

APPENDIX G

PROPOSED STUDY PLANS

CULTURAL RESOURCES
STUDY PLAN
TOLEDO BEND RELICENSING PROJECT
FERC NO. 2305

September 2008

Prepared by:
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EXECUTIVE SUMMARY

On September 15, 2008 the Sabine River Authorities in Texas and Louisiana (Authorities) filed a Pre-Application Document PAD with the Federal Energy Regulatory Commission (Commission) to initiate the formal relicensing process for the Toledo Bend Project (Project), located in Texas and Louisiana.

Section 106 of the National Historic Preservation Act (Section 106) requires federal agencies to take into account the effects of their undertakings on historic properties listed in or eligible for listing in the National Register of Historic Places (National Register). As a Commission undertaking, the licensing process for the Project is subject to the provisions and regulations of Section 106.

The Authorities propose to undertake a Cultural Resources Study in order to evaluate effects, if any, of Project operations on historic properties. An initial review of available records indicates that there are several historic resources located within the Project's proposed Area of Potential Effects. However, significant data gaps were also identified, including specific information regarding the location, nature, and National Register eligibility or recorded resources. The Cultural Resource Study provides measures for collecting additional information regarding historic properties, identifying previously-unrecorded resources, and if necessary, the developing a Historic Properties Management Plan for the Project.

1.0 INTRODUCTION

1.1 General Description of the Toledo Bend Project

The Sabine River Authority of Texas was formed in 1949 and the Sabine River Authority State of Louisiana in 1950, and these two agencies collaborated to build the Toledo Bend Project (Project), which began to impound the Sabine River in October 1966. The Project is jointly operated by the respective Sabine River Authorities in Texas and Louisiana (Authorities).

The Project was originally conceived, licensed, and constructed as a water supply facility, but also provides multiple uses, such as hydroelectric power generation and recreation. The Project is located 147 miles upstream from where the mouth of the Sabine River discharges to Sabine Lake and approximately 156.5 miles upstream from the Gulf of Mexico. Both the Project and this reach of the river serve as the border between Louisiana and Texas.

The Project Reservoir (which is oriented in a southeast to northwest direction), is approximately 85 miles in length. The Project extends approximately 132 river miles (channel miles) from Toledo Bend Dam, which is located at river mile 147, upstream to above Logansport, Louisiana (i.e., Murvaul Bayou), located at river mile 279. Thus, the Project occupies lands and waters within Panola, Shelby, Sabine, and Newton Counties in Texas and De Soto, Sabine, and Vernon Parishes in Louisiana. Toledo Bend Reservoir is the largest manmade body of water in the South and the fifth largest in surface acres in the United States.

The Reservoir has approximately 1,200 miles of shoreline with a surface area of 185,000 acres at the Reservoir elevation of 172 .00 feet msl (full pool). The Toledo Bend Reservoir is 7 miles at its widest point and contains a total storage volume of 4,477,000 acre-feet within a 10 foot operating range. Primary hydroelectric generation occurs between 172 and 168. Toledo Bend Reservoir drains approximately 7,178 square miles and had an estimated runoff in 2004 of 3.6 million acre-feet (SRA 2008). Historic water levels for the Reservoir range from 173.93 feet msl to 162.25 feet msl.

As currently licensed, the principal Project works consist of:

- A rolled earth-filled dam with a maximum height of 112-feet and a length of 11,250-feet (including saddle dikes);
- A reservoir covering 185,000 acres and approximately 1,200 miles of shoreline, with a storage capacity of 4,477,000 acre-feet;
- A spillway comprised of a concrete, gravity-type, gated weir with a concrete chute and stilling basin and a discharge channel on the left abutment located in Louisiana, with a maximum length of 838-feet with eleven 40-foot by 28-foot tainter gates. Maximum elevation to the top of the gates is 173-feet and maximum elevation to the top of the spillway weir is 145-feet;
- A powerhouse located in the right abutment in Texas contains two 58,500 horsepower (43.875-MW) vertical shaft Kaplan generators; a tailrace channel; and appurtenant electrical and mechanical facilities.

1.2 Relicensing Process

The current Toledo Bend license will expire on September 30, 2013. The Authorities are using the Integrated Licensing Process (ILP) as promulgated by the FERC regulations issued July 23, 2003 (18 CFR Pt. 5). A number of federal and state resource agencies and stakeholders have expressed an interest in participating in the Authorities' process for the relicensing of the Project. During the process, information needs will be identified as they relate to Project relicensing. In association with this interest, the following study plan has been prepared that addresses each of the required seven FERC study plan criteria provide in 18 CFR § 5.9(b). Any information or study request must address the following:

(1) *Describe the goals and objectives of each study and the information to be obtained (§ 5.9(b)(1))*: This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study should clearly relate to the need to evaluate the effects of the project on a particular resource. The objectives are the specific information that needs to be gathered to allow achievement of the study goal.

(2) *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied (§ 5.9(b)(2)):* This section should clearly establish the connection between the study request and management goals or resource of interest. A statement by an agency connecting its study request to a legal, regulatory, or policy mandate needs to be included that thoroughly explains how the mandate relates to the study request, as well as the project impacts.

(3) *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study (§ 5.9(b)(3)):* This section is for non-agency or tribal stakeholders to establish the relationship between the study request and the relevant public interest considerations.

(4) *Describe existing information concerning the subject of the study proposal, and the need for additional information (§ 5.9(b)(4)):* This section should discuss any gaps in existing data by reviewing the available information presented in the Pre-Application Document (PAD) or information relative to the project that is known from other sources. This section should clearly explain why the existing information is inadequate and the need for additional information.

