



South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

January 21, 2009  
U7-C-STP-NRC-090004

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

South Texas Project  
Units 3 and 4  
Docket Nos. 52-012 and 52-013  
Second Re-submittal of Response to Request for Additional Information

- References:
- 1) Letter, Paul Kallan to Gregory Gibson, "Request for Additional Information, Letter Number One Related to the Environmental Report for the South Texas Combined License Application," dated May 19, 2008 (AE-ABR-08000097)
  - 2) Letter, Gregory T. Gibson to Document Control Desk, "Response to Requests for Additional Information," dated August 14, 2008 (ABR-AE-08000063)
  - 3) Letter, Scott Head to Document Control Desk, "Re-submittal of Responses to Request for Additional Information" dated December 18, 2008 (U7-C-STP-NRC-080074)

Attached is a second re-submittal of STPNOC's response to Reference Letter 1 which contained twenty-one responses to NRC requests for additional information. The original response (Reference Letter 2) was submitted on August 14, 2008 and was resubmitted (Reference Letter 3) on December 18, 2008. We understand that these letters, the attachments, and the enclosed CD/DVD source files were not docketed because some files on the CD/DVD did not comply with the requirements for electronic submission in NRC Guidance Document, "Guidance for Electronic Submissions to the NRC," dated November 20, 2007.

Enclosure 1 was previously submitted as a pdf file and is resubmitted in paper copy. Enclosure 2 contains native source files on CD/DVD. Please note that the files on the enclosed CD/DVD remain unable to comply with the NRC guidance document and can not be formatted as pdf files and remain functional for analyses. The NRC Staff requested that the files be submitted in the native formats required by the software in which they are utilized, to support the Environmental Report development. Specifically, these files contain input/output codes for various models or spreadsheets with embedded formulas and calculations.

We request that you place this information on the docket and make the source files available for use by NRC Staff.

There are no commitments in this letter.

If you have any questions, please feel free to contact me at (361) 972-7136, or Russell W. Kiesling at (361)-972-4716.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 1/21/09



Scott Head  
Manager, Regulatory Affairs  
South Texas Project, Units 3 & 4

rwk

**Attachment:**

Letter, Gregory T. Gibson to Paul Kallan, "Response to Requests for Additional Information," dated August 14, 2008 (ABR-AE-08000063)

**Enclosures Associated with Attachment:**

Enclosure 1 for RAI 02.04.01-01. Ecological Survey Report – Habitat Assessment  
Enclosure 2 for RAI 05.03.02-01. CD/DVD Containing data files in Folder entitled  
"Enclosure\_05.03.02-01"

cc: w/o attachment except\*  
(paper copy)

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**Attachment:**

Re-Submittal of: Letter, Gregory T. Gibson to Paul Kallan, "Response to Requests for Additional Information," dated August 14, 2008 (ABR-AE-08000063).



South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

August 14, 2008  
ABR-AE-08000063

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
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South Texas Project  
Units 3 and 4  
Docket Nos. 52-012 and 52-013  
Response to Requests for Additional Information

References: Letter, Paul Kallan to Greg Gibson, “Request for Additional Information, Letter Number One Related to the Environmental Report for the South Texas Combined License Application”, dated May 19, 2008 (AE-ABR-08000097)

Attached are 21 responses to NRC questions included in the Reference letter. They are listed below by Question Number:

02.03-06	02.05-11	05.03.01.02-04
02.04.01-01	02.05-12	5.03.01.02-05
02.04.01-02	04.02-13	05.03.02-01
02.04.01-03	04.03.01-02	05.03.04-01
02.04.01-04	04.04-03	10.05S-01
02.05-04	04.04-14	10.05S-02
02.05-06	05.03.01.02-03	10.05S-03

When a change to the COLA is indicated by a question response, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the question response.

With this letter, STPNOC has responded to 175 of the 177 questions issued by NRC. STPNOC will submit the remaining 2 responses (02.04.02-01 and 02.04.02-03) by September 15, 2008.

There are no commitments in this letter.

If you have any questions, please feel free to contact me at (361) 972-4626, or Russell W. Kiesling at (361)-972-4716

I declare under penalty of perjury that the foregoing is true and correct.

