# Appendix H: Additional Technical Information

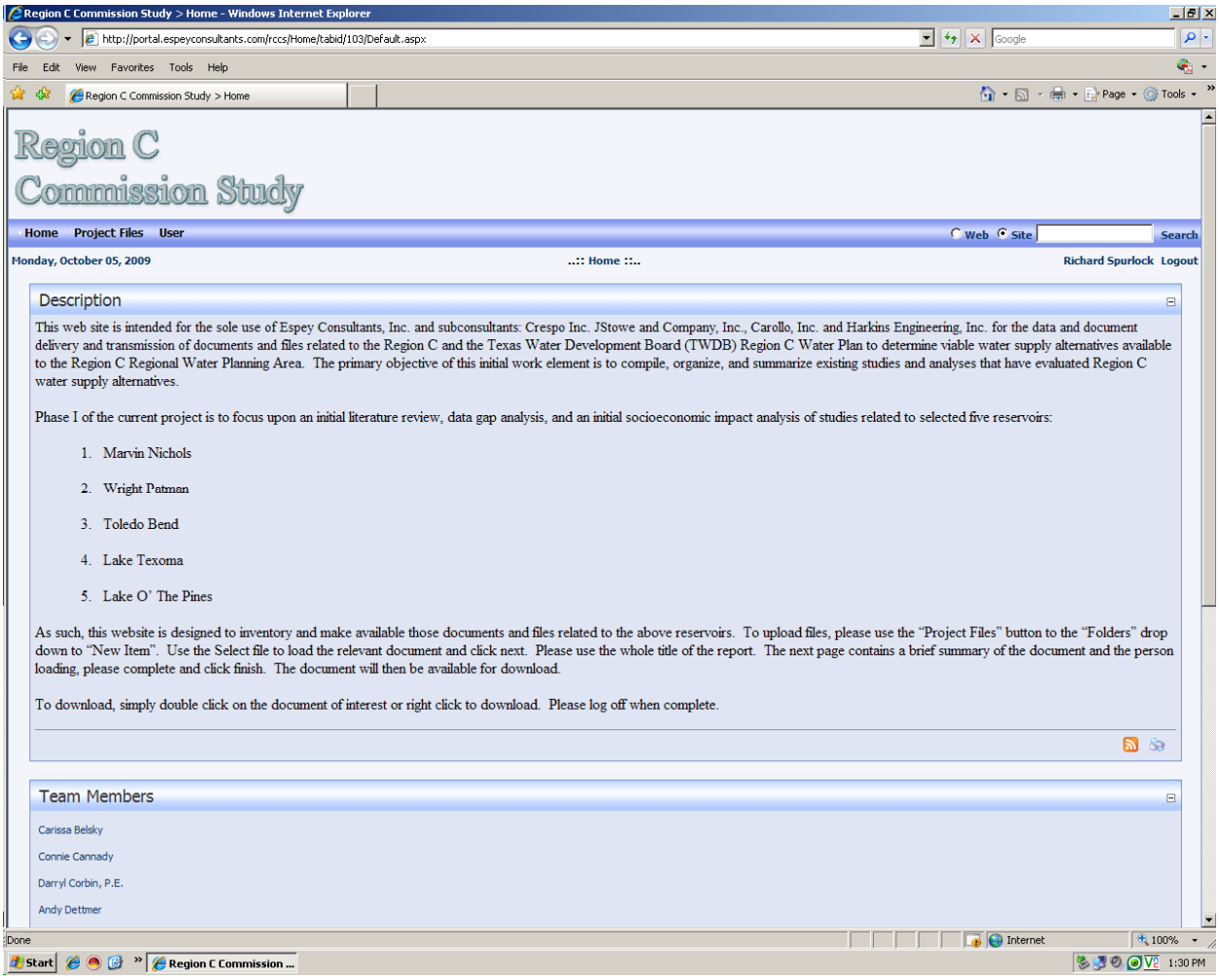
**Data Collection and Storage**

For ease of use and organization of the collected reports and information, the Project Team divided the collected documents into multiple categories. The categories included:

- Marvin Nichols Reservoir;
- Lake Wright Patman;
- Toledo Bend Reservoir;
- Lake Texoma;
- Lake O' the Pines (LOP);
- Region wide Studies;
- Statewide Studies;
- Conservation;
- Northeast Texas Municipal Water District (NETMWD);
- North Texas Municipal Water District (NTMWD);
- Trinity River Basin; and
- Economic Studies.

