11.0 Other Analyses

The project's study period plan identified studies needed to determine the feasibility of the project and support permitting requirements. While comprehensive, the plan was also designed to be flexible to allow for new studies based on results of the programmed studies as well as those recommended through the public and scientific review processes. During 2006, two studies were added to the suite of assessments for the project including additional water quality analysis near the mouth of the river to examine potential effects of the project on operations of the South Texas Project and a water fowl and wildlife evaluation.

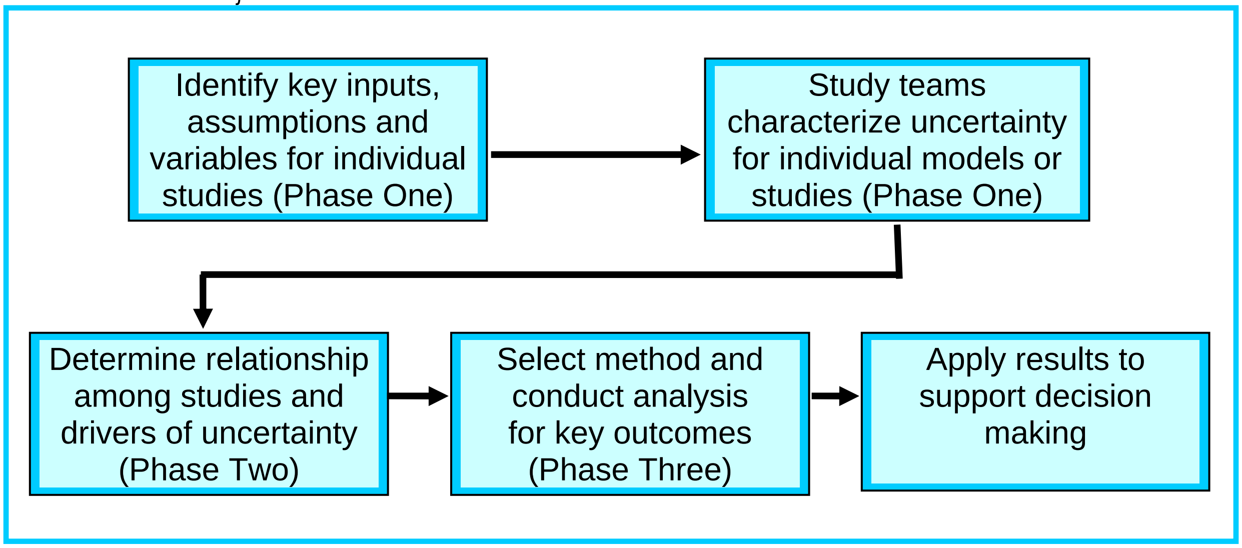
Through the input processes, additional studies were suggested by the public and the science review panel. These include an evaluation of the potential implications of climate change on the project as well as an assessment of uncertainty associated with the various studies. The two studies, planned to begin during 2008, are described in this section of the Project Viability Assessment.

11.1 Uncertainty Analysis

As noted, the technical studies for the project are well underway and nearing the final stages of completion. Each of the studies includes sensitivity analyses to identify the degree and magnitude of variability in data and significant model parameters, and the potential risks associated with those uncertainties. Generally, the individual study approaches were developed using norms and regulatory requirements for specific areas and fields as well as being shaped by the public input process. Risk management and mitigation methods have been built into recommendations and some of the teams' modeling or analytic tools according to those norms. Further characterization and assessment of the uncertainties of each study (i.e., inherent model limitations or variable data) and the relative influence of those variable on key parameters (e.g., study outcomes such as yield)) is appropriate to better understand the uncertainty of the analyses. The project's science review panel recommended that an integrated framework for understanding and assessing uncertainty be developed for the project.