Executed on

August 14, 2008



Gregory T. Gibson  
Manager, Regulatory Affairs  
South Texas Project, Units 3 & 4

rwk

Enclosures (on CD):

- 1) 02.04.01-01 Ecological Survey Report-Habitat Assessment (ENSR June 2008)
- 2) 05.03.02-01 Cormix Input/Output Files

Attachments:

1. Question 02.03-06
2. Question 02.04.01-01
3. Question 02.04.01-02
4. Question 02.04.01-03
5. Question 02.04.01-04
6. Question 02.05-04
7. Question 02.05-06
8. Question 02.05-11
9. Question 02.05-12
10. Question 04.02-13
11. Question 04.03.01-02
12. Question 04.04-03
13. Question 04.04-14
14. Question 05.03.01.02-03
15. Question 05.03.01.02-04
16. Question 05.03.01.02-05
17. Question 05.03.02-01
18. Question 05.03.04-01
19. Question 10.05S-01
20. Question 10.05S-02
21. Question 10.05S-03

cc: w/o attachment except\*  
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**Question Number: 2.3-6**

**QUESTION:**

Provide details of MCR operation during existing two-unit and future four-unit operation to help staff independently estimate water-use and water-quality impacts.

**Full Text (Supporting Information):**

Provide details of operating policy for the MCR including details of water withdrawal conditions and limits defined by the Lower Colorado River Authority (LCRA) permit. Provide details on differences in the operating policy of the MCR for operation with all four units compared to the existing operation with two units.

When was the maximum operating water level in the MCR increased from 45 to 47 ft mean sea level (MSL)? Why was this necessary? Discuss the impact of an increase in maximum water level of the MCR from 47 to 49 ft MSL on natural and forced evaporation and on seepage losses from the MCR.

Why is a discharge of 1200 cfs in the Colorado River near the RMPF considered the threshold for "high flow?" How is the discharge in the Colorado River near the RMPF monitored?

Provide water budget and water quality models of the MCR for two-unit and for four-unit operation taking into account the water withdrawal policy, LCRA permit limits, discharges to the MCR, seepage losses from the MCR, and blowdown from the MCR.

Provide details of frequencies of operation of the RMPF for existing two-unit operation and for future four-unit operation.

Provide details of existing water use for Units 1 and 2 as well as estimated water use for all four units, including (1) maximum annual makeup from Colorado River, (2) maximum monthly makeup from the Colorado River for each month, (3) maximum annual consumptive use, and (4) maximum monthly consumptive use for each month.

Provide an explanation as to why there has been no release of water to the Colorado River from operation of Units 1 and 2.

Describe the assessment performed or provide the analysis to support the conclusion that the impact on water quality in the Colorado River from the operation of the MCR blowdown would be SMALL. Include the description of chemical and thermal impacts.

Describe the impact of a prolonged drought on water quality in the MCR and how this may affect the water quality impact on the Colorado River during a subsequent blowdown.

**RESPONSES:**

For convenience, each of the nine parts of the question is restated below with the response to that part immediately following.

**RESTATEMENT OF QUESTION PART 1:**

Provide details of operating policy for the MCR including details of water withdrawal conditions and limits defined by the Lower Colorado River Authority (LCRA) permit. Provide details on differences in the operating policy of the MCR for operation with all four units compared to the existing operation with two units.

**RESPONSE TO QUESTION PART 1:**

The operating policy for the MCR is based on the STPNOC contract with the Lower Colorado River Authority (LCRA). Under the contract, STPNOC may withdraw up to 102,000 acre-feet/year of water from the Colorado River at a maximum rate of 1,200 cfs. The withdrawal rate is, however, limited to no more than 55% of the flows of the Colorado River in excess of 300 cfs base flow at the authorized diversion point on the Colorado River. These withdrawal quantity and withdrawal rate limits are the current permit limitations in Certificate of Adjudication 14-5437 issued by the Texas Water Commission (TWC), now the Texas Commission on Environmental Quality (TCEQ). In addition, the contract contains a Water Delivery Plan, reflected in the following table and accompanying notes, that identifies the conditions under which withdrawal from the river may occur.

Main Cooling Reservoir (MCR) Level	Actions
Normal operating level between 40 and 49 feet Mean Sea Level (MSL)	Pumping under River Permit when river conductivity is <math><2100 \mu\text{s}/\text{cm}</math> <b>OR</b> River TDS level is $\leq 1260$ mg/L. (Notes 1 & 2)
MCR level between 36 and 40 feet MSL	Pumping under River Permit when river conductivity is $\leq$ MCR conductivity. (Notes 1 & 2) <b>IF</b> water deliveries are being made to meet bay and estuary requirements, <b>THEN</b> daily communications with LCRA are required, as necessary. (Note 3) (Chemistry/Environmental action)
MCR Level at 37 feet MSL	STPNOC requests LCRA to prepare for delivery of backup water when MCR level drops to 35 feet MSL.
MCR level between 32 and 36 feet MSL	Pumping under River Permit when river conductivity is $\leq 10,000 \mu\text{s}/\text{cm}$ <b>OR</b> River TDS level $\leq 6000$ mg/L. (Note 1) Daily communications, as necessary, with the LCRA if deliveries are being made to meet bay and estuary requirements. (Note 3) (Chemistry/Environmental action)
MCR level below 35 feet MSL	LCRA begins staged deliveries of firm water to ensure that MCR level does not drop below 27 feet MSL. (Notes 4 & 5) Delivery of firm water subject only to the LCRA bay and estuary restrictions; <b>NOT</b> River Permit stream flow restrictions.