A database was created to store documents and information collected by the Project Team. An internet web portal was created to allow the Project Team to add documents as they were obtained during the literature review. The database is accessible via a web portal to allow all team members access to all reports collected for Task 1. The web portal is also available for Study Commission and stakeholder use (see figure below). All digital copies of the documents obtained as part of the literature collection were input into the database. Each item in the database included metadata to allow the documents to be researched on the internet web site. The web portal is accessible via: http://portal.espeyconsultants.com/rccs/Home/tabid/103/Default.aspx

Each document collected was reviewed as part of Task 1. A comprehensive list was created detailing each study, including a synopsis of each study, title, date of study, sponsor, author, type (technical vs. planning), subject (specific facility vs. water user water plan), and information relevant to the focus of this project. The comprehensive list was created in the form of a standard matrix in Microsoft Excel. The matrix was divided into 27 columns of information on each of the five reservoirs that are the focus of Phase I. A digital summary was created in the form of a Microsoft Excel spreadsheet matrix (Appendix A) and a literature review summary page was established (Appendix B) for each reference. The list of documents in Appendix A are inclusive of all the documents collected as part of the literature review. The list is presented in alphabetical order for ease of use. As part of the literature review, only those documents viewed as relevant were included in this report. As such the references used in the report are not numerically in order but rather presented by number used in Appendix A. Finally, contact information collected by the Project Team with any of the agencies or individuals are provided in Appendix C.




**Web Portal for Collected Documents and Information.**

**Yield Modeling for Lakes Wright Patman and Jim Chapman**

Freese and Nichols, Inc. (FNI) performed firm yield modeling for Lake Wright Patman and Lake Jim Chapman ("System Operation Assessment of Lake Wright Patman and Lake Jim Chapman", 2003). The goal of the project was to determine the potential gain in water supply from implementing alternative operation policies in Lake Wright Patman. Specific goals were:

> • To determine the potential increase in yield if Lakes Wright Patman and Jim Chapman are operated together as a system, and
>
> • To identify potential opportunities and constraints regarding bottomland hardwood and wetland resources in the Sulphur River Basin resulting from changes in operation. Specifically, the White Oak Creek Wildlife Management Area (WMA) was evaluated with respect to operational changes.

The primary tool used in this study was a computer model based on the program OPERATE, a proprietary general purpose reservoir operation model developed by FNI. The model uses a daily time step and historical hydrology covering the period from 1940 through 2001. The model was capable of simulating a variety of operational policies utilized by the United States Army Corp of Engineers (USACE). Components of the model included:

- Operation of Lake Jim Chapman and Lake Wright Patman, including reservoir content, inflows, spills and releases, evaporative losses and reservoir demands,
- Flows between the reservoirs at USGS gages 07342500 (South Sulphur near Cooper) and 07433210 (Sulphur River below Talco), and at the Highway 67 bridge in the White Oak Creek WMA, and
- Delivery of water from Lake Wright Patman to Lake Jim Chapman at various pumping rates.

Operations for Lakes Jim Chapman and Wright Patman differ depending on USACE operating criteria. The operation criteria for Lake Jim Chapman were derived from the June 1999 USACE publication *Jim Chapman Lake Cooper Dam Water Control Manual*. The USACE currently operates Lake Wright Patman with a variable conservation pool elevation. Three different curves control reservoir operations and were considered in the study:

- The *interim curve*, which is the curve that currently governs reservoir operation.
- The *ultimate curve*, which is the curve proposed in the Corps contract with the City of Texarkana.
- Various constant level conservation storages ranging from 223.0 feet to 228.64 feet.

The ultimate curve is the contractual curve of choice to be utilized in the model runs for Lake Wright Patman. The interim curve, however, is the curve that currently governs reservoir operation of Lake Wright Patman. The contractual implementation of the ultimate curve at Lake Wright Patman would require the reallocation of flood storage. In return, the reallocation of flood storage subjects Lake Wright Patman to federal guidelines outlined in the National Environmental Policy Act of 1970 (NEPA) and by the Council of Environmental Quality. An Environmental Assessment (EA) will most likely be required before the flood storage can be reallocated, as well as an Environmental Impact Statement if impacts are found to be significant.

Each of the three curves that govern the operation of Lake Wright Patman impacts the yield of the reservoir and system operation differently. In order to calculate and compare stand alone yields

for Lake Wright Patman four basic operating rules are used in the model runs (the current interim curve or operating rule curve, the ultimate curve, the flat conservation storages ranging from 223.0 ft to 228.64 feet, and the interim rule curve with a maximum of 50,000 acre-feet of additional storage). Stand alone yields for Lake Jim Chapman and Lake Wright Patman are shown in Tables H1 and H2, respectively. The top of the conservation storage for Lake Wright Patman is determined by these rule curves. Figure H1 illustrates the operating interim curve and ultimate curve at Lake Wright Patman. The red line in Figure H1 is a graphical representation of the interim curve, while the green line depicts the ultimate curve. Figure H2 illustrates the ultimate curve and a modeled curve developed by FNI for the USACE. A modeled smooth curve was developed since the ultimate curve is referenced monthly and it is uncertain how the ultimate rule curve would be implemented at Lake Wright Patman. Table H3 summarizes specific model runs and the yield of the reservoir at Lake Wright Patman.

