Action: Macroinvertebrate Survey **Prerequisite Actions:** N/A

Action Description:

Characterization of the aquatic macrobenthos using the Standard Qualitative Method as described in the state of NC Standard Operating Procedures upstream and downstream of the project dam and in applicable bypasses, and conduct a mussel survey.

Applicable Hydro Projects/Developments:

Nantahala (2692), Thorpe (Glenville-2686), Tuckasegee (Little Glenville-2686), Cedar Cliff (2698), Bear Creek (2698), Tennessee Creek (2698), and Wolf Creek (2698), Bryson (2601), Dillsboro (2602), Franklin (2603), and Mission (2619).

I. Objective

The study objective is to provide basic information about macrobenthic communities and Proposed, Endangered, Threatened and Special concern (PETS) species and evaluate any potential project-related effects on macrobenthic resources at each project.

II. Basis

The bases for this study are contained in 18CFR4.51 and 18CFR4.61 under basic information requirements for the identification of project-related fish and wildlife resources relative to the identification of macrobenthic resources and Endangered Species Act, Section 7, relative to the identification of any federally listed rare, threatened, or endangered species.

III. Geographic and Temporal Scope

Surveys will be conducted upstream and downstream of each project and at any associated bypasses where fish sampling (see **Fish Survey** for sampling locations) occurs, during the summer (August-September) using the Standard Qualitative Method (SQM) of the North Carolina Bioassesment protocol (NC SOP, 1997). By using the SQM a full inventory of the macrobenthic fauna at each site will be obtained; no live mussels will be collected. No special attempt will be made to identify the dragonfly nymphs to species; generic identifications will give an indication that the habitat in the project area would probably be of sufficient quality to support the species of concern. A mussel inventory will be conducted upstream and downstream of Bryson, Dillsboro, Franklin and Mission Projects.

IV. Approach and Analysis

A literature survey will be the first step of all invertebrate investigations in order to locate information about the macrobenthos at the project. Aquatic insects will be collected from upstream and downstream locations using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). All applicable QA/QC procedures and standards will be used for both field and laboratory procedures per the North Carolina Laboratory Certification requirements and Duke Power Company internal procedures. Any work conducted by personnel outside of Duke Power will be conducted by a mutually agreed upon consultant(s).

Since the exact sampling regime varies from project to project, the specific sampling program for each project is listed separately. The sampling regimes have been designed to allow maximum coordination of sampling efforts and utilization of resulting data among the other biological and water quality studies.

East Fork

Aquatic insect sampling for the East Fork projects will consist of a general description of the aquatic insect resources in the bypass reaches associated with the Tennessee Creek, Wolf Creek, Bear Creek and Cedar Cliff impoundments. Aquatic insects will be collected from upstream and downstream locations and any bypass reaches using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

West Fork

Aquatic insect collection for the West Fork will be restricted to the Thorpe bypass reach and will consist of the same general qualitative survey and methods described for the East Fork bypasses.

Nantahala

Aquatic insect sampling for the Nantahala Project will consist of a general description of the aquatic insect resources within the bypass reach between the dam and the powerhouse and a general aquatic insect assessment in the mainstem Nantahala River downstream of the powerhouse. Aquatic insects will be collected from upstream and downstream locations and any bypass reaches using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

Mission

Aquatic insect sampling for the Mission Project will consist of a general description of the aquatic insect resources in two areas of the Hiwassee River:

(1) a representative riverine reach upstream of the project impoundment; and,

(2)a representative riverine reach 2 to 3 mi. downstream of the project dam, but upstream of the confluence of Brasstown Creek.

Aquatic insects will be collected from upstream and downstream locations using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

Franklin

Aquatic insect sampling for the Franklin Project will consist of a general description of the aquatic insect resources in two areas of the Little Tennessee River:

(1) a representative reach upstream of the project impoundment; and,

(2) a representative reach downstream of the project dam.

Aquatic insects will be collected from upstream and downstream locations using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

Bryson

Aquatic insect sampling for the Bryson Project will consist of a general description of the aquatic insect resources in two areas of the Oconaluftee River:

(1) a representative reach upstream of the project impoundment; and,

(2) a representative reach downstream of the project dam, between the dam and the first bridge crossing.

Aquatic insects will be collected from upstream and downstream locations using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

Dillsboro

Aquatic insect sampling for the Dillsboro Project will be done in the mainstem of the Tuckasegee River between the confluence of the East and West Forks Tuckasegee and the confluence of Caney Fork Creek. The sampling program will include aquatic insect assessments in four areas of the Tuckasegee River:

(1) a representative reach between the confluence of the East and West Forks Tuckasegee and the confluence of Caney Fork Creek;

(2) a representative reach upstream of the Dillsboro impoundment and the Sylva Wastewater Treatment Plant;

(3) a representative reach downstream of the project dam, but upstream of the USGS gauge at Dillsboro; and,

(4) an additional representative reach in the vicinity of Whittier.

