

CAPE FEAR RIVER ASSEMBLY / DIVISION OF WATER RESOURCES

Request for Proposal

For

CAPE FEAR RIVER BASIN MODEL UPDATE PROJECT

Closing Date: August 31, 2004

Time: 5:00 PM

PART I

SCOPE OF WORK – MODEL UPDATE

1.1 BACKGROUND: Over a quarter of the state's population depends on the Cape Fear River Basin for water supply, wastewater assimilation, power generation, navigation, recreation, and other purposes. In 1999, stakeholders in the Cape Fear River Basin including local governments that rely on the water resource collaborated with the N.C. Division of Water Resources (DWR) in constructing a hydrologic computer simulation basin model down to U.S. Lock & Dam No. 1. The model is most importantly used as a tool to assist with long-range water resources planning. It has also been used to evaluate water quantity impacts in the Jordan Lake water supply allocation process and interbasin transfer certifications.

1.2 GENERAL REQUIREMENTS: The effort to update the model will result in a product which has all of the current model's capability and, in addition, will fulfill the following requirements:

1. The consultant must update the model input data files through calendar year 2003, current Corps' operating policies for Jordan Lake, and EMC Jordan Lake allocations.
2. The model must be developed in an open, cooperative manner and generally accepted among the project partners. This includes, but is not limited to, four meetings with the project partners.
3. The consultant must demonstrate the validity of the model prior to its release.
4. The consultant must provide an updated users' manual that describes the model input data assumptions and default model-operating parameters, and the basics on how to use the model and make changes such as add a new node. The consultant must provide twenty printed copies and an electronic version using MS Word or PDF format to the NC Division of Water Resources (DWR).
5. The model must be easily updated as new input data become available. The consultant must provide documentation and software to facilitate periodic model updates.

6. The consultant must provide a copy of the software for each funding partner and five additional copies for DWR. Additional copies may be requested later as needed. DWR prefers an installation package that can be easily downloaded over the Internet or distributed on a single CD that includes documentation. The software must not require a hardware key in order to run.
7. The consultant must provide at least one hands-on computer training session on how to use the model for DWR staff, project partners, and other interested users.
8. The consultant must provide software support to DWR for four years, with a two-day response time in which to provide either a complete response, or a plan and schedule for providing a complete response that addresses DWR's concern. Funds will be set aside to provide for this consultant support, and those funds will be released to the consultant on an annual basis, based on the consultant's ability to provide timely customer support and thoroughly tested software updates.

1.3 MODEL FUNCTION: The updated model must meet the following requirements related to model function:

1. The user must be able to evaluate a variety of "what if" scenarios.
2. The model must simulate smaller impoundments such as Buckhorn Dam, as well as the future Randleman Lake.
3. The model must adequately account for storage in smaller impoundment areas – specifically, in the area between Jordan Dam and Buckhorn Dam - during low flow periods.
4. The model must provide mass-balance simulations that emulate the operation of Jordan Lake and other pertinent reservoirs and flow conditions for major stream segments for the available hydrologic record.
5. The model must run daily time steps and be able to run periods of one year to the total period of record.
6. The modeled withdrawals and discharges must vary with every time step of the simulation.
7. The model must incorporate varying seasonal water consumption from agricultural use based on climatic conditions during the growing season. The model must also incorporate varying annual water consumption from agriculture based on differing annual precipitation over the period of record.
8. The model must be flexible and allow the simulation of user-defined withdrawals or discharge levels at any point on the river or lakes that differ from existing conditions.
9. The model must accurately keep separate accounts of water supply storage for each allocation holder, and for water quality (low flow augmentation) storage. The model must track and display individual water supply allocation accounts (amount withdrawn and storage remaining).

1.4 MODEL OPERATION: The updated model must meet the following requirements related to model operation:

1. The model must graphically display at least a map-based schematic showing locations of model nodes for reservoirs, stream segments, withdrawal points and discharge points. The user must have the ability to zoom-in on any feature or area. The model

- user group prefers the map-based schematic to be clickable to display both key model input parameters and output results.
2. The model user must be able to control the model inputs using simple menus or windows. Additional withdrawals and discharges for specific model nodes must also be user selectable via the menu structure.
 3. The model must be flexible and fully documented to allow adding nodes for new withdrawals, discharges, or streamflow evaluation points. Nodes must not be hard-coded so that code modification is needed to add or delete nodes.
 4. The model's default conditions must correspond to the calendar year 2003 withdrawal and discharge conditions (i.e., base case scenario). Stakeholders may determine that a default drought conditions scenario also be included.
 5. The model user must have the option of beginning a simulation with reservoir storage volumes that are <100%. The model must default to reservoirs at full normal pool.
 6. The model must include the ability to input multiplication factors for any single withdrawal and discharge, or group of withdrawals and discharges.

