

THE REMOVAL OF DILLSBORO DAM: THE UNIQUE CHALLENGE OF SUCCESS



INTRODUCTION AND BACKGROUND

- *Duke Energy Carolinas, LLC (Duke) operated the Dillsboro Hydroelectric Project under a license from the Federal Energy Regulatory Commission (FERC No. 2602). The Project is located in southwestern North Carolina, on the Tuckasegee River in the Town of Dillsboro, Jackson County. The development consisted of a small reservoir of limited storage (15 acres in size) and run of river (inflow approximates outflow), cyclopean dam (312 feet long by 12 feet high) and powerhouse, and a small amount of adjacent shoreline land.*

INTRODUCTION AND BACKGROUND

- *Duke proposed to surrender the FERC License and subsequently remove the dam and powerhouse as part of Settlement Agreements addressing continued operation of Duke's East Fork and West Fork Projects, as well as the Nantahala Project. This Settlement Agreement was signed by Duke, along with 20 of the 22 stakeholders including all the pertinent state and federal agencies and filed with FERC in January 2004. The removal of the dam would provide mitigation for fish passage at the above mentioned projects and instream flow relief at specific bypassed reaches within the East Fork, West Fork, and Nantahala Projects. The dam removal would allow full aquatic and recreational access to an additional 9.5 miles of river (coldwater and Critical Habitat) and ultimately restore 4,220 feet of the river to its original condition and elevation. FERC stated in their Surrender Order that the Project would have short-term environmental impacts, significant environmental benefits, and would be in the public interest.*

PRIMARY ISSUES AND SOLUTIONS

- **SEDIMENT QUALITY AND QUANTITY**
 - 100,000 cubic yards of sediment (primarily sand. Equivalent to one year of sediment normally transported downstream)
 - Studies to determine:
 - ✓ Quantity and gradation
 - ✓ Downstream transport and mobilization
 - Study concluded downstream reach has high sediment transport capacity and rapid conveyance
 - ✓ Potential contamination (partnered with USFWS for analysis)
 - Clean sediment-all metals and contaminants below toxicity threshold
 - Stakeholders and agencies determined sediment could be reached downstream in a controlled incremental manner
 - Agencies reverse opinion and require dredging of sediment-Section 401 requires removal of 70,000 cubic yards

PRIMARY ISSUES AND SOLUTIONS

- **AQUATIC RESOURCE STUDIES CONDUCTED**

- Water Quality

- ✓ Temperature typically below 20 C
- ✓ High Dissolved Oxygen
- ✓ Turbidity below 10 NTU except during storm events

- Fisheries (primarily coldwater habitat)

- ✓ Reservoir
- ✓ Downstream Reach

- Macroinvertebrates and Mussels

- ✓ Reservoir
- ✓ Downstream Reach

- Wetlands and Riparian Habitat

PRIMARY ISSUES AND SOLUTIONS

- **RARE, THREATENED AND ENDANGERED SPECIES**
 - Wavy-rayed Mussel (NC Species of Concern)
 - Wounded and Olive Darter (NC Species of Concern)
 - Eastern Hellbender (Federal Species of Concern)
 - Appalachian Elktoe (Federal and State Endangered)
 - ✓ Immediately upstream and Downstream of the Project including designated Critical Habitat
 - ✓ Duke/HDR prepared Biological Assessment at USFWS request
 - ✓ USFWS prepared a Biological Opinion recommending relocation of downstream populations due to Incidental Take determination
 - ✓ Over 600 individuals relocated immediately upstream to known population, tagged, and monitored for three years

PRIMARY ISSUES AND SOLUTIONS

- **FERC REQUIRED PLANS**

- Sediment Management Plan
- Approved Drawings and Specifications
- Fish Protection Plan
- Sediment and Erosion Plan
- Bat Relocation Plan (powerhouse)-500 Little Brown Bats
- Mussel Relocation Plan
- Public Safety Plan
- Temporary Emergency Action Plan
- Restoration and Revegetation Plan

PRIMARY ISSUES AND SOLUTIONS

- **LEGAL ISSUES**

- Opposition to Dillsboro Dam Removal

- ✓ Loss of Tourism
- ✓ Negative Effects on Business
- ✓ Effects of Sediment Release Downstream
- ✓ Disagreement on Settlement Agreement
 - County and Municipal Legal Action in Court
 - Duke eventually “wins” after more than 4 year legal battle

PRIMARY ISSUES AND SOLUTIONS

- **PERMIT AUTHORIZATIONS AND SIMILAR REQUIREMENTS**
 - NEPA Based EA and BA (federal and state agencies)
 - Section 7 of the Endangered Species Act
 - ✓ Biological Opinion and Incidental Take (USFWS)
 - FERC License Surrender Order
 - Section 401 Water Quality Certification (NCDWQ)
 - ✓ public hearing, sediment removal, pre and post removal monitoring in association with water quality, sediment, and aquatic resources
 - Section 404 Dredge and Fill Authorization (USACE and NCDWQ)
 - ✓ Nationwide Permit for Instream Dam Access Pad
 - ✓ Nationwide Permit Modification for Bank Stability
 - State Mining Permit (Sand Dredging) (NCDENR-Land Quality Section)
 - NPDES Permit Waived
 - Removal constraints due fish spawning requirements (NCWRC)
 - ✓ January through end of April only

PRIMARY ISSUES AND SOLUTIONS

- **ENGINEERING**

- Staged Removal of Cyclopean Dam

- ✓ Unfortunately no explosives-hoe ram used
- ✓ Access issues due to close proximity of the roads
- ✓ Disposal of debris
- ✓ Turbidity standards and containment

- Geotechnical Analysis

- ✓ Determine underlying substrate and slope stability

- Infrastructure Proximity

- Sewer pipe and fiber-optic cable required bank stabilization measures

LESSONS LEARNED

- Carefully consider your Settlement Agreement and all Protection, Mitigation and Enhancement (PM&E) measures;
- **Consult with the pertinent state and federal agencies** especially in the areas of agency concerns and likely permit **authorizations-dam removal does not easily fit into the regulatory process**;
- **Partner and collaborate** with the agencies and universities as much as possible. Specific examples include a USFWS sponsored sediment contamination study, mussel surveys, mussel relocation efforts, and post-removal monitoring support;
- Know/anticipate all the existing and potential issues and do your homework on potential solutions- **due diligence is very important**;
- Don't let them fool you- **dam removal is not as easy** as just blowing up the dam;
- **Employ outside expertise**, if necessary (e.g., sediment transport, mussels, demolition);
- In most cases, accumulated **sediment will be an issue** to contend with-be prepared for sediment analysis, permit issues, additional costs, and removal;
- Be prepared for **hidden costs and scheduling constraints** due to permit requirements, environmental regulations, legal issues, and weather conditions;
- **Identify your engineering constraints** such as site access, removal logistics, schedule, bank stability and erosion issues, and adjacent infrastructure; and
- Contract with a **knowledgeable dam removal demolition expert**.