**Table H1**
**Stand Alone Yield Runs for Lake Jim Chapman**

| Run ID | Description | Conservation Pool Elevation (ft) | Stand-Alone Yield (ac-ft/yr) |
|---|---|---|---|
| C-1 | Current operations | 440 | 128,600 |
| C-2 | Wildlife management goals | Variable * | 108,533 |

* See figure 4-1

**Table H2**
**Stand Alone Yield Runs for Lake Wright Patman**

| Run ID | Conservation Pool Rule Curve | Minimum Elevation (ft) | Stand-Alone Yield (ac-ft/yr) |
|---|---|---|---|
| I-1 | Interim | 220 | 8,974 |
| I-2 | Interim | 217.5 | 104,397 |
| I-3 | Interim | 215.25 | 154,205 |
| U-1 | Ultimate | 220 | 184,591 |
| U-2 | Ultimate | 217.5 | 255,194 |
| U-3 | Ultimate | 215.25 | 301,580 |
| U-3a | Ultimate Stair-step | 215.25 | 301,450 |
| F23-1 | Flat at 223.0 | 220 | 0 |
| F25-1 | Flat at 225.0 | 220 | 116,499 |
| F27-1 | Flat at 227.0 | 220 | 211,414 |
| F28-1 | Flat at 228.64 | 220 | 275,313 |
| F23-2 | Flat at 223.0 | 215.25 | 163,331 |
| F25-2 | Flat at 225.0 | 215.25 | 229,788 |
| F27-2 | Flat at 227.0 | 215.25 | 300,489 |
| F28-2 | Flat at 228.64 | 215.25 | 363,717 |
| I + 50 | Interim + 50,000 | 220 | 99,589 |