1.5 MODEL OUTPUT: The updated model must meet the following requirements related to output:

1. The model runs must generate time-series outputs for each specified time step.
2. The model must display the history of river flow conditions at all *selected* model nodes during the simulation period for all major stream segments.
3. The model must display the history of pool level, surface area, storage volume (for each allocation holder), and flow augmentation storage use and water balance information in any modeled reservoir over the simulation period. This includes annual summary tables of maximum and minimum lake levels, water supply balances, and flow augmentation balances. The model user must be able to define the period of analysis (e.g., water year, climatic year, calendar year, etc.).
4. The model must produce stream flow profiles for a variety of flow scenarios including 7Q10 drought conditions.
5. The model must produce stream flow output data for use in conjunction with EPA-approved water quality models.
6. The model must produce flow output data at the downstream boundary of L&D #1 that are suitable for input as boundary conditions for hydrodynamic, water quality and water quantity models for the tidally-influenced portion of the Cape Fear River.
7. The model must include the ability to select HTML format for output tables.

Part II

SCOPE OF WORK – MODEL ENHANCEMENTS

2.1 ENHANCEMENTS - BACKGROUND: One reason for the update is to add certain enhancements to the current model, mostly related to drought management. . Five years have past since the model's completion, one of which, 2002, was one of the driest years on record in the region. Model users now wish to update the model by including the most recent input data, and enhancing the model's capability to help with drought management.

2.2 ENHANCEMENTS - MODEL FUNCTIONS: Model enhancements must meet the following requirements related to model function:

1. The model must simulate the Corps' existing and potential future operating policies for Jordan Lake.
2. The model must allow user-defined reservoir operating policies that differ from existing conditions (e.g., different storage allocations, triggers, releases, flow targets, etc.), without resorting to the model developer to implement the changes.
3. The model must track low flow targets downstream that vary by week and as a function of the water quality storage remaining in Jordan Lake, or some other trigger or set of triggers (e.g., lake inflow, lake level, time of year, etc.).
4. The model must support drought management planning. Drought management planning includes, but is not limited to, the following:
 - i. Safe yield estimates for river withdrawals, return period estimation for user-defined Jordan Lake water supply-storage-yield values, tracking of user-defined minimum instream flow targets at individual nodes, flow targets that vary by time step, and water supply benefits at any node from conservation scenarios. DWR would prefer an automated methodology for estimating reservoir safe yield.
 - ii. Conservation and drought response measures by water users need only be thresholds and associated percentage reductions in water use.
 - iii. Reduction thresholds must have a variety of potential triggers or combinations of triggers, such as inflows (both current and previous n-day moving average), lake elevations, pool volumes, stream flows (in the case of run-of-river intakes), time of year, etc.
 - iv. The model must be able to set a schedule of drought response triggers that vary week-to-week over the course of a year.
 - v. The model must be able to schedule a change in any downstream flow target as a triggered drought response.
 - vi. The model must simulate both the Jordan Lake drought management plan and each system's Jordan Lake drought management plan.
 - vii. The model must be able to incorporate National Weather Service Extended Streamflow Prediction System (ESP) data for "what-if" scenarios.

2.3 ENHANCEMENTS – MODEL OPERATION: The model user must have the option of mathematically linking selected withdrawals and discharges for any system. This includes systems with multiple withdrawals and discharges, as well as systems that have discharges upstream of their withdrawal.

2.4 ENHANCEMENTS – MODEL OUTPUT:

1. The model must provide flow duration curves and flow statistics of model output at user-selected nodes. Model users must be able to define the flow statistics (i.e., aQ_b , where the users can input a range of values for a and b).
2. The model output must include the tables and graphs similar to the ones found in the *Cape Fear River Basin Water Supply Plan* to show impacts for the various model scenarios.

2.5 ADDITIONAL ENHANCEMENTS: Additional capabilities are needed in the model that will not be used at this time, but need to be available for DWR or other users to add in the future. For example, analysis of the changes in Deep River flows caused by the removal of one or more of the small run-of-river projects. Another example is the ability to examine the basin-wide drought management strategies vs. individual system drought management policies. For all the following items the consultant must provide adequate documentation so that DWR or other users can add these capabilities at some future date.