The work plan for 2008 includes three steps to explore the linkages among, and uncertainties within, the project's study program as illustrated in Figure 11-1. During the first phase, the assessment is intended to compile information about and characterize the uncertainties of individual studies in a systematic way to examine the potential for compounding uncertainties as well as for unanticipated interdependencies among the individual studies. Phase two will integrate the information from the study teams regarding those assumptions and variables that most influence major study results. The third phase of the assessment will explore the relationships among and between the studies and, at a minimum, qualitatively assess the information and results developed in phases one and two. The specific methodology to be used in the phase three global project effort will be chosen using the results from the previous phases, as well as schedule and budget constraints associated with the project.

FIGURE 11-1
Process to Evaluate Uncertainty and Variability
LCRA-SAWS Water Project



The assessment can be used by decision-makers to assist in the evaluation of the project. Additionally, the assessment may be used to characterize potential future conditions as required to support permitting processes.

11.2 Potential Implications of Climate Change

In light of the project's 80-year planning horizon, contractual obligations associated with this particular project, comments from the project's science review panel and increased public and regulatory awareness of the climate change issue, potential implications of climate change within the region and on the LCRA-SAWS Water Project will be explored during 2008. Based on a 2007 report prepared for the project that reviewed the "state of the science" regarding global climactic historical trends as well as model simulations for potential future conditions and available information for the Gulf Coast region, the project team added an evaluation of climate change to the study plan. This assessment, "A Framework for Assessing Impacts of Climate Change" (CH2M HILL, 2007) is available on the project's Web site www.lcra.org/lswp.

Historic observations for key climate parameters indicate fairly consistent trends both globally and within the Gulf Coast region of Texas of increasing temperatures, rising sea levels, and increased climate variability. Precipitation rate trends are not uniform globally or within Texas. Some areas are experiencing increased rainfall, while others are experiencing more droughts. Global circulation models that simulate potential changes due to changes in carbon emissions have been used to forecast potential changes in key climate parameters such as temperature, precipitation, sea level rise, and evapotranspiration. The models result in a range of potential changes in these parameters.

Figure 11-2 summarizes how climate changes potentially could affect the Texas region. The values should be treated as an initial step in identifying possible impacts to Texas water resources, but significantly more detail may be provided through downscaling of global circulation model results to the region of interest

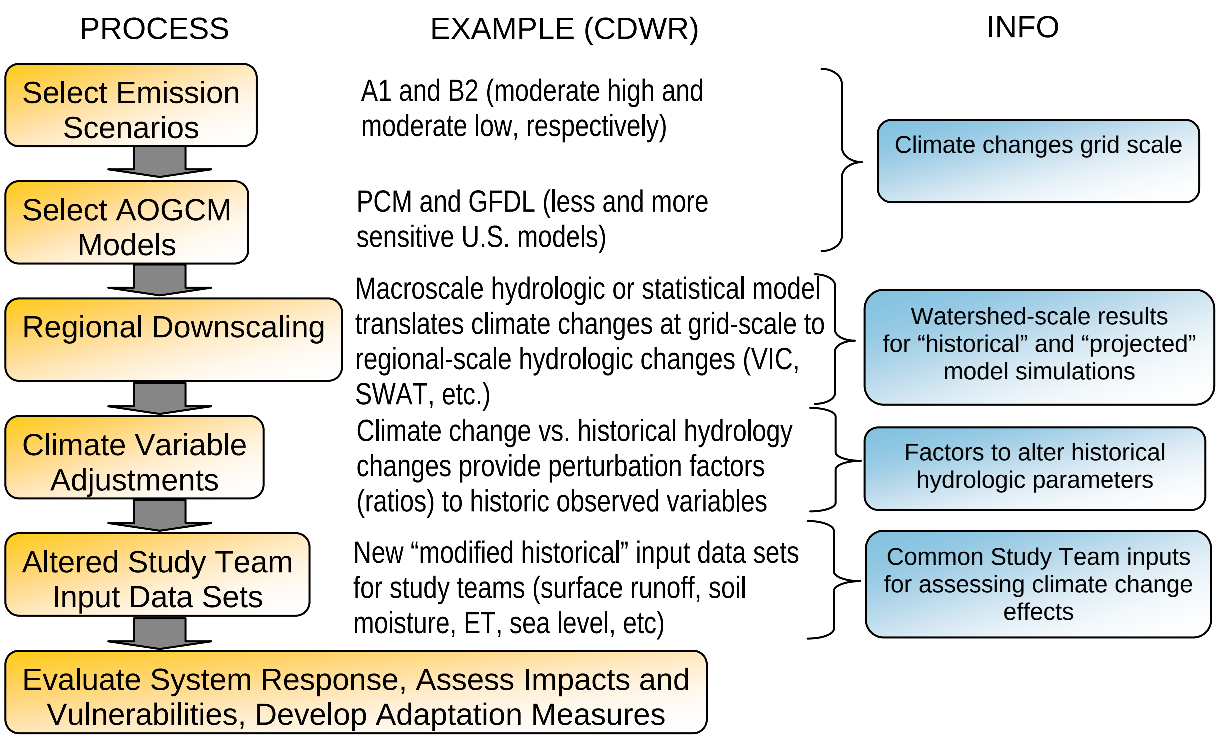
FIGURE 11-2
Summary of Key Climate Indicators and Potential Changes for Texas/Gulf Coast Region
LCRA-SAWS Water Project

