

SUMMARY **DRAFT 1/27/09**
**Cypress Basin Flows Workshop &
Caddo Lake WPP - Hydrology Work Group Meeting**

December 2-4, 2008, Jeffersonian Institute, Jefferson, Texas

Introduction

This workshop served as the third in a series of workshops for the development of proposals for environmental flows in the Cypress Basin and as the Fall 2008 meeting of the Hydrology Work Group of the Caddo Lake Watershed Protection Planning process. It was convened by the Caddo Lake Institute (CLI), the Nature Conservancy (TNC) and the North East Texas Municipal Water District (NETMWD) in Jefferson, Texas.

A. Agenda: The agenda for the workshop is provided as Appendix A.

B. Participants: The names and affiliations of the 74 participants are shown on Appendix B. (Approximately 300 people have participated in prior workshops and were invited to this workshop.)

C. Background: The Cypress Basin Flows Project was initiated in 2004 by the Caddo Lake Institute and the Nature Conservancy in partnership with U.S. Army Corps of Engineers and others. This project was started after the State of Texas made the decision that no new water rights would be granted for protection of flows in rivers, lakes and bays. Instead, the state proposed, and has now enacted, a law (Senate Bill 3 or SB 3) to provide a process for setting aside water for instream flows in Texas.

The work of the Project was expanded with the initiation of the Caddo Lake Watershed Protection Plan (WPP) in 2006 to address issues of water quality. That process is coordinated by the Northeast Texas Municipal Water District. The flows project now serves as the work group on hydrology for the WPP.

D. Goals and Objectives: The overall purpose of the meeting was to advance the prior work to assure adequate instream flows to sustain the ecological, recreational and economic values of Caddo Lake watershed and the Cypress Basin. To reach this goal, the Project currently has four objectives:

1. An SB 3 Flow Reservation or Set Aside: Develop recommendations for a SB 3 type “environmental flow standard” for a reservation of water in the watershed.
2. A New “Release Rule” for Lake O’ the Pines: A recommendation for changes in the operations of the dam at Lake O’ the Pines to provide a more natural pattern of releases, while assuring flood control, water supply, and the other purposes of the reservoir.
3. Flow Needs for Watershed Protection Plan: Serve as the Hydrology Work Group for the Watershed Protection Plan to evaluate and recommend flows, lake level management, etc. and to assist with protection of water quality and management of invasive aquatic species.
4. Long-term Adaptive Management: Establish a long-term effort, with the continuation of field work, other research, and consensus decision-making to refine environmental flow recommendations over time.

E. Work leading up to the December 2008 Meetings: In December 2004, the scientists and stakeholders who participated agreed to pursue the flows project, based on a methodology developed by the TNC-Corps of Engineers Sustainable Rivers Program at other rivers in the United States. The project has also relied heavily upon a similar approach recommended by the National Academy of Sciences for the State of Texas.

Since the December 2004 orientation meeting, workshops were held in 2005 and 2006, with participation in each by 70 to 80 scientists and stakeholders. In addition, the project has relied on field and other research by the USGS, the Corps of Engineers, and a number of experts. Annual planning meetings and small meetings of scientists have also been held to advance the work. This work has been adjusted with the assistance of the state agencies with the goal of consistency with the intent of Senate Bills 2 and 3.

Background documents and summaries for this and prior flows workshops in May 2005 and October 2006, along with documents prepared for interim coordinating and science meetings, can be reviewed at the flow web pages on the CLI website at www.caddolakeinstitute.us.

Details on the Watershed Protection Plan and related work groups can be reviewed at the NETMWD website www.netmwd.com/Caddo%20Lake%20Protection%20Plan/Caddo_index.html

Based on meetings and research, initial proposals for "building blocks" (or SB 3 type "environmental flow regimes") were developed. An adaptive management approach has been initiated, where some of the recommended flows in the building blocks were tested in the field.