(5) *Explain any nexus between project operation and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements (§ 5.9(b)(5)):* This section should clearly make the connection between project operations and project effects on the applicable resource. Additionally, this section should explain how the study results would be used to develop protection, mitigation, and enhancement (PM&E) measures. The PM&E measures should include those related to any mandatory conditioning authority under section 401 of the Clean Water Act or sections 4(e) and 18 of the Federal Power Act.

(6) *Explain how any proposed study methodology is consistent with generally accepted practices in the scientific community or, as appropriate, considers relevant tribal values and knowledge. This includes any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration (§ 5.9(b)(6)):*

This section should provide a detailed explanation of the study methodology. The methodology may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs (§ 5.9(b)(7)):

This section should describe the expected level of cost and effort to conduct the study. Additionally, if there are proposed alternative studies, this section should address why the alternatives would not meet the stated information needs.

2.0 GOALS AND OBJECTIVES

Section 106 of the National Historic Preservation Act (Section 106) requires agencies with the authority to license an undertaking to consider the effects of that undertaking on historic properties listed in or eligible for listing in the National Register of Historic Places (National Register). The Commission's issuance of a license for the Project is considered an undertaking, and is therefore subject to the provisions and regulations of Section 106.

The principal goal of this study is to evaluate the potential effects of Project operations on historic properties listed in or eligible for inclusion in the National Register. Based on the results of research conducted in support of PAD development, the Authorities have identified three primary objectives for meeting this goal:

1. To provide additional information regarding the location and nature of historic properties within the Project's Area of Potential Effects (APE),
2. To determine if further studies are warranted to make a National Register eligibility determination for specific historic properties within the APE that are affected by the operation or maintenance of the Project; and
3. If necessary, develop appropriate management measures for identified National Register eligible historic properties in consultation with the Texas and Louisiana State Historic Preservation Offices (SHPOs) and interested Indian tribes.

3.0 STUDY AREA

The study area for the cultural resources study will be the Project's APE. The Authorities have proposed in the PAD that APE for the Toledo Bend Project be defined as:

The Toledo Bend Project APE includes all lands within the FERC Project boundary. The APE also includes any lands outside of the Project boundary where cultural resources may be affected by Project-related activities that are conducted in compliance with the FERC license.

In general, the Project boundary encompasses all lands that are necessary for Project purposes. The Authorities believe that this proposed APE is consistent with the manner in which FERC has defined the APE for similar hydroelectric projects.

4.0 BACKGROUND AND EXISTING INFORMATION

4.1 Resource Discussion

The Project's APE and adjacent areas have been the setting of numerous cultural resource studies, beginning in the 1960s. In developing the PAD, the Authorities initiated a database inventory (i.e, Texas Historical Commission and Louisiana Division of Archaeology) and document review to collect available information regarding historic properties that have been identified in the Project's vicinity. While this review provided useful information regarding Prehistoric and Historic period resources, an assessment of the data revealed significant gaps in the existing information. These gaps are likely the result of several factors, including the nature and focus of archaeological investigations conducted prior to the implementation of Section 106, the relatively remote and rural location of the Project, the lack of a comprehensive survey of the area, and inconsistencies in existing databases.

Based on the available information, the Authorities have concluded that 411 archaeological sites have been previously reported within the Project's proposed APE. This total includes a variety of site types, including Prehistoric camps and villages, Historic period farms and homesteads, and several multi-component sites. However, because of the factors discussed above, the

existing information regarding these resources varies greatly, and information including the specific location and integrity of reported sites has not been verified. Additionally, of the 164 reported sites, only 10 have been assessed as potentially eligible for inclusion in the National Register, and 20 have been determined to be ineligible. The National Register eligibility of the remaining 134 sites is presently unknown or unreported.

In addition to reported archaeological sites, the Authorities will initiate discussions regarding the National Register eligibility of the Project and its facilities. The Project's National Register eligibility has not formally been determined, and the character-defining features of the Project have not been evaluated.

5.0 PROJECT NEXUS

Section 106 requires the Commission to take into account the effects of any undertaking on historic properties. The licensing and continued operation of the Project has the potential to affect historic properties in a number of ways. Fluctuating surface water levels caused by Project operations have the potential to cause erosion along the shoreline of the Reservoir and could adversely affect the integrity of buried archaeological deposits. Additionally, shoreline erosion or a significant drawdown in reservoir levels could expose cultural resources and inadvertently facilitate vandalism or looting.

Recreational activities associated with the Project and routine Project maintenance, repair, or construction activities that may occur during the term of the license also have the potential to affect historic properties. These activities could involve ground disturbance or other activities that have the potential to affect the integrity of cultural resources.

The proposed Cultural Resources Study will provide additional information regarding cultural resources within the APE, including the location, nature, integrity, and National Register status of historic properties. If necessary, this information will be incorporated into a Historic Properties Management Plan (HPMP) that will describe how the Authorities will manage historic properties within the APE throughout the term of the license.

6.0 METHODOLOGY

The methods for conducting the study described above in the goals and objectives are as follows.