Climate Change Variable	Potential Magnitude of Change	Time Period	Range of Uncertainty
Temperature Increase	1.8 – 4.0 °C (3.2-7.2°F)	By 2100 related to 1980-99 mean	Absolute range between 1.1 °C and 6.4 °C (2 -11.5°F)
Sea Level Rise	0.18 – 0.59 m (0.59-1.93 ft.)	By 2100	0.10 m (0.33 ft.) per century adjustment for subsidence – could be higher. No assumptions of rapid changes to ice flow that could have significant effect on sea levels
Precipitation Change	5-20% decreases in southwest; possible 5% increases in north/northeast; no consensus for much of state	By 2100	Downscaling would be required for better discretization
Precipitation minus Potential Evapo-transpiration (P-E)	Greater than 15% decrease throughout the state; greater than 25% decrease in central and west Texas	2035-2060	Downscaling would be required for better discretization
Climate Variability	More severe droughts, response to more persistent El Niño activity More severe storm intensity Greater extremes		

Source: "A Framework for Assessing the Impacts of Climate Change" CH2M HILL, 2007

The project team reviewed two basic approaches to assess potential implications of climate change. These include a scenario, or "top down" approach and a threshold, or "bottom-up" approach. Much of the work to date globally in this area of study has been based on a scenario approach. Use of a scenario approach was selected as the basis for the 2008 analysis. The general process for conducting the assessment is illustrated in Figure 11-3. The process begins with selecting carbon emission "futures" (developed by the International Panel on Climate Change) and choosing global circulation models that have simulated the potential effects of the carbon emission "futures" on global climate parameters. These parameters will be downscaled for application in this region so that a range of possible implications can be assessed during the planning process.

FIGURE 11-3
Scenario Approach - Analytical Process
LCRA-SAWS Water Project



The process illustrated as an example in this Figure was conducted by the California Department of Water Resources (CDWR). Emission scenarios "A1" and "B2" refer to alternative possible futures and resulting carbon emission scenarios developed by the International Panel on Climate Change in their 2007 report. The atmospheric-oceanic global circulation models (AOGCM) referred to are the Parallel Climate Model (PCM) and National Oceanic and Atmospheric Administration's Geophysical Fluids Dynamic Laboratory (GFDL) model. ET in the figure is evapotranspiration.