Aquatic insects will be collected from upstream and downstream locations using the SQM protocol developed by the North Carolina Division of Water Quality (NC SOP, 1997). Data from these surveys will be summarized in tabular format.

PETS Evaluation

Other than certain mussels (see attached listing) no other endangered species of invertebrates were listed from the project areas. The PETS species of concern were obtained from the NC Natural Heritage Program and the US Fish and Wildlife Service – List of Threatened and Endangered Animals and Plants (see attached list entitled “Rare Species List – Aquatics Nantahala National Forest – updated 11/30/99”). Six aquatic insects were listed in the sensitive species section as “SR” under the NC Status designation. None of the immature dragonfly taxa have been associated with the adult forms, thus making species identification of the immatures problematic. Dragonflies are very strong fliers and can range far from their emergence stream. The presence of adults identified through visual searches will not provide useful information regarding the location of the habitat of the immature forms. No special attempt will be made to identify the dragonfly and mayfly immature forms to species; generic identifications will give an indication that the habitat in the project area would probably be of sufficient quality to support the species of concern.

Under the heading “Forest Service concern species”, 26 species of aquatic insects were designated as “SR” under the NC Status designation (see attached list). The adult and immature forms have not been associated for all of these 26 species and, therefore, cannot be identified in the immature stage. No attempt will be made to identify any of the other forms to the species level;

generic identifications will give an indication that the habitat in the project area would probably be of sufficient quality to support the species of concern.

Aquatic macroinvertebrate sampling

Sampling at all projects will be conducted once during the summer of 2001. According to the NC SOP page 12, "equal weight … (is) given to biotic index value and EPT taxa richness value in assigning bioclassifications." Also, summer generally represents a time of greatest stress (i.e., high temperatures and low flow) for aquatic insects so that any project-related effects would have the highest probability of occurring at this time.

Selected first-form males (a growth stage when positive identifications can be made) of any crayfish sampled using the SQM protocol will be preserved and sent to an expert for identification.

The fieldwork will be conducted by a Duke Power crew or a Duke individual with assistance from qualified field personnel provided by a consultant. In the later case, the Duke person will actively participate in the field collections and will provide direct oversight and guidance to the consultant field personnel. The logistics, field equipment, sampling protocol, labeling of samples and chain of custody of samples will all be under direct control of the Duke person. The identification (except crayfish, which will be sent to a recognized expert mutually agreed upon by the Technical Leadership Team members) and data analysis will be done by Duke personnel at the Environmental Center in Huntersville, NC.

The mussel survey will be conducted by a recognized field expert, mutually agreed upon by the Technical Leadership Team members. The expert will be asked to conduct a literature survey, provide life history information about each species of concern and identify habitat requirements. The survey will be conducted in the summer of 2001 using standard protocols at upstream and downstream sites. Mussel beds will be identified, population estimates made and their locations recorded with GPS.

V. Schedules and Required Conditions

The fieldwork will be completed by late September 2001. The identification of collections will be completed by the end of January 2002, and a draft report will be sent to the Technical Leadership Team by the end of February 2002. The final report should be completed by the end of April, 2002.

VI. Results

The results of this study will be used to describe the aquatic insect assemblages associated with the respective projects and to evaluate any potential project-related impacts to those resources.

VII. Participants

	Organization	Name	Phone #	E-Mail
Duke Power Lead	Duke Power	Duane Harrell	(704) 875-5453	rdharrel@duke-energy.com
Agency Contacts	NC Wildlife Resources Commission	Chris Goudreau	(919) 652-4360	goudrecj@wnclink.com
		Chris McGrath	(828) 683-0671	mcgrathcl@mindspring.com
	US Fish and Wildlife Service	Mark Cantrell	(828) 258-3939 Ext. 227	mark_a_cantrell@fws.gov
	US Forest Service	Donley Hill	(828) 257-4212	donleyhill@fs.fed.us
	US Forest Service	Ray Johns	(828) 257-4859	rayjohns@fs.fed.us
Duke Supporting Consultant	TBD			
Other Participants	Land Trust for the Little Tennessee	Suzi Wilkins Berl		ennalls@juno.com

VIII. Expected Benefits

The expected benefit of these studies is to provide basic descriptive information on the aquatic insect communities associated with these projects. See Section IV for site specific study benefits.

IX. List of Attachments

Rare Species List – Aquatics Nantahala National Forest – updated 11/30/99

X. List of References

NCDEHNR. 1997. *Standard operating procedures biological monitoring.* NCDEHNR, Raleigh, NC.