6.1 Cultural Resources Study

The primary goal of the Cultural Resources Study is to evaluate the potential effects of the Project on historic properties listed in or eligible for listing in the National Register. As noted above, the existing information regarding historic properties within the Project's APE is inadequate and insufficient for evaluating potential effects. Consequently, the Cultural Resource Study will address this data gap through the following tasks:

Task 1: Literature Review. The Authorities have previously initiated a Pre-PAD database review of recorded historic properties within the Project's vicinity. This information has been provided in the PAD. While this information was useful for providing data regarding the number and types of historic resources within the Project area, additional research and further review of existing reports and documents are necessary to provide a more thorough context for field studies and resource management. The Authorities will contract with a qualified cultural resource professional¹ to review additional sources of information, as necessary. Additional sources may include (but are not limited to):

- a) Archaeological survey reports, site forms, or building and structure inventory forms on file with the SHPOs;
- b) Reports or management plans prepared by the U.S. Forest Service for lands adjacent to the Project;
- c) U.S. Department of Agriculture soil survey maps and reports;
- d) Historic maps of the Project vicinity;
- e) Historic photographs of the Project area;
- f) Records related to Project construction, including photographs, maps, and reports;

¹ For purposes of this Project, a qualified cultural resource professional is defined as an individual who meets or exceeds the Secretary of the Interior's Professional Qualification Standards (36 CFR § 61), the Rules of Practice and Procedure for the Antiquities Code of Texas (Chapter 26, Section 26.5), and Louisiana Administrative Code (Title 25-Cultural Resources, Part I, Chapter I, Subpart A, Section 102) as applicable .

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- g) Deed and survey records;
 - h) Documents or reports retained by local historical societies and museums.

Task 2: Landscape Analysis. The Authorities will contract with a qualified cultural resource professional to conduct a landscape analysis of the Project's APE. This Project-wide landscape assessment will be conducted to determine areas that will have a high probability of containing cultural features (i.e. stream confluences, peninsulas into the reservoir). This landscape assessment will determine which specific or potential cultural areas within the Project APE will be field reconned. Based on this desktop analysis, directed reconnaissance surveys will then be conducted.

Task 2: Field Reconnaissance Survey. The Authorities will contract with a qualified cultural resource professional to conduct a reconnaissance and visual inspection within the Project's APE. The purpose of this reconnaissance survey will be to:

- a) Identify and document unreported historic resources;
- b) Verify the location and type of reported historic resources, and provide additional documentation, as necessary;
- c) Map the location of historic properties within the APE;
- d) Identify areas where additional cultural resource studies or PM&E measures may be necessary.

The field reconnaissance will include a walkover survey of the selected high probability sites. All unrecorded historic resources encountered during the survey will be documented with the appropriate site, building, or structure forms, as required by the SHPOs. Identified properties will be photographed, and available information for each resource will be recorded, including (but not limited to): resource name and number (if applicable), elevation or range of elevation, description of environmental setting, general description of the resource, observed cultural features and artifacts, areas of occupation and concentrations of cultural material, pertinent natural features, associated soil types, relationship to waterways, relationship to the Project, observed Project affects to the resource (if any), potential Project affects to the resource,

recommendations for National Register eligibility, and recommendations for further studies or for avoidance, protection, or mitigation measures.

Task 3: Identify Areas and Historic Properties where Additional Studies or Management Measures are recommended. A qualified cultural resource professional will prepare recommendations regarding the need for further studies and identify portions of the APE or specific resources where protection, avoidance, mitigation, or other management measures (such as erosion monitoring) are necessary. These recommendations will be based on the background research, the results of the field reconnaissance, and an evaluation of potential Project effects on identified historic resources.

6.2 Data Analysis and Reporting

A Draft and Final technical report on the results of the literature review, field reconnaissance, and recommendations (Phase I report) will be prepared for this study and will include the following elements:

- a) Project Introduction and Background;
- b) Study area;
- c) Methodology;
- d) Discussion and Analysis;
- e) Results (including discussions of Project effects and recommendations);
- f) Location maps, GIS analysis and photos;
- g) Any agency correspondence and or consultation;
- h) Literature citations

The Authorities will consult with the SHPOs and interested Indian tribes regarding the results and recommendations provided in the Phase I report.

6.3 Historic Properties Management Plan

The Authorities will consult with the SHPOs regarding the results of the Phase I report to determine if additional investigations or a HPMP is necessary for the Project. If a HPMP is

required, the Authorities will develop the HPMP in consultation with the SHPOs and interested Indian tribes. The HPMP will be prepared in accordance with the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, promulgated by the Commission and the Advisory Council on Historic Preservation (Council) on May 20, 2002. At minimum, the HPMP will address the following items (FERC 2002):

- Management measures for identified historic properties within the Project's APE;
- Continued use and maintenance of historic properties;
- Protection of historic properties threatened by Project construction or Project-related shoreline erosion, recreation, ground-disturbing activities, vandalism or other Project activities;
- Resolution of unavoidable adverse effects on historic properties;
- Treatment and disposition of any human remains that be discovered, taking into account any applicable state laws and the Council's "Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects" (February 23, 2007 Washington, D.C.);
- Compliance with the Native American Graves Protection and Repatriation Act (25 U.S.C. Section 3001), if Tribal or Federal lands are within the Project's APE;
- Protection of previously unidentified historic properties discovered during Project operation;
- Categorical exclusions from further review of effects;
- Public interpretation of the historic and archaeological values of the Project, if any; and
- Coordination with the SHPOs, Indian tribes, and other interested parties during implementation of the HPMP.

7.0 SCHEDULE

- a) File Initial Progress Report (Authorities): June 12, 2009
- b) File Follow-up Progress Report (Authorities): October 9, 2009
- c) File Initial Study Report (Authorities): August 16, 2010
- d) Initial Study Report Meeting (Authorities and stakeholders): August 31, 2010
- e) File Study Report Meeting Summary (Authorities): September 15, 2010

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- f) File Meeting Summary Comments (Authorities): October 15, 2010
 - g) File Response to Meeting Summary Comments (Stakeholders): November 14, 2010
 - h) Study Plan Resolution/Amendments by FERC: December 14, 2010

8.0 BUDGET

This study would likely take one study season to complete. The estimated budget for the study is approximately \$200,000.

9.0 DISCUSSION OF ALTERNATIVE APPROACHES

The proposed methods for this study are consistent with professional practices. The overall approach is commonly used in relicensing proceedings in developing a HPMP for the new license term, and is consistent with FERC study requirements under the newly developed Integrated Licensing Process (FERC 2004). No alternative approaches to this study are necessary.