F. December 2008 Workshop: The workshop began with field trips to Caddo Lake and to Big Cypress Bayou on December 2nd. The formal meetings were held on December 3rd and 4th. The results include:

1. Refinement of the Building Blocks for Big Cypress Bayou;
2. Environmental Flow Regimes and recommendations for Environmental Flow Standards and Strategies for the basin;
3. A consensus that the Regimes and Standards should be reexamined within 3 years based on additional field work, research, and stakeholder input and revised as needed;
4. Identification of data gaps and next steps needed to develop recommendations for changes in the operations of the dam at Lake O' the Pines;
5. Agreement that additional research and other work is needed to develop recommendations for lake level management options to assist the WPP; and
6. Recognition that continuation of the adaptive management approach and other research is needed to answer a number of technical questions regarding the proper long-term management of the flows in the Basin.

Role of Senate Bill 3

While the work prior to December 2008 had anticipated the passage of a new law in Texas to protect environmental flows, the details of that process were not known until May 2007. The Texas Legislature enacted Senate Bill 3 to create goals and a process for reserving water for instream flows similar to the process that was being used by this project for the Cypress Basin. The law now provides the state policy for protecting environmental flows, a process for developing flow recommendations for each river basin and a framework for final decisions by the Texas Commission on Environmental Quality. While not exactly the process that had been developed for the Cypress Basin, the goals and procedures of SB 3 are consistent with the Cypress Basin work. For example, SB 3 defines Environmental Flow Regimes to be the equivalent of what this Cypress Basin process has called Building Blocks.

“Environmental flow regime” means a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment and to maintain the productivity, extent, and persistence of key aquatic habitats in and along the affected water bodies. *Section 11.002, Texas Water Code (TWC).*

The major difference in methodology lies in the joint science and stakeholder process that has been used for the Cypress Basin work and the SB 3 approach of separate meetings and roles for stakeholders and scientists. Thus, under SB 3 the environmental flow regimes are set by scientists and cannot be changed by the stakeholders, whereas in the Cypress Basin, the regimes were developed in joint meetings with a consensus of both scientists and stakeholders.

The process that was developed for the Cypress Basin was not altered to fit the specifics of the SB 3 process, because both processes focus on the goals, i.e., a sound scientific basis for the flow recommendations, due consideration of stakeholder’s concern and consensus from the process. In fact, it is difficult to see the SB 3 process not providing some of the integration that the Cypress Basin process involves, even if it is only stakeholders sitting in on the discussions of the scientists since they will want to understand how the science decisions are made and may even bring some expertise or facts to that process given their experience and observations of flows, fisheries, etc., in the basin. Likewise, the scientists may want or need to participate in stakeholder discussions to address questions or help resolve conflicts in goals.

Again, what appears important is a set of sound scientific decisions, effective participation by stakeholders, and strong support for the results by both the scientists and the stakeholders.

Other key terms, goals and steps set out in SB 3 include:

1. Definitions:

“Environmental flow analysis:” “[T]he application of a scientifically derived process for predicting the response of an ecosystem to changes in instream flows or freshwater inflows.” *Section 11.002, TWC.*

“Environmental flow standards:” “[A] schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location....” *Sec. 11.1471(c), TWC.*

2. Directives to TCEQ:

The agency “by rule shall:”

- a) adopt appropriate environmental flow standards for each river basin ... that are adequate to support a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors;
- b) establish an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs;” *Sec. 11.1471 (a), TWC, emphasis added.*

3. A Methodology:

“Each ... expert science team shall develop environmental flow analyses and a recommended environmental flow regime for the river basin ... through a collaborative process designed to achieve a consensus.” *Sec. 11.02362(m), TWC, emphasis added.*

“Each ... stakeholders committee shall review the environmental flow analyses and environmental flow regime recommendations submitted by the ... expert science team and shall consider them in conjunction with other factors, including the present and future needs for water for other uses” *Sec. 11.02362(o), TWC, emphasis added.*

“The ... stakeholders committee shall develop recommendations regarding environmental flow standards and strategies to meet the environmental flow standards and submit those recommendations to [TCEQ]” *Sec. 11.02362(o), TWC, emphasis added.*

“...in a river basin and bay system for which the [state environmental flows] advisory group has not yet established a schedule for the development of environmental flow regime recommendations and the adoption of environmental flow standards, an effort to develop information on environmental flow needs and ways in which those needs can be met by a voluntary consensus-building process.” *Sec. 11.02362(e), TWC, emphasis added.*

As discussed below, a significant part of the time at the December 2008 meetings was spent developing a consensus for the environmental flow regimes, standards and related recommendations.