1. The model needs to be able to simulate hydropower projects.
2. The model needs to be able to mathematically link water systems with a complex mix of withdrawal, discharges, purchases and sales of water.
3. The model needs to be able to simulate a variety of different types of individual system drought management plans with the option of a basin-wide plan having a higher priority.

Part III

RESPONSIBILITIES

3.1 PROJECT GUIDANCE: The successful offeror will be required to interact with and take direction from the Cape Fear River Basin Assembly Technical Review Committee, chaired by the Division of Water Resources (DWR). DWR's instructions to the successful offeror will be based on the consensus of the Technical Review Committee. In the event that a general consensus cannot be reached, DWR will make a final decision deemed to be in the best interest of all parties concerned.

3.2 DELIVERABLES: All deliverables will be reviewed by the Technical Review Committee. DWR will coordinate final review comments to the successful offeror. All deliverables are required to be in full and complete accordance with **all** the specifications as described in this RFP. Payment will not be made to the offeror unless deliverables are in full accordance with all the specifications as described in this RFP.

3.3 DURATION OF PROJECT: Each offeror shall propose a contract schedule and guaranteed completion date and shall assure the Issuing Agency that its firm is capable of maintaining the schedules and meeting the deadlines that have been established. Contract schedules must be broken down by project tasks and interim deliverables. Any schedule and deadline, once established by contract, can only be adjusted by mutual consent of all parties thereto.

PART IV

TECHNICAL PROPOSAL/ COST PROPOSAL

4.1 PRESENTATION: Each offeror responding to this RFP will submit a proposal that addresses both technical and cost aspects of the project. Submit THREE copies of the

proposal, one of which **must be signed** by an official authorized to bind the firm and will be retained for contract purposes.

4.2 PROPOSAL REQUIREMENTS: The technical proposal **must** follow the following requirements. Proposals must be submitted with each section tabbed and numbered according to the following format:

[SECTION A] Project Understanding

A description of the understanding of the project.

[SECTION B] Background and Experience

Information relative to the offeror's general background, experience, and such other information as may be deemed relevant for the purpose of evaluation of professional skills and capability to perform the service required.

[SECTION C] Size and Organizational Structure

Information describing the size and organizational structure of the offeror's firm, including the year the firm was established and any former names under which the firm has operated. The offeror is also required to submit a financial statement prepared by a certified public accountant for the current corporate financial tax year.

[SECTION D] Scope of Work

Detailed information describing how each requirement of the scope of work (as described in PART II) will be addressed. This section must follow the general format outlined in Section 2.4 (Responsibilities) of this RFP, such as:

Meetings

Model development

Deliverables

Product

Documentation

Training

Software Support

Interim Deliverables

Validation

Duration

[SECTION E] Similar Related Experience

Each offeror must submit a list of similar water resources models developed by the offeror, including the client's name, a detailed description of the project and type of services provided, the completion date and time required, and the person who can be contacted for reference, using no more than one page per project.

SECTION F] Technical Staff - Location/Distribution

Each offeror shall submit a summary list (by project task and phase) of the names, title, affiliation (if subcontracted) and locations of technical staff (to be assigned to this project, and percentage of their time expected to be devoted to this project.

[SECTION G] Prior, Existing or Pending Work

Each offeror shall submit a list of any prior, existing or pending work related to water resources planning, use or discharge in the Cape Fear River Basin, including the client's name, a brief description, the contract amount, and the completion date.

[SECTION H] Cost Proposal

The bid price offered will be a fixed price or fixed rate and shall include all professional fees for services to be rendered as well as all incidental travel and production expenses. The offeror shall provide a detailed rate chart of hourly rates by technical category, and any reimbursable cost items that would normally be expected to be used if any additional services beyond the scope of work provided in any agreement for professional services were desired. The cost proposal format must be structured according to Table 1 - Cost Proposal included with Part IV - Form of Proposal. This table must be submitted, with project tasks grouped as shown in the table. However, the offeror may choose to be more specific within each group, a group being items such as "Data Requirements", "Basic Model - Development", "Enhanced User Graphics", "Documentation", etc. The offeror may use technical categories other than those mentioned in the table e.g. junior engineer, senior engineer, project manager, etc.