10.0 REFERENCES

Federal Energy Regulatory Commission. 2002. Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects. May 20, 2002. Washington D.C.

Federal Energy Regulatory Commission. 2004. Hydroelectric Licensing Under the Federal Power Act, Final Rule and Tribal Policy Statement. Revised February 23, 2004. Washington D.C.

DOWNSTREAM AQUATIC RESOURCES
STUDY PLAN
TOLEDO BEND RELICENSING PROJECT
FERC NO. 2305

September 2008

Prepared by:
Sabine River Authority of Texas
Sabine River Authority, State of Louisiana
Orange, Texas

EXECUTIVE SUMMARY

Geomorphological assessment of the Lower Sabine River below the Toledo Bend Dam has identified physical evidence of Project operational effects (scour) between the dam and Burr Ferry (Phillips 2003 and 2007). However, there is an insufficient amount of fisheries data to evaluate how these geomorphological changes affect the fish and mussel populations in this area. There are three distinct river reaches above RM 132 (Highway 63, Burr Ferry) that require additional study and information to determine the existence and extent Project effects.

The scour zone in the lower tailrace channel and Sabine River down to Jones Creek (RM 137) is quite uniform with little cover and experiences the full range of rapidly changing operational flows with little attenuation. Additionally, the six-mile base flow channel (RM 141 to 147) has a very different habitat and hydrology.

The Authorities prefer the direct biological sampling approach with the assessment of empirical data to evaluate Project operational effects over Instream Flow modeling. The habitat specific, multiple gear sampling approach, similar to the sampling methods employed in recent lower Sabine River Priority Instream Flow Study Baseline Fish Collections (TWDB 2007, 2008), are proposed for fish sampling. Mussel sampling methods would follow techniques recently applied by Randklev and Kennedy (2008) to lower Sabine River surveys. There are several reasons for selecting this approach:

- The area to be sampled is relatively small (15 miles plus 1 ½ miles of tailrace) and can be adequately covered;
- There is adequate existing fisheries data, as recent as 2006-2007, downstream of RM 132 for analysis of spatial trends with increasing distance below the Project;
- TWDB is already in the process of conducting a lower Sabine River instream flow study which has a much broader basin wide scope than Toledo Bend Project hydro operation effects; and
- This biological assessment will help TWDB integrate Toledo Bend Hydro operational effects into their overall basin model.

1.0 INTRODUCTION

1.1 General Description of the Toledo Bend Project

The Sabine River Authority of Texas was formed in 1949 and the Sabine River Authority State of Louisiana in 1950, and these two agencies collaborated to build the Toledo Bend Project (Project), which began to impound the Sabine River in October 1966. The Project is jointly operated by the respective Sabine River Authorities in Texas and Louisiana (Authorities).

The Project was originally conceived, licensed, and constructed as a water supply facility, but also provides multiple uses, such as hydroelectric power generation and recreation. The Project is located 147 miles upstream from where the mouth of the Sabine River discharges to Sabine Lake and approximately 156.5 miles upstream from the Gulf of Mexico. Both the Project and this reach of the river serve as the border between Louisiana and Texas.

The Project Reservoir (which is oriented in a southeast to northwest direction), is approximately 85 miles in length. The Project extends approximately 132 river miles (channel miles) from Toledo Bend Dam, which is located at river mile 147, upstream to above Logansport, Louisiana (i.e., Murvaul Bayou), located at river mile 279. Thus, the Project occupies lands and waters within Panola, Shelby, Sabine, and Newton Counties in Texas and De Soto, Sabine, and Vernon Parishes in Louisiana. Toledo Bend Reservoir is the largest manmade body of water in the South and the fifth largest in surface acres in the United States.

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(1) *Describe the goals and objectives of each study and the information to be obtained (§ 5.9(b)(1))*: This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study should clearly relate to the need to evaluate the effects of the Project on a particular resource. The objectives are the specific information that needs to be gathered to allow achievement of the study goal.

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may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs (§ 5.9(b)(7)): This section should describe the expected level of cost and effort to conduct the study. Additionally, if there are proposed alternative studies, this section should address why the alternatives would not meet the stated information needs.

2.0 GOALS AND OBJECTIVES

The goal of this study is to evaluate the existence and magnitude of Project operational effects on the aquatic resources, if any, primarily fish and mussels, immediately downstream of the Toledo Bend Dam and to document the spatial extent of any operational effects on the aquatic resources in the lower Sabine River in a downstream direction between the dam and Burr Ferry at RM 132. Existing contemporary and historical data in the vicinity of Burr Ferry (RM 132) and downstream are abundant and suggest that the fish community is relatively unaffected by Project operations (PAD Section 6.3.3). However, in the remaining 15 miles upstream of this point to the Project dam, there is insufficient information to judge the status of the aquatic resources. The study objective is to collect sufficient biological data on fish and mussels to fill this data gap in the 15 mile reach between Burr Ferry and Toledo Bend Dam (RM 132-147). The data should be adequate to describe the magnitude of Project effects, if any, immediately below the dam and spatial extent of Project effects on aquatic resources and transition pattern between the dam and Burr Ferry. A second objective is to relate the condition of the aquatic resources in this 15 mile reach to the observed patterns of physical habitat alteration resulting from Project operation.