- Note 1: Current stream flow restrictions of 55% of river flow over 300 cubic feet per second (cfs) would apply unless and until such time as permit is amended to establish other limitations for diversion.
- Note 2: Reservoir blowdown will commence as necessary to maintain MCR water at an average of 3000  $\mu\text{s/cm}$ .
- Note 3: To maintain MCR level as high as possible, the LCRA will communicate to STPNOC if the LCRA determines that any additional supply may be available in the river for diversion by STPNOC over and above the amounts to be supplied by the LCRA to meet its other demands. STPNOC may divert such water at its discretion, subject only to the LCRA bay and estuary restrictions. Any diversions of water by STPNOC that is made available under this condition and that would not be permitted under the River Permit stream flow restrictions would count towards the maximum quantities to be made available as provided in Note 4.
- Note 4: The LCRA will provide firm water for diversion by STPNOC up to installed pumping capacity, with a minimum rate to be specified by STPNOC to assist in maintaining the reservoir level at or above 27 feet MSL. Under no circumstances will the LCRA make available firm supply under this condition totaling more than 20,000 acre feet per year (af/y) (rolling five-year average) for 2-unit operation OR 40,000 af/y (rolling five-year average) for any additional generation capacity.
- Note 5: At 30 feet MSL, STPNOC and the LCRA will pursue an emergency suspension of permit pumping restrictions. (Chemistry/Environmental action)

Changes in MCR operation will be implemented as a result of the change from two-unit to four-unit operation. Currently, for two-unit operation, STPNOC provides makeup water to the MCR from the Colorado River at up to 600 cfs and has set the MCR maximum operating level at 47 ft MSL. For four-unit operation, makeup water will be provided to the MCR from the Colorado River at a rate up to the maximum permitted withdrawal rate from the river of 1,200 cfs and the maximum operating level of the MCR will be 49 ft MSL. Also, as identified in Note 4 above, the firm water supply for two and four-unit operation is different, 20,000 acre feet per year (rolling five-year average) for two-unit operation and 40,000 acre-feet/year (rolling five-year average) for any additional generation capacity.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 2:**

When was the maximum operating water level in the MCR increased from 45 to 47 ft mean sea level (MSL)? Why was this necessary? Discuss the impact of an increase in maximum water level of the MCR from 47 to 49 ft MSL on natural and forced evaporation and on seepage losses from the MCR.

**RESPONSE TO QUESTION PART 2:**

Although the maximum operating level in the MCR had initially been established for two-unit operation at 45 ft MSL, the MCR design is based on a maximum operating water level of 49 ft MSL. The increased level of 47 ft MSL was achieved in the fall of 2002. The procedural limit on maximum operating level was changed from 45 ft MSL to 47 ft MSL to take advantage of makeup opportunities during periods of higher river flows thereby providing more assurance of operating through a repeat of the drought of record. This also improved water quality in the MCR and provided better utilization of the water permit.

An increase in the operating level procedural limit from 47 ft MSL to 49 ft MSL will not significantly affect evaporation losses because of the relatively small change in surface area between these two elevations (less than 0.3 percent). Observed seepage losses from the MCR would be expected to increase slightly when the operating level is increased from 47 ft MSL to 49 ft MSL because of the increase in elevation head. However, because the MCR was originally designed to operate at a maximum water level of 49 ft MSL, these increases in evaporation and seepage losses would be considered to not impact the designed performance capability of the MCR.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 3:**

Why is a discharge of 1200 cfs in the Colorado River near the RMPF considered the threshold for “high flow?” How is the discharge in the Colorado River near the RMPF monitored?