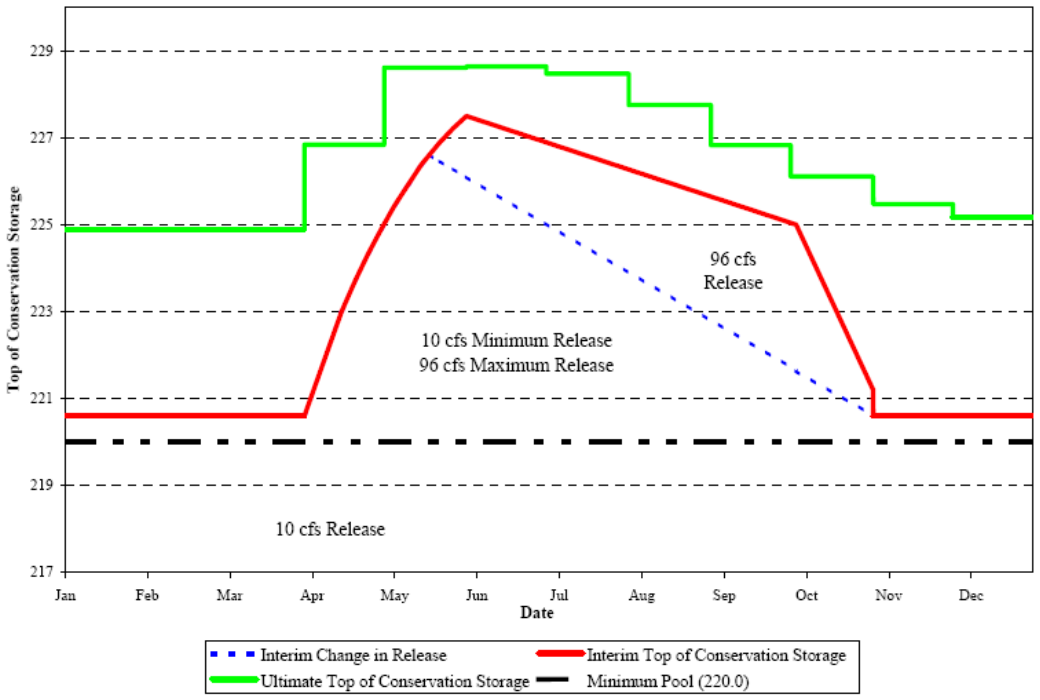



**Figure H1: Operating Curves for Lake Wright Patman**

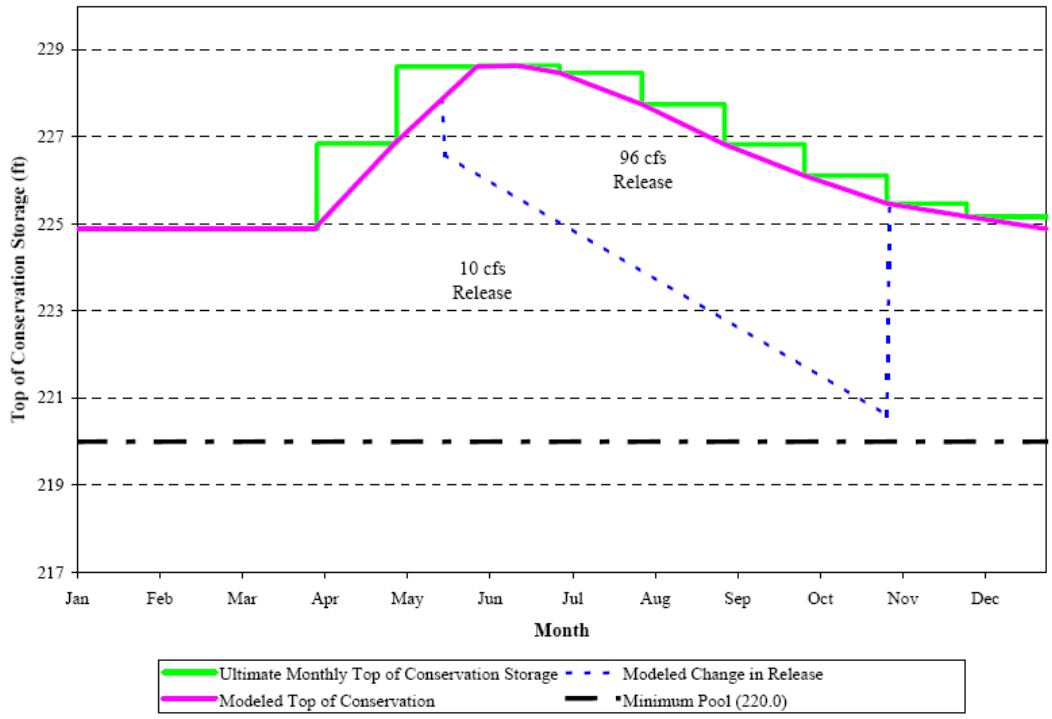



**Figure H2: Ultimate Rule Curve as Modeled.**

**Table H3: Summary of the model runs and operating curves at Lake Wright Patman.**

| Run ID | Minimum Elevation Wright Patman (Ft-MSL) | Conservation Pool in Wright Patman | Yield Wright Patman (Ac-Ft) |
|---|---|---|---|
| C-1 | 215.25 | Interim | N/A |
| I-1 | 220 | Interim | 8,974 |
| I-2 | 217.5 | Interim | 104,397 |
| I-3 | 215.25 | Interim | 154,205 |
| U-1 | 220 | Ultimate | 184,591 |
| U-2 | 217.5 | Ultimate | 255,194 |
| U-3 | 215.25 | Ultimate | 301,580 |
| U-3a | 215.25 | Ultimate Stair-step | 301,450 |
| F23-1 | 220 | Flat at 223.0 | 0 |
| F25-1 | 220 | Flat at 225.0 | 116,499 |
| F27-1 | 220 | Flat at 227.0 | 211,414 |
| F28-1 | 220 | Flat at 228.64 | 275,313 |
| F23-2 | 215.25 | Flat at 223.0 | 163,331 |
| F25-2 | 215.25 | Flat at 225.0 | 229,788 |
| F27-2 | 215.25 | Flat at 227.0 | 300,489 |
| F28-2 | 215.25 | Flat at 228.64 | 363,717 |

The stand-alone total yield of Lake Wright Patman under the above mentioned operations is approximately 364,000 afpy. Therefore, the total available water supply to Region C from this reallocation of flood storage to conservation storage could be approximately 180,000 afpy.

The 2003 report estimated that when operated as a system the reservoir yield for the two projects could be increased approximately 108,000 afpy. This increase would be available to Region C as additional water supply. System operation will require a pipeline from Lake Wright Patman to Jim Chapman Lake and a pump station at Lake Wright Patman and booster pumps and storage tanks at Jim Chapman. The plan includes preliminary cost estimates for these facilities. Systems operation would include the same issues as addressed above for reallocation and redistribution.