3.0 STUDY AREA

The fisheries study area is the lower Sabine River from the Toledo Bend Dam downstream to Burr Ferry in the vicinity of Highway 63 (RM 132). The study area includes the excavated tailrace channel from the powerhouse to the confluence with the lower Sabine River channel. It also includes the base flow channel from the gated spillway portion of the dam, through the intersection with the original lower Sabine River channel, down to the confluence with the

tailrace channel (RM 141 to 147). It also includes the lower Sabine River from its confluence with the tailrace channel down to Burr Ferry (RM 132 to 141). The mussel study area includes all of the study area above and may continue further downstream to the upper extent of the preliminary 2008 mussel sampling by Randklev and Kennedy (2008). (See Volume II-Appendix D for river mile maps of the study area).

4.0 BACKGROUND AND EXISTING INFORMATION

4.1 Resource Discussion

The TWDB, TCEQ, and TPWD, in cooperation with other appropriate governmental agencies such as the SRA-TX and SRA-LA, are charged with the executing the Texas Instream Flow Program (TIFP) pursuant to the Texas Water Code Section 16.059. SRA-TX is a partner on the lower Sabine River study and is assisting with field studies and stakeholder process. The study has a broad, basin wide scope, far beyond the effects of Toledo Bend Project hydroelectric generation on the river, including the entire lower Sabine sub-basin down to, but not including, the Sabine Lake estuary waters.

The Downstream Aquatic Resources Study proposed herein as part of the FERC relicensing process will contribute to the larger Texas Instream Flow Program assessment of the lower Sabine River Basin by identifying potential and specific effects of Toledo Bend Project operation on aquatic resources through empirical data collection and analysis and help to isolate Project hydropower operational effects from other basin wide water resource issues.

4.2 Issue Statements

Existing contemporary and historical data in the vicinity of Burr Ferry (RM 132) and downstream 132 miles to Sabine Lake are abundant and suggest that the fish community is unaffected by Project operations (PAD Section 6.3.3). However, in the remaining 15 miles upstream of this point to the Project dam, there is insufficient information to confidently evaluate the status of the aquatic resources and any operational effects (i.e., flows and temperature) the Project may have on those resources.

5.0 PROJECT NEXUS

Geomorphological assessment of the Lower Sabine River below the Toledo Bend Dam has identified physical evidence of Project operational effects (scour) between the dam and Burr Ferry (Phillips 2003 and 2007). However, there is an insufficient amount of fisheries data to evaluate how these geomorphological changes affect the fish and mussel populations in this area. There are three distinct river reaches above RM 132 (Highway 63, Burr Ferry) that are expected to show signs of Project effects.

The scour zone in the lower tailrace channel and Sabine River down to Jones Creek (RM 137) is quite uniform with little cover and experiences the full range of rapidly changing operational flows with little attenuation. Additionally, the six mile base flow channel (RM 141 to 147) has a very different habitat and hydrology.

Once the fish and mussel community in this upper 15 mile reach is documented, it can be compared to the historic and contemporary data available downstream (below RM 132) to assess Project effects. The spatial overlap of the physical signs of Project effects (scour, habitat uniformity, water temperature) or hydraulic gradient (hydraulic attenuation of peaking flows downstream) with fish and mussel species and community characteristics will be examined to evaluate Project operation effects, if any.

6.0 METHODOLOGY

The methods for conducting the study described above in the goals and objectives are as follows.

6.1 Downstream Aquatic Resources Study

Two methods are generally accepted as appropriate for assessing the operational effects of hydropower on downstream aquatic resources. One method is an instream flow study using the IFIM/PHABSIM modeling technique or other closely aligned methodology. This approach usually involves some form of hydraulic measurements, assessment, or more commonly a model to simulate the effects of altered flows on the physical aquatic habitat in the river, followed by a second modeling step to relate those hydraulic effects to the quantity and quality of fish or other aquatic organism habitat. The implicit assumption in this methodology is that changes in

simulated hydraulic aquatic habitat parameters will generally reflect changes in the ability of that habitat to support, improve, or diminish aquatic life as represented by the biological models (habitat suitability index models). Direct evidence to support this assumption is often lacking and likely points to the model's over-simplistic representation of habitat value and the behavioral response of aquatic organisms to hydraulic alteration. The strength of this approach is the ability to model large areas and assess multiple flow alternatives at a relatively low cost and effort.

A second generally accepted method for assessing operational effects on downstream aquatic resources is to sample the aquatic life directly. Results of such sampling provide direct empirical evidence of cumulative Project operational effects on the downstream aquatic resources over recent history. Biological data collected along a downstream gradient along with evidence of hydraulic attenuation over the same reach can provide insight into the relationship between aquatic communities and hydraulic affects of Project operation. Forecasting the effects of alternative flow scenarios is subject to some of the same uncertainties of modeling. Segmenting sampling effort by habitat type along with careful documentation of sampling site habitat parameters (depth, velocity, substrate, cover, water temperature, DO) can aid in the determination of site specific habitat preference and utilization, and make better predictions of the effect of PM&E measures.

The Authorities prefer the direct biological sampling approach with the assessment of empirical data to evaluate Project operational effects over IFIM/PHABSIM modeling. The habitat specific, multiple gear sampling approach, similar to the sampling methods employed in recent lower Sabine River Priority Instream Flow Study Baseline Fish Collections (TWDB 2007, 2008), are proposed for fish sampling. Mussel sampling methods would follow techniques recently applied by Randklev and Kennedy (2008) to lower Sabine River surveys. There are several reasons for selecting this approach:

- The area to be sampled is relatively small (15 miles plus 1 ½ miles of tailrace) and can be adequately covered;
- There is adequate existing fisheries data, as recent as 2006-2007, downstream of RM 132 for analysis of spatial trends with increasing distance below the Project;

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- TWDB is already in the process of conducting a lower Sabine River instream flow study which has a much broader basin wide scope than Toledo Bend Project hydro operation effects; and,
 - This biological assessment will help TWDB integrate Toledo Bend Hydro operational effects into their overall basin model.