Input to and Results of the Workshop

Most of the presentations and the background document for the presentations at the meeting can be seen at <http://www.caddolakeinstitute.us/decflowsmeeting08.html>. The meeting was divided into two areas for discussion:

- * Review and Revisions of Building Blocks (Environmental Flow Regimes)
- * Development of Recommendations for Environmental Flow Standards and Strategies

For both areas of discussion, the process included a series of talks on the issues, followed by breakout sessions where the participants developed recommendations to present to the full meeting of the participants. Scientists and stakeholders participated in all of the breakout sessions.

A. Review and Revision of the Building Blocks: The initial discussions focused on whether and how the building blocks, which were developed in prior workshops, should be revised based on field

work and other technical work completed since the October 2006 workshop. The discussion was divided into two areas of work, as were the breakout sessions that followed. Those areas were:

- * Pulse and flood flows in the building blocks; and
- * Base flow for the building blocks

Ryan Smith provided an overview of the application of the Sustainable Rivers Project approach to develop the four existing building blocks for Big Cypress, Black Cypress, and Little Cypress Bayous and Caddo Lake.

1. Low Flows: Joe Trungale then discussed work that had been done since the flows meeting in October 2006 to evaluate the base flows in the building blocks for the three rivers.

In summary, this work included an analysis of historic trends in fish assemblages and development hydrodynamic-habitat models. Existing synoptic surveys suitable to characterize aquatic communities in the river are sparse, however findings based on the analysis of the available data is consistent with conclusions of previous research. Thus, surveys showed that the community has experienced a shift in relative abundances from obligate riverine species such as darters and minnows that broadcast-spawn buoyant eggs within current to more habitat generalist species, including Centrarchidae, which spawn elliptical egg envelopes over rock or gravel nests.

To evaluate the hypothesis that this shift is related to changes in instream habitat conditions, one-dimensional hydrodynamic models were created based on historical cross section surveys. Habitat suitability criteria, developed from site specific collections, for dominant species within habitat-spawning guild matrices, were applied to the hydrodynamic model to predict instream habitat conditions as a function of stream flow. Quantities and distributions of available instream habitat types predicted by the models at the building blocks recommended flows were reviewed.

The following questions were posed to the breakout session on low flows:

- Does anything jump out as a concern?
- Does the change in habitat based on pre vs. post LOP conditions suggest a refinement?
- Re-evaluate adjustments from IHA outputs?
- Refinements for declining guilds?
- Do we need all three levels (wet/average/dry)?
- Are the base flows upstream and downstream of Jefferson the same?

In the break out session that followed, the discussion first focused on if and how this analysis could be used to validate and or refine the preliminary flow recommendations. Generally, the analysis showed that the building blocks provide variability in stream habitat conditions. Although the area of some habitat types would be relatively lower than others, this was assumed to be reflective of the natural habitat conditions of the stream which the recommendations are intended to protect. One clear conclusion from the analysis was that habitat in the lower reach of Big Cypress Bayou is far less sensitive to changes in flow than in the upper reach.

While the group felt that this type of evaluation is useful in providing insight into what the base flows recommendations would produce in terms of instream habitat, given the lack of any outstanding concerns arising from this analysis, as well as the uncertainty associated with the scarcity of biological

data and the hydrodynamic model itself, the group's recommendation was that the results of this evaluation supported the basic approach taken for low flows in the Building Blocks for the three rivers and that the results did not suggest any revisions to the approach or prior recommendations for those flows.

The breakout group then focused on an issue raised by Tim Osting with Espey Consultants. He suggested that an adjustment be made to low flows for dry conditions in Big Cypress Bayou during July through September to assure adequate flows to protect water quality. The state water quality standards and permitting system use a 7Q2 flow of 8.4 cfs¹ for this segment of Big Cypress Bayou that is higher than the low flow proposed in the building block of 6 cfs.