**RESPONSE TO QUESTION PART 3:**

The lower portion of the Colorado River including the Reservoir Makeup Pumping Facility (RMPF) is under tidal influence of the Gulf of Mexico. The extent of tidal influence at any time is dependent on both the tidal conditions at the mouth of the Colorado River and the fresh water flow rate of the river. Depending on the tidal conditions and duration of low flow periods, salt water may intrude into the river and may be present at the RMPF. Historical conductivity data collected at the RMPF provides the basis for using a discharge of 1200 CFS as a reference point for sufficient fresh water flow to minimize the tidal influence at the RMPF. Withdrawals at the higher discharge help minimize the introduction of total dissolved solids to the reservoir and preserve the water quality in the MCR. Therefore, a river flow rate of 1200 cfs at the RMPF for a period of two or more days has been used as a rule of thumb for cessation of tidal influence and has been considered the threshold for high river flow conditions. It should be noted that the renewed contract with LCRA allows for water diversion based on the MCR level, river water conductivity, and MCR water conductivity.

The river flow rate is monitored using the United States Geological Survey (USGS) gauge at the Bay City Gauge Station.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 4:**

Provide water budget and water quality models of the MCR for two-unit and for four-unit operation taking into account the water withdrawal policy, LCRA permit limits, discharges to the MCR, seepage losses from the MCR, and blowdown from the MCR.

**RESPONSE TO QUESTION PART 4:**

The maximum amount of water budgeted for use by Units 1, 2, 3 & 4 is specified in Certificate of Adjudication 14-5437 from the Texas Water Commission, now the Texas Commission on Environmental Quality. The amount of water authorized for use under this certificate is provided for use through a contract between the LCRA and STPNOC. Under the certificate, STPNOC is permitted to divert up to a maximum total of 102,000 acre-feet/year of water from the Colorado River. The certificate also permits STPNOC to divert water at a rate of up to 1,200 cfs from the Colorado River. However, STPNOC is limited under this certificate to withdrawing no more than 55% of the flows of the Colorado River in excess of 300 cfs base flow at the authorized diversion point on the Colorado River. As discussed in ER Section 5.2, this permitted withdrawal is sufficient to support the operation of all four units.

Water quality discharge limits are determined by the United States Environmental Protection Agency regulations governing effluent guidelines and limitations for steam-electric power generating units with point-source discharges. Discharge limits and requirements are contained in the Texas Pollutant Discharge Elimination System (TPDES) permit issued to STPNOC (TPDES Permit No. WQ0001908000).

The modeling of the MCR for two-unit operation (Units 1 & 2) is described in the Environmental Report – Construction Phase (ER-CP), Section 3.4 – Heat Dissipation System.

Water use for Units 3 & 4 is discussed in ER Section 3.3 and diagrammatically shown in Figure 3.3-1, Water Use Diagram Summary. A water budget analysis for four-unit operation is currently under development to address blowdown quantity and frequency based on the water quality discharge criteria established by the TPDES permit, the maximum water diversion to the MCR from the Colorado River established by Certificate of Adjudication 14-5437 and the Water Delivery Plan from the contract between the LCRA and STPNOC. The updated analysis currently under development is expected to be completed prior to the end of 2008.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 5:**

Provide details of frequencies of operation of the RMPF for existing two-unit operation and for future four-unit operation.

**RESPONSE TO QUESTION PART 5:**

The actual frequency of operation of the RMPF is a function of (1) the flow in the Colorado River available for diversion considering the LCRA contract and TCEQ permit limits, (2) river water quality, (3) MCR water quality and (4) the MCR level.

During the licensing of STP Units 1 and 2, a figure of the monthly reservoir makeup was included in the Environmental Report – Construction Phase (ER-CP). The figure, identified in ER-CP as Figure 3.4-15, Monthly Reservoir Makeup, 1949-1988, provides the means to approximate a frequency of operation of the RMPF for two-unit operation, as simulated based on historic river flows and weather conditions. The frequency of operation of the RMPF for two-unit operation (Units 1 and 2) during a recent period (2001-2006) can be found in STP Units 3 and 4 COLA ER Tables 2.3.2-8 and 2.3.2-9. The months in which water was diverted during that period is shown in Table 2.3.2-8, while the days during which water was diverted are shown in Table 2.3.2-9.

While the frequency of water withdrawal from the Colorado River for four units is not expected to change substantially, the withdrawal rate and quantity for any given period of time should increase depending on the amount of water needed to makeup for losses from the MCR through evaporation, seepage and blowdown because of added pumping capacity to be installed for four-unit operation. For the existing two-unit operation, only half of the permitted withdrawal rate is utilized based on the currently installed pumping capacity. In the Certificate of Adjudication No. 14-5437, the river water withdrawal is limited to the four-unit rate of 1200 cfs, and annual withdrawal of 102,000 acre-feet.

The analysis addressed in the above Response to Question Part 4 will also reflect the frequency of operation of the RMPF. That analysis is expected to be completed in late 2008.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 6:**

Provide details of existing water use for Units 1 and 2 as well as estimated water use for all four units, including (1) maximum annual makeup from Colorado River, (2) maximum monthly makeup from the Colorado River for each month, (3) maximum annual consumptive use, and (4) maximum monthly consumptive use for each month.