Fisheries sampling should consist of sampling for at least three seasonal episodes (to evaluate differing seasonal habitat use) during spring, summer, and fall of 2009 (a fourth winter sample is optional). Sampling effort will be segmented into four reaches: the tailrace channel (RM 141 to powerhouse), the base flow channel (spillway dam to RM 141), the tailwater scour zone (RM141 to 137), and the transition zone (RM 137 to RM 132). The lower transition zone reach will include re-sampling the TWDB site 5080 (RM 131.3 to RM 132.3) to provide a calibration point to assist in data comparisons and interpretation between 2009 and 2006-2007 data sets. At least two locations within each reach will be sampled. Mussel sampling may occur over a larger geographic area, pending results of baseline sampling currently under way in 2008 (Randklev and Kennedy 2008).

Fisheries sampling methods will generally follow the most recent sampling protocols used by TPWD and cooperators for the Lower Sabine River Baseline Fish Collections (TWDB 2007, 2008) and include the use of seine and electrofishing techniques. One recommended addition to this protocol is to add gillnet, baited trap nets or other sampling methods to more effectively sample catfish, suckers and redhorse species that typically occupy deeper water habitats. Mussel sampling will include a combination of qualitative reconnaissance sampling followed by quantitative sampling at mussel bed sites, similar to the methods of Randklev and Kennedy (2008).

Each seasonal fisheries sampling effort would require approximately 2 to 3 weeks of field effort followed by laboratory processing of samples and data analysis. Mussels would require only one time sampling with about 2 to 3 weeks of field effort followed by data analysis and reporting.

6.2 Data Analysis and Reporting

A Draft and Final technical report will be prepared for this study and will include the following elements:

- a) Project Introduction and Background;
- b) Study area;
- c) Methodology;
- d) Discussion and Analysis;
- e) Results (includes impact discussion);
- f) Location maps, GIS analysis and photos;
- g) Any agency correspondence and or consultation;
- h) Literature citations

7.0 SCHEDULE

- a) File Initial Progress Report (Authorities): June 12, 2009
- b) File Follow-up Progress Report (Authorities): October 9, 2009
- c) File Initial Study Report (Authorities): August 16, 2010
- d) Initial Study Report Meeting (Authorities and stakeholders): August 31, 2010
- e) File Study Report Meeting Summary (Authorities): September 15, 2010
- f) File Meeting Summary Comments (Authorities): October 15, 2010
- g) File Response to Meeting Summary Comments (Stakeholders): November 14, 2010
- h) Study Plan Resolution/Amendments by FERC: December 14, 2010

8.0 BUDGET

The estimated budget for the downstream aquatic resources study is \$270,000.

9.0 DISCUSSION OF ALTERNATIVE APPROACHES

The proposed methods for this study are consistent with professional practices. The overall approach is commonly used in relicensing proceedings in developing PM&E measures, for the new license term, and is consistent with FERC study requirements under the newly developed

Integrated Licensing Process (FERC 2004). No alternative approaches to this study are necessary.

10.0 REFERENCES

- Phillips, J. D. 2007. Geomorphic controls and transition zones in the lower Sabine River. Hydrological Processes. Published Online in *Wiley InterScience*. URL: www.interscience.wiley.com (accepted for publication 5/21/2007).
- Phillips, J. D. 2003. Toledo Bend Reservoir and Geomorphic Response in the Lower Sabine River. *River Research and Applications* 19:137-159. Wiley Interscience.
- Randklev, C. and J. Kennedy. 2008. Preliminary summary report on Sabine River mussel survey performed 22 – 24 July, 2008. Courtesy Copy, provided by authors to the Sabine River Authority of Texas, prior to formal publication.
- Texas Water Development Board. 2008. Baseline fish Collections [2007], lower Sabine River priority instream flow study. Prepared by Sabine River Authority of Texas, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas Water Development Board. Draft Data June 2008.
- Texas Water Development Board. 2007. Baseline fish Collections [2006], lower Sabine River priority instream flow study. Prepared by Sabine River Authority of Texas, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas Water Development Board. February 28, 2007.

RECREATION USE AND NEED ASSESSMENT

STUDY PLAN

**TOLEDO BEND RELICENSING PROJECT
FERC NO. 2305**

September 2008

Prepared by:
Sabine River Authority of Texas
Sabine River Authority, State of Louisiana
Orange, Texas

EXECUTIVE SUMMARY

To meet the requirements of FERC relicensing regulations regarding public access and use at the Toledo Bend Hydroelectric Project (FERC No. 2305), a recreation use and needs assessment is proposed. The recreation use and needs assessment will characterize the existing recreation setting; identify and characterize current participation in various types of recreation activities, participant experience and satisfaction levels including perception of crowding, existing facility conditions, facility availability, and unsatisfied demand; estimate and characterize future demand for the various types of recreation opportunities; evaluate the recreation carrying capacity for the Project; identify and characterize recreation facility needs; and develop a method to determine when additional facilities may be required in the future. A detailed report will be developed based on the results of the recreation use and need assessment.

1.0 INTRODUCTION

1.1 General Description of the Toledo Bend Project

The Sabine River Authority of Texas was formed in 1949 and the Sabine River Authority State of Louisiana in 1950, and these two agencies collaborated to build the Toledo Bend Project (Project), which began to impound the Sabine River in October 1966. The Project is jointly operated by the respective Sabine River Authorities in Texas and Louisiana (Authorities).

The Project was originally conceived, licensed, and constructed as a water supply facility, but also provides multiple uses, such as hydroelectric power generation and recreation. The Project is located 147 miles upstream from where the mouth of the Sabine River discharges to Sabine Lake and approximately 156.5 miles upstream from the Gulf of Mexico. Both the Project and this reach of the river serve as the border between Louisiana and Texas.