That discussion resulted in a recommendation from the breakout session to revise the building block accordingly and use the 7Q2 flow as a conservative measure until additional data or analysis indicates another value should be used.

2. Pulse and High Flows: Bruce Moring, with USGS, covered the pulse and high flow conditions. He explained the field and other work done to evaluate the building blocks for Big Cypress Bayou. In brief, in late 2006, USGS instrumented 9 sites with pressure transducers from just below Lake O' the Pines to about 2 miles downstream of the confluence of Big Cypress and Black Cypress Bayous to monitor releases from Lake O' The Pines. Releases from Lake O' the Pines were monitored over a range of flows from about 50 to 3,000 cfs. Data recorded by the pressure transducers was converted to actual elevations, and low-flow to over-bank flow prescriptions were evaluated for connectivity of hydromorphic unit such as riffles, runs and pools; inundation of woody structure, bankfull height, and over-bank inundation of floodplain wetlands.

He recommended consideration of changes to pulse flows for Big Cypress Bayou, given the results of the field work. In summary, the field work indicated that bankfull flows occurred below 3,000 cfs. The flows needed for bankfull conditions also changed from the upper reach (generally above Jefferson) to the lower reach (below Jefferson). He recommended that the high flow pulse for channel maintenance in the building block for Big Cypress Bayou be reevaluated and lowered. He also recommended that the lower flood flows building block be changed to recognize that at 3,000 cfs there were significant connections to oxbows and other off-channel wetlands.

For Black Cypress and Little Cypress Bayous, he suggested consideration of the fact that the current building blocks may not be adequate to maintain

- the ecological integrity of the main (low-flow) channel and adjacent floodplain wetlands;
- the geomorphic character of the channel as defined by the current sequence and size of hydromorphic units, channel width, and bankfull height; or
- the composition, taxa richness, and distribution of the aquatic biological communities.

In the breakout session on high flow, a consensus was reached that a change similar to that proposed by Bruce Moring would be appropriate for Big Cypress Bayou. The exact number to be used for high pulses was left to a discussion with the larger group. No recommendation was made for changes to pulse or high flows for Black and Little Cypress Bayous.

¹ 7q2 reference: http://info.sos.state.tx.us/fids/30_0307_0010-7.html

3. Recommendations for Building Blocks: The breakout sessions then reported to the full group to seek consensus on the building blocks and that the building blocks should serve as the environmental flow regimes. The recommendations from the first breakout session on low flows for Big Cypress Bayou to protect water quality were accepted. The discussion then turned to a change to the 6,000 cfs pulse flow for Big Cypress Bayou. The discussion led to a consensus of 2,500 cfs, which appeared to provide a good approximation of bankfull flow. The lower flood flow was then changed to a range from 3,000 cfs to 10,000 from the prior range of 6,000 to 10,000 to reflect that there was good connectivity accruing at flows as low as 3,000 cfs.

Concerns were raised in the breakout session and again in the full meeting on the duration of pulse and flood flows. The building blocks indicated pulse and flood flows with durations of 2 to 3 days. The question was whether the maximum flows were needed for 2 to 3 days or if the entire pulse or flood event was 2 to 3 days. That led to a short discussion that, for flows in Big Cypress Bayou, the time for releases from Lake O' the Pines to reach the peak flows proposed would be much greater than 2 or 3 days. Natural conditions could result in faster ramping up to the peak flows. The consensus was reached that the durations given in the building blocks represented flows at or about the maximum levels proposed.

A second set of concerns involved the more basic approach used for pulse and flood flows in Black and Little Cypress Bayous as compared to more complex or multiple proposals for Big Cypress Bayou. For example, there are two building blocks for pulses for Big Cypress Bayou, while only one for Black and Little Cypress Bayous. Moreover, concerns continued to be expressed about the need for more research to provide greater confidence or allow revisions to the building blocks.