Use of the scenario approach will provide a common set of possible "futures" and the associated changes in the climate parameters noted previously that could influence major aspects of the project such as yield, bay health, aquatic habitat, agricultural water demands, and water quality. Using common sets of modified climate data resulting from the regional downscaling, various study teams will explore the potential effects of the possible climate futures on their particular study. Those results will be compiled into a single assessment report late in 2008 or early in 2009.

11.3 Water Quality Study of Tidally Influenced Reach of the Colorado River

The South Texas Project Nuclear Operating Company (South Texas Project or STPNOC) diverts Colorado River water south of the Bay City Dam and upstream of the river's intersection with the Gulf Intracoastal Waterway, for use as cooling water in their nuclear plant operations. The South Texas Project and LCRA have entered into an agreement in which the parties "…recognize that STPNOC desires that in current and future projects, consideration be given to any impact such projects may have on the quality of water diverted by STPNOC…." Because the South Texas Project's diversion is in the tidal portion of the river (i.e., the area of the river that experiences an inflow and outflow of saline water from Matagorda Bay, due to the tides), a change in the amount of water that flows over the Bay City Dam could potentially affect the amount of saline water that travels upstream during the tidal cycle. The sources of the water diverted for the South Texas Project include both run-of-river rights and stored water releases from LCRA.

South Texas Project prefers to divert low saline water for their cooling water, as salt may degrade the infrastructure that conveys cooling water through the plant or increase operating costs. Consistent with a settlement agreement between LCRA and STPNOC, a study was initiated at the beginning of 2007 to understand the possible impacts of the LSWP on the quality of water available for South Texas Project's cooling purposes. This study is investigating the potential changes in quality (i.e., salinity) due to changes in the timing and amount of flow that the South Texas Project will be able to divert in the future, if the project were to be implemented.

Study Status

In 2007, the focus of the LSWP's South Texas Plant study was to understand the daily availability of water to the plant both with and without the project in place, given a combination of restrictions and other guidelines that are in operation today at the South Texas Project's diversion. The guidelines and restrictions are in place for a number of reasons, including requirements outlined in the current permit that the South Texas Project and LCRA jointly own, as well as operational guidelines STPNOC has in place to help minimize diversion of higher saline water Additionally, some physical pumping limitations exist currently due to the configuration of the plant's pumps. The analysis did not consider on-site reservoir operations.

Results of the analysis, based on the 2007 PVA water availability model simulations performed by the surface water availability team for the 95,000 acre-feet yield SAWS scenario, indicate that with all permit restrictions and STPNOC's operational guidelines in place, the plant would be able to divert water from both sources identified previously about 1 percent less often with 2030 demands and a little over 3 percent less often with 2080 demands, during the entire period of historical record simulated by the water availability model. During the drought of record conditions, the analysis predicted that the South Texas Project's pumping of water (run-of-river and firm back-up) would potentially be reduced by 11.5 percent with 2080 demands, considering all restrictions and the guidelines that aid the South Texas Project in diverting low saline water. Current operating guidelines for the plant limit pumping from the river during certain low flow conditions to reduce the intake of higher salinity water. This limitation can occur when water would otherwise be available under the permit. If the plant's operational guideline that aids diversion of lower saline water is not applied, more run-of-river and firm back-up water is potentially available to the South Texas Project during the period of record and only slightly lower (about 1 percent less water is available) during the drought of record with 2080 demands.

A limitation of this analysis is that it does not account for on-site reservoir operations, which means that this analysis only indicates whether the water is available in the river for diversion to the South Texas Project and the timing of such availability. It does not consider whether water is actually needed to fill up the on-site cooling water reservoir. Additionally, the simulations indicated that magnitude of the potential changes in flow is likely to be the same or less than the accuracy of the methods used to conduct the analysis, making specific interpretations uncertain.

Next Steps

The results of this analysis will be used in 2008 to guide further work in this study, which will include the development of an empirical model that will predict the actual salinity of the water at the South Texas Project diversion point, given changing flows over the Bay City Dam and the tidal dynamics that exist from Matagorda Bay in this area of the river.