The Project Reservoir (which is oriented in a southeast to northwest direction), is approximately 85 miles in length. The Project extends approximately 132 river miles (channel miles) from Toledo Bend Dam, which is located at river mile 147, upstream to above Logansport, Louisiana (i.e., Murvaul Bayou), located at river mile 279. Thus, the Project occupies lands and waters within Panola, Shelby, Sabine, and Newton Counties in Texas and De Soto, Sabine, and Vernon Parishes in Louisiana. Toledo Bend Reservoir is the largest manmade body of water in the South and the fifth largest in surface acres in the United States.

The Reservoir has approximately 1,200 miles of shoreline with a surface area of 185,000 acres at the Reservoir elevation of 172.00 feet msl (full pool). The Toledo Bend Reservoir is 7 miles at its widest point and contains a total storage volume of 4,477,000 acre-feet within a 10 foot operating range. Primary hydroelectric generation occurs between 172 and 168 feet. Toledo Bend Reservoir drains approximately 7,178 square miles and had an estimated runoff in 2004 of 3.6 million acre-feet (SRA 2008). Historic water levels for the Reservoir range from 173.93 feet msl to 161.25 feet msl.

As currently licensed, the principal Project works consist of:

- A rolled earth-filled dam with a maximum height of 112-feet and a length of 11,250-feet (including saddle dikes);
- A reservoir covering 185,000 acres and approximately 1,200 miles of shoreline, with a storage capacity of 4,477,000 acre-feet;
- A spillway comprised of a concrete, gravity-type, gated weir with a concrete chute and stilling basin and a discharge channel on the left abutment located in Louisiana, with a maximum length of 838-feet with eleven 40-foot by 28-foot tainter gates. Maximum elevation to the top of the gates is 173-feet and maximum elevation to the top of the spillway weir is 145-feet;
- A powerhouse located in the right abutment in Texas contains two 58,500 horsepower (43.875-MW) vertical shaft Kaplan generators; a tailrace channel; and appurtenant electrical and mechanical facilities.

1.2 Relicensing Process

The current Toledo Bend license will expire on September 30, 2013. The Authorities are using the Integrated Licensing Process (ILP) as promulgated by the FERC regulations issued July 23, 2003 (18 CFR Pt. 5). A number of federal and state resource agencies and stakeholders have expressed an interest in participating in the Authorities' process for the relicensing of the Project. During the process, information needs will be identified as they relate to Project relicensing. In association with this interest, the following study plan has been prepared that addresses each of the required seven FERC study plan criteria provide in 18 CFR § 5.9(b). Any information or study request must address the following:

(1) *Describe the goals and objectives of each study and the information to be obtained (§ 5.9(b)(1))*: This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study should clearly relate to the need to evaluate the effects of the project on a particular resource. The objectives are the specific information that needs to be gathered to allow achievement of the study goal.

(2) *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied (§ 5.9(b)(2)):* This section should clearly establish the connection between the study request and management goals or resource of interest. A statement by an agency connecting its study request to a legal, regulatory, or policy mandate needs to be included that thoroughly explains how the mandate relates to the study request, as well as the project impacts.

(3) *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study (§ 5.9(b)(3)):* This section is for non-agency or tribal Stakeholders to establish the relationship between the study request and the relevant public interest considerations.

(4) *Describe existing information concerning the subject of the study proposal, and the need for additional information (§ 5.9(b)(4)):* This section should discuss any gaps in existing data by reviewing the available information presented in the Pre-Application Document (PAD) or information relative to the project that is known from other sources. This section should clearly explain why the existing information is inadequate and the need for additional information.

(5) *Explain any nexus between project operation and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements (§ 5.9(b)(5)):* This section should clearly make the connection between project operations and project effects on the applicable resource. Additionally, this section should explain how the study results would be used to develop protection, mitigation, and enhancement (PM&E) measures. The PM&E measures should include those related to any mandatory conditioning authority under section 401 of the Clean Water Act or sections 4(e) and 18 of the Federal Power Act.

(6) *Explain how any proposed study methodology is consistent with generally accepted practices in the scientific community or, as appropriate, considers relevant tribal values and knowledge. This includes any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration (§ 5.9(b)(6)):*

This section should provide a detailed explanation of the study methodology. The methodology may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs (§ 5.9(b)(7)):

This section should describe the expected level of cost and effort to conduct the study. Additionally, if there are proposed alternative studies, this section should address why the alternatives would not meet the stated information needs.

2.0 GOALS AND OBJECTIVES

1. To provide data and analysis sufficient to characterize present public recreation use and experience levels at the Project.
2. To provide data and analysis sufficient to estimate future demand for public recreation at the Project.
3. To provide data and analysis sufficient to estimate present and future capacity of Toledo Bend Reservoir and existing developed recreation sites to support present and future demand for public recreation at the Project (i.e., carrying capacity).
4. To provide data and analysis sufficient to determine present and future public recreation facility requirements for the Project.

3.0 STUDY AREA

The study area will include the Toledo Bend Reservoir, tailrace, and spillway channel contained within the FERC Project Boundary immediately downstream of the Toledo Bend Dam and Powerhouse, existing developed SRA recreation facilities at the Project, and other governmental and commercial facilities at the Project that provide water-based recreation opportunities to the general public. The study will consider data on recreation use gathered over a one-year period.

4.0 BACKGROUND AND EXISTING INFORMATION

4.1 Resource Discussion

There is a lack of comprehensive information on general recreation use of the Toledo Bend Project, including facility condition, visitor use estimates, visitor characteristics and preferences, projected demand, and carrying capacity. The Recreation Use and Needs Assessment should consider the results of ongoing LDFW and TPWD creel surveys, recently completed socioeconomic studies, and any other recreation information from the Project area.