It was pointed out that the Senate Bill 3 approach required science and stakeholder groups to develop regimes and standards based on existing information and without field work or other additional research and that the effort for the Cypress Basin had gone beyond what SB 3 would require for the Basin. Field work and some experimental flows had been carried out to supplement the information available in literature and from experts on the system. Thus, the participants concluded that the current building blocks should be maintained with the exceptions of the changes recommended by the breakout sessions, but that the process of collecting more information and reconsideration of the building blocks needed to continue.

During these discussions, concern was also raised about the lack of building blocks for James Bayou and a number of small streams in the basin. Because these streams do not have gages, it was agreed that the IHA approach used for Big, Little and Black Cypress Bayous could not be applied. Instead, the group agreed that the flow regimes should be based on the building blocks for Black Cypress Bayou with a proportional adjustment for the different size of the watersheds.

The participants also agreed the building blocks should be reconsidered in three years, by which time additional work on the following would be continued:

- 1) water quality issues being pursued under the Watershed Protection Plan;
- 2) the results of additional evaluations of experimental releases from Lake O' the Pines;
- 3) flood flow and elevation monitoring on Big, Black and Little Cypress Bayous being developed by the Corps of Engineers; and

- 4) new projections on water needs in the region by the Region D water planning group.

In summary, the results of the morning sessions on revisions to the building blocks or environmental flow regimes are:

- 1) Building blocks for Big Cypress Bayou were changed.
- 2) Building blocks for Little and Black Cypress Bayous and for Caddo were not changed.

The building blocks are shown in Appendix 3.

B. Development of Recommendations for Environmental Flow Standards and Strategies: The second area of work proceeded with presentations for developing recommendations for environmental flow standards based on the building blocks, stakeholders issues, physical limitations on flows, and other such issues.

Presentations were made by Joe Trungale on the extent to which there is unappropriated water and unused appropriated water available to satisfy the building blocks for the three rivers. Given the existing water rights in Little and Black Cypress Bayous and all other parts of the basin except Big Cypress Bayou, TCEQ's water availability model predicted sufficient water most of the time to meet the flows proposed in the building blocks. That is not true for Big Cypress Bayou. See, <http://www.caddolakeinstitute.us/decflowsmeeting08.html>.

Representatives of the Corps of Engineers and NETMWD explained the limitations on flows in Big Cypress Bayou downstream of Lake O' the Pines.² The current design and operations of the dam limit releases to about 3,000 cfs. Existing water rights, if fully exercised, would also limit the amount of water available for flows down stream of the dam. Strategies to overcome the deficiencies in the amount of water needed for flows in Big Cypress Bayou were then discussed, including the possibility of increasing storage levels in Lake O' the Pines during certain times of the year and options for purchase, lease or use of appropriated but unneeded waters.

Issues related to the role of flows in protecting water quality and managing invasive aquatic plants were also discussed.

1. Breakout Sessions: The three breakout sessions were:

1. Practical Considerations & Physical Limits on Flows in the Building Blocks;
2. Legal Limitations, Water Rights & Uses, & Future Water Needs for Flows; and
3. Flows & Lake Level Management for Water Quality and Invasive Aquatic Vegetation.

The challenge to the participants in the breakout sessions was to develop recommendations for environmental flow standards, as that term is defined by SB 3 as well as proposals for strategies to assure adequate water for such standards.

² The basic information on the Lake O' the Pines and the Ferrells Bridge Dam can be found in a presentation by the Corps of Engineers at the May 2005 workshop at <http://www.caddolakeinstitute.us/may05.html>

The consensus from the third breakout session was that the flows proposed in the building blocks should be used for the environmental flow standard. In essence, the participants did not believe they had or could obtain in the near future the information they would need to recommend changes to the building blocks for purposes of protection or restoration of water quality or for management of aquatic vegetation. It was noted that the ongoing WPP would provide more analysis of the water quality impairments in the basin and potential solutions to address those problems. Changes in flows may be one option. The next round of analysis for the WPP will be available within three years. Likewise, it was agreed that more information would be needed before the participants could recommend adjustments in flows patterns or water levels in Caddo or any other lake for purposes of management of aquatic plants. Again, the WPP process may provide additional information over the next few years.

