw), and Tuckasegee (2.2 mw) Plans at normal maximum peaking load for five hours only.

Sunday May 6, 2001: Do not operate Cedar Cliff, Thorpe or Tuckasegee Plants.

Monday May 7, 2001: Resume normal operations for the East Fork and West Fork Plants. (Plants can be started after midnight)

Nantahala River

Monday May 7, 2001: Do not operate Nantahala Plant after 5 p.m. to accommodate levellogger deployment.

Tuesday May 8, 2001: Do not operate Nantahala.

Wednesday May 9, 2001: Resume normal operations at Nantahala Plant.

Monday May 14, 2001: Do not operate Nantahala or Queens Creek Plants after 5 p.m.

Tuesday May 15, 2001: Do not operate Nantahala or Queens Creek Plants.

Wednesday May 16, 2001: Starting at 8 am, operate Nantahala Plant (45 mw) at normal maximum peaking load for seven hours only. Do not operate Queens Creek Plant.

Thursday May 17, 2001: Resume normal operations after 11 am at Nantahala and Queens Creek Plant.

VI. Results

During this study, flow, depth, and temperature will be measured at various points along the downstream river as outlined in section IV. The criteria to be used to determine the point at which the peaking influence is considered to be negligible for flow-related aquatic habitat issues will be

the point at which the change in flow at that location is less than 20 percent of the historical unregulated mean monthly flows (10/1/1897-9/30/1940) for that location and that month. The following are the monthly mean flows for that period:

MonthMean (cubic feet per second)

- Jan2036
- Feb2282
- Mar2637
- Apr2243
- May1735
- Jun1401
- Jul1247
- Aug1228
- Sep991
- Oct949
- Nov978
- Dec1570
- Annual1605

The criteria for peaking zone influence for issues influenced by depth and/or temperature is very issue specific and will be determined specifically for those issues on a case by case basis.

VII. Participants

	Organization	Name	Phone #	E-Mail
NP&L Lead	Duke Power	Ed Bruce	704-382-5239	edbruce@duke-energy.com
Agency Contacts	NCDENR/DWR	Steve Reed	919-715-5424	Steven.Reed@ncmail.net
	USFWS	Mark Cantrell	828-258-3939	mark_a_cantrell@fws.gov
	USFS	Ray Johns	828-257-4859	Rayjohns@fs.fed.us
	NCWRC	Chris Goudreau	828-652-4360	Goudrecj@wnclink.com
Other Participants	Duke Power	Jon Knight	704-875-5417	Jcknight@duke-energy.com

VIII.Expected Benefits

The results of this study will determine the downstream location of peaking zone influence for the East Fork/West Fork Project and the Nantahala Project. This information will be used in other studies to determine points at which the project does or does not have any effect.

IX. List of Attachments

N/A

X. List of References

Levelogger™ Model 3001 F15 Instruction Manual