4.4 EVALUATION CRITERIA: Evaluation of each proposal will be made by the Technical Review Committee. This effort will be coordinated by DWR. Proposals in response to this RFP will be evaluated in two steps.

4.4.1 Technical Proposal

The technical proposal will be evaluated first, based on the following criteria

4.4.1.1 Capability of the offeror to perform: Fiscal condition of the offeror and personnel resources will be considered. The offeror is required to submit a

financial statement prepared by a certified public accountant for the current corporate financial tax year.

4.4.1.2 Qualifications and experience

Qualifications and experience of the technical personnel assigned to the project including the offeror's similar related experience, past performance, references, and overall demonstrated ability to perform the service required. Consideration will be given to those offeror's where the greater percentage of work is done in-house and not contracted/sent out. As described earlier, each offeror shall submit a summary list (by project task and phase) of the names, title, affiliation (if subcontracted) and locations of technical staff (to be assigned to this project, and percentage of their time expected to be devoted to this project. This information will be used towards this evaluation.

4.4.1.3 Schedule

The proposed schedule for performing the work including labor supply and hours offered for the project. Once a contract is awarded the selected offeror must be in a position to begin work immediately and move quickly towards completion.

4.4.1.4 Technical evaluation

Response to detailed scope of work for this project i.e the quality in the technical approach the offeror plans to use in order to successfully complete the scope of work as described in Part I.

PART V

FORM OF PROPOSAL (PAGE 1 OF 2)

The undersigned bidder proposes and agrees if this proposal is accepted to contract with the Cape Fear River Assembly (CFRA) to furnish the services required herein, and to complete the scope of work as described in Parts I and II hereof. Services shall be accomplished in full and complete accordance with the specifications and contract documents to the full and entire satisfaction of CFRA and the Division of Water Resources, with a definite understanding that no money will be allowed for extra work except as may be set forth in written addendum to the contract, duly executed by all parties thereto.

The parties hereto agree that in consideration for performing all the requirements hereunder, CFRA shall pay the offeror ***per the attached cost proposal*** for the services as described herein, said sum to be full and complete compensation for the offeror's services required herein.

Pursuant to the provisions of G.S. 143-54, and under penalty of perjury, the signer of this proposal certifies that this proposal has not been arrived at collusively nor otherwise in violation of Federal or North Carolina antitrust laws.

Name of Firm or Corporation submitting bid

Federal I.D Number _____

By: _____

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Typed Name: _____

Title: _____

Address: _____

Phone: _____ Fax: _____

Witness: _____

Failure to execute the Form of Proposal shall render the proposal invalid. By execution and delivery of this document, the offeror agrees that any additional terms and conditions, whether submitted purposely or inadvertently, shall have no force or effect.

Please indicate if one of the following applies:

Minority Owned/Controlled _____ Women Owned/Controlled _____

Handicapped Owned/Controlled _____

Submitted this _____, day of _____, 2004

FORM OF PROPOSAL (PAGE 2 OF 2)

NAME OF FIRM:

	PHASE I				PHASE II			
PROJECT TASK	TECHNICAL CATEGORY	TECHNICAL HOURS	TECHNICAL RATE	TOTAL DOLLARS	TECHNICAL CATEGORY	TECHNICAL HOURS	TECHNICAL RATE	TOTAL DOLLARS
MEETINGS								
Initial	Engineer IV							
	Engineer II							
	Supplies/ Other							
Interim	Engineer ..etc							
Final	Engineer IV ..etc							
DATA GATHERING								
Preliminary Data Inv./Contact Water Users	Engineer III							
	Engineer I							
Date Requirements	Engineer I							
	Engineer II							

MODEL DEVELOPMENT								
Basic Model - Development	Modeler IV							
	Modeler II							
Basic Model - Drought Management	Engineer III							
	Modeler I							
Basic Model - User Graphics	Modeler I.... etc...							
Enhanced User Graphics	Modeler II							
	Modeler III...etc...							
Agricultural Consumptive Analysis	etc....							
Flood Routing	etc...							
Water Conservation Strategies/Specific Drought Management Policies	etc...							

DELIVERABLES								
Product	Supplies							
Documentation	Engineer II							
	Engineer I							
Training	Engineer II							
	Engineer III							
Software Support	etc...							
Interim Deliverables	etc...							
VALIDATION								
	Engineer III							
	Engineer II etc...							
TOTAL								

Table - 1. Cost Proposal