The second breakout session focused on how much water is available given existing water rights and future projections of needs. With the limitations on Big Cypress Bayou subject to issues being discussed in the first breakout session, the participants in the second reconsidered a proposal made at the flows meeting in October 2006. At that time, while developing the building blocks, concern was raised that the role of Black and Little Cypress Bayous may need to change, given the limitations on flood flows in Big Cypress Bayou with the construction of the dam at Lake O' the Pines. There was an interest expressed in the 2006 meeting about the possibility of maintaining flows in Black and Little Cypress Bayous in relatively natural conditions. This was especially for Black Cypress.

Thus, the participants decided that, rather than recommending the flows in the building blocks or other numerical flows for the environmental flow standards for Black and Little Cypress Bayou, that a narrative approach should be considered. For Black Cypress Bayou, the group recommended an environmental flow standard that maintains flows in Black Cypress Bayou at essentially current flows with no new major reservoirs or diversions permitted. The consensus was that Black Cypress Bayou was needed as a reference stream and that the flood flows were important to maintain the wetlands and Caddo Lake, given the reduction in such flows in Big Cypress Bayou due to the construction of Lake O' the Pines.

A similar approach was proposed for Little Cypress Bayou, but not as limiting. Little Cypress Bayou was described as somewhat impacted by dams, diversions and discharges. A hybrid approach, using the building blocks for low flows and the narrative standard for high flows was proposed, although no specific language was recommended.

The first breakout session focused on Big Cypress Bayou and the limitations on the operations of the dam at Lake O' the Pines. The Corps of Engineers indicated that the potential flooding of a downstream oil and gas development and possibly other properties had not been adequately evaluated for releases at 3,000 cfs. Thus, more investigation of the impacts of 3,000 cfs was recommended during the next round of field tests.

The Corps of Engineers also indicated a desire to expand its model of flows in Big Cypress Bayou to cover the flows in Little and Black Cypress Bayous at and just above the confluences of these bayous with Big Cypress Bayou. While releases of 3,000 cfs from Lake O' the Pines would be a small addition to the water levels when flood waters were moving from Black and Little Cypress Bayous, work to develop a better understanding of the flood flows and contributions by Big Cypress Bayou under different conditions was proposed.

2. Recommendations: During the larger group discussions of the results of the three breakout sessions, the full group of participants met to develop recommendations for environmental flow standards and strategies. The discussion focused on how some tributaries to Caddo Lake could be used to address the reduction in flood flows that result from the construction of Lake O' the Pines. The approach proposed by the second breakout session gained support, although the exact language for a narrative standard and a hybrid between the building blocks and a narrative standard was not developed.

The result was a proposal to adopt the narrative and hybrid approach for some tributaries and allow the sponsors of the meeting to develop language that would be circulated to all participants and presented to key state entities, such as the Science Advisory Committee (SAC) for the Senate Bill 3, for comment. While there is nothing in Senate Bill 3 to suggest that the environmental flow standard cannot be a narrative standard, this approach may not be anticipated by TCEQ, SAC, or the Environmental Flows Advisory Group.

2. Resulting Environmental Flow Standards: Thus, the following recommendations were developed for the environmental flow standard (EFS), with the proposed language in italics:

1. EFS for Big Cypress Bayou: *The revised building blocks as limited by the 3,000 cfs maximum flow rate from Lake O' the Pines and existing water rights.*
2. EFS for Black Cypress Bayou: *A narrative standard: Maintain Black Cypress Bayou in as natural condition as possible, allowing additional appropriations of water only where the impacts on the low flow building blocks are de minimis and where pulses and flood flows are not significantly reduced in timing, duration, or magnitude.*
3. EFS for Little Cypress Bayou: *A hybrid standard: The building blocks, with the exception for flood flows with the added narrative standard that flood flows should not be further reduced significantly in timing, duration or magnitude.*
4. EFSs for James Bayou and other streams flowing into to Caddo Lake: *The building blocks for low and pulse flows for Black Cypress Bayou should be used for each stream by adjusting the building blocks in proportion to the size of the watershed of the stream in question to the size of the watershed for Black Cypress Bayou. Flood flows should not be reduced significantly in timing, duration or flow.*
5. EFSs for other streams in the Cypress Basin. *The building blocks for low, pulse, and flood flows for Black Cypress Bayou should be used for each stream by adjusting the building blocks in proportion to the size of the watershed of the stream to the size of the watershed for Black Cypress Bayou.*