The following existing information will be used to prepare the study:

1. Pre-Application Document for the Toledo Bend Hydroelectric Project (PAD).
2. Louisiana Department of Culture, Recreation and Tourism (n.d.) Louisiana Statewide Comprehensive Outdoor Recreation Plan. Information Base for Executive Decision 2003-2008.
3. Texas Parks and Wildlife Department. 2005. Land and Water Resources Conservation and Recreation Plan. Revised and Approved January 2005.
4. Thailing, C.E. and R.B. Ditton. 2000. Characteristics, Participation Patterns, Attitudes, Management Preferences, Expenditures, and Economic Impacts of Toledo Bend Reservoir Anglers: Texas and Louisiana. Prepared for Texas Parks and Wildlife Department, Louisiana Department of Wildlife and Fisheries, Sabine River Authorities of both Texas and Louisiana. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Fish & Wildlife Service and U.S. Census Bureau).
5. Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity (Bureau of Outdoor Recreation, 1997).
6. Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends (Cordell, 1999).
7. Emerging Markets for Outdoor Recreation in the United States: Based on the National Survey on Recreation and the Environment (Cordell, et al, 1999).

4.2 Issue Statements

While much is known about angling on the Toledo Bend Reservoir, general recreation use of existing facilities and future recreation needs through the duration of the next license term are not well understood. SRA-LA and LDCRT conduct visitor counts at the recreation facilities that they operate, use estimates are not available from other sites. Apart from the results of creel surveys conducted by LDFW and TPWD, little is known about characteristics, behaviors, and attitudes of visitors to the Project. Recreation plans under the new license should consider current use levels and types, recreation trends, and an analysis of the condition and capacity at Project recreation facilities.

5.0 PROJECT NEXUS

FERC regulations require that the license application include a statement of the existing recreation measures or facilities to be continued or maintained and the new measures or facilities proposed by the applicant for the purpose of creating, preserving, or enhancing recreational opportunities at the Project and in its vicinity, and for the purpose of ensuring the safety of the public in its use of Project lands and waters.

6.0 METHODOLOGY

The methods for conducting the study described above in the goals and objectives are as follows.

6.1 Recreation Use and Need Assessment

This study should assess use levels at existing facilities and on the Toledo Bend Reservoir and the condition of existing recreation facilities, and evaluate the ability of existing facilities to meet future recreation demands within the Toledo Bend Project.

The Study will utilize various accepted survey techniques to gather input from a cross section of reservoir and riverine recreation users including Toledo Bend public access area users, State and local park users and managers, lake front residents and property owners, commercial recreation facility customers and managers, and the general public within the study area. The study will

gather sufficient seasonal data to allow for statistical analysis. The various user segments will not be combined unless statistically similar. The study will focus on five work elements:

1. Characterize the existing recreation setting in a regional context to identify the relative uniqueness of the recreation experience at the Project. Identify and characterize a) current participation in various types of recreation activities (including recreation user profiles for each type, place of residence, length of stay, primary activity, etc), b) participant experience and satisfaction levels including perception of crowding, c) existing facility conditions, d) facility availability (existing, infill or expansion of existing, and construction of new facilities and planned facility inventory), and e) unsatisfied demand.
2. Estimate and characterize future demand for the various types of recreation opportunities.
3. Evaluate the recreation carrying capacity for the Project based on the mix of current use and projected future demand, for the average weekday and peak and non-peak weekend day during the various seasons.
4. Identify and characterize recreation facility needs, considering status quo, infill or expansion of existing facilities, or construction of new facilities. Develop a “limits of acceptable change” model to determine when additional facilities may be required in the future.

The study results will characterize the types and amounts of existing and estimated future recreation use at the Project, and the ability of the Project to accommodate future increases in use. It will also provide information on the quantity and quality of existing and proposed recreation facilities available at the Project and in the vicinity of the Project, and their ability to support existing and estimated future demand. Finally, the study will provide a prioritization of the types of, and locations for, any additional facilities needed at the Project.

6.2 Data Analysis and Reporting

A Draft and Final technical report will be prepared for this study and will include the following elements:

- a) Project Introduction and Background;
- b) Study area;
- c) Methodology;
- d) Discussion and Analysis;
- e) Results;
- f) Location maps, GIS analysis and photos;
- g) Any agency correspondence and or consultation;
- h) Literature citations

7.0 SCHEDULE

- a) File Initial Progress Report (Authorities): June 12, 2009
- b) File Follow-up Progress Report (Authorities): October 9, 2009
- c) File Initial Study Report (Authorities): August 16, 2010
- d) Initial Study Report Meeting (Authorities and stakeholders): August 31, 2010
- e) File Study Report Meeting Summary (Authorities): September 15, 2010
- f) File Meeting Summary Comments (Authorities): October 15, 2010
- g) File Response to Meeting Summary Comments (Stakeholders): November 14, 2010
- h) Study Plan Resolution/Amendments by FERC: December 14, 2010

8.0 BUDGET

The estimated budget for the recreation use and needs study is \$198,000.

9.0 DISCUSSION OF ALTERNATIVE APPROACHES

The proposed methods for this study are consistent with professional practices. The overall approach is commonly used in relicensing proceedings in developing a recreation resource management plan for the new license term, and is consistent with FERC study requirements under the newly developed Integrated Licensing Process (FERC 2004). No alternative approaches to this study are necessary.

10.0 REFERENCES

Federal Energy Regulatory Commission. 2004. Hydroelectric Licensing Under the Federal Power Act, Final Rule and Tribal Policy Statement. Revised February 23, 2004. Washington D.C.