3. Resulting Proposals for Strategies: The full group then turned its attention to the issues of where there may not be sufficient water available to meet the environmental flow standards. The only segment that did not appear to have sufficient water was Big Cypress Bayou below Lake O' the Pines. The participants discussed a range of options. They indicated that several strategies should be included in the recommendations for obtaining sufficient water in the future. Those strategies were:

1. Extension of the dates for maintaining the recreational pool from the current period of May 20 to September 30 to the entire year to provide an additional 1.5 feet of storage of waters that

could be set aside by TCEQ to be released down stream for environmental flows. See, Appendix D. This option would provide much of the needed water, but not at all times.

2. Raising the level of storage pool to reallocate some flood storage and provide addition water that could be set aside by TCEQ to be released down stream for environmental flows.

3. Purchase, lease, or otherwise acquiring access to water currently appropriated but not currently needed or projected to be needed.

There was recognition that some strategies, such as raising the level of the storage pool, would require considerable time and effort, including new environmental, cultural and other studies to evaluate potential impacts.

Planning for Future Work

The participants then turned their attention to the next steps for the work. The recommendations can be divided into work based on the four objectives described above in the Introduction:

1. **An SB 3 Flow Reservation or Set Aside:** Develop recommendations for a SB 3 type “environmental flow standard” for a reservation of water in the watershed.

Workshop recommendation:

1) Develop language for the narrative and hybrid environmental flow standards to circulate to the participants and others for comments.

2) If a consensus is reached, present these standards, along with the environmental flow regimes and strategies in a summary report to the Texas Environmental Flow Advisory Group, the Texas Environmental Flow Science Advisory Committee, and the Texas Commission on Environmental Quality to seek a set aside pursuant to Senate Bill 3.

2. **A New “Release Rule” for Lake O’ the Pines:** A recommendation for changes in the operations of the dam at Lake O’ the Pines to provide a more natural pattern of releases, while assuring flood control, water supply, and the other purposes of the reservoir.

Workshop recommendations:

1) Develop additional technical information on flows, especially flood flows, in Black and Little Cypress Bayous to assist the Corps on Engineers in developing a better HEC RAS model for Big Cypress Bayou from Lake O’ the Pines to Caddo Lake and in the areas of the confluences of Black and Little Cypress Bayous with Big Cypress Bayou.

2) Pursue new field work on potential flooding of developed properties downstream of Lake O’ the Pines at releases up to 3,000 cfs.

3) Continue to pursue proposals for changes to the operations of Lake O’ the Pines with the U.S. Corps of Engineers and Northeast Texas Municipal Water District for release of waters from the lake consistent with the building blocks.

3. **Flow Needs for Watershed Protection Plan:** Serve as the Hydrology Work Group for the Watershed Protection Plan to evaluate and recommend flows, lake level management, etc., and to assist with protection of water quality and management of invasive aquatic species.

Workshop recommendation: Continue to serve as the Hydrology Work Group for the WPP to coordinate the work on water quality and aquatic vegetation with the work on environmental flows.

4. **Long-term Adaptive Management:** Establish a long-term effort, with the continuation of field work, other research, and consensus decision-making to refine environmental flow recommendations over time.

Workshop recommendation: Continue to pursue field work and other research to gain a better understanding of the ecological needs and values of the Cypress Basin, with a special focus over the next year or two on geomorphology and better indicators of progress at reaching the overall goal of adequate instream flows to sustain the ecological, recreational, and economic values of Caddo Lake watershed and the Cypress Basin.

In addition, the participants proposed that another workshop be scheduled within 3 years to allow the scientists and stakeholders to review new information and make any appropriate revisions to the recommendation from this meeting.