**RESPONSE TO QUESTION PART 6:****Units 1 and 2:**

ER Table 2.3.2-8 contains details from recent years (2001-2006) for the existing water use for Units 1 and 2 operation. Per Table 2.3.2-8, the maximum annual makeup from the Colorado River of 62,374 acre-feet and the maximum annual consumptive use (reservoir water consumed) of 37,963 acre-feet occurred in 2004. The maximum monthly makeup from the Colorado River for each month and maximum monthly consumptive use, per Table 2.3.2-8, is as follows:

<b>Month</b>	<b>Maximum Makeup from the Colorado River (acre-feet)</b>	<b>Maximum Consumptive Use -Reservoir Water Consumed (acre-feet)</b>
January	18,034	2,843
February	0	2,640
March	829	2,836
April	22,761	3,439
May	18,225	3,538
June	11,422	3,836
July	25,001	3,959
August	2,736	3,948
September	19,352	3,825
October	16,815	3,537
November	9,945	2,732
December	1,182	2,922

It should be noted that makeup from the river for any given month during the 2001-2006 period may have varied from zero to the maximum shown in the table above. Also, no makeup at all was diverted from the river during 2003.

**Units 1, 2, 3 and 4:**

The maximum annual makeup to the MCR for four-unit operation would be up to the maximum allowed by the Certificate of Adjudication 14-5437. The certificate states that STPNOC is permitted to divert up to a maximum total of 102,000 acre-feet/year of water from the Colorado River.

As noted in the Response to Question Part 4, a water budget analysis for four-unit operation is currently under development to address the blowdown quantity and frequency based on the water quality discharge criteria established by the TPDES permit and the water diversion to the MCR from the Colorado River in accordance with the requirements of the water budget established by the Certificate of Adjudication 14-5437 as reflected in the current contract between the LCRA and STPNOC.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 7:**

Provide an explanation as to why there has been no release of water to the Colorado River from operation of Units 1 and 2.

**RESPONSE TO QUESTION PART 7:**

The MCR is designed with a storage capacity to support operation of four units, taking into account the intermittent nature of the makeup water supply from the Colorado River. With only two units in operation, this additional storage capacity provides operational flexibility to be selective with the quality of diverted water and to maintain the MCR water quality at desirable limits without blowdown. The MCR has not required an operational blowdown during the operation of Units 1 & 2 because water quality in the MCR has thus far remained suitable for plant uses through operational losses compensated by rainfall and selective opportunities for makeup from the river when conditions are deemed suitable.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 8:**

Describe the assessment performed or provide the analysis to support the conclusion that the impact on water quality in the Colorado River from the operation of the MCR blowdown would be SMALL. Include the description of chemical and thermal impacts.

**RESPONSE TO QUESTION PART 8:**

The amount of MCR blowdown to the Colorado River is currently limited by the existing STPNOC TPDES permit to a daily average discharge of 144 million gallons per day with a daily maximum of 200 million gallons per day and 12.5% of river flow. STPNOC also cannot blow down to the river unless a minimum flow of 800 cubic feet per second (cfs) is present at the discharge location at the time of discharge. The 12.5% discharge to flow requirement would represent a minimum dilution factor of 8. The dilution factor could be larger depending on river flow conditions and the amount of blowdown.

The concentration from evaporation of total dissolved solids in the MCR changes based on the water quality of the river when pumping to the MCR occurs, operational releases to the MCR, and on the water level of the MCR. Even though blowdown operations, other than a system test in 1997, have not occurred, at some point in the future during the operation of all four units, blowdown could be required to improve the water quality in the MCR or as the result of an operational need. The more the operating level of the MCR drops from the 49 feet mean sea level elevation due to operational losses of the MCR, the more likely water quality could be improved by the selective pumping of makeup water from the river. The pumping of makeup water would dilute the total dissolved solids concentration levels. Also, blowing down during a high river flow rate event would dilute the concentration of the blowdown water reducing any total dissolved solids concentrations it would contain. Therefore impacts from the discharge of dissolved constituents would be SMALL and not warrant further mitigation.

As discussed in RAI Response 5.3.4-2, the STP COLA ER includes predicted temperatures in the "cold" end (CWS intake) of the MCR with four units operating in the range from around 70°F in December and January to around 96°F in July and August (see Table 3.4.3 of STP COLA ER). Temperatures in the "hot" end (CWS discharge) of the MCR would range from around 86°F in December to 112°F in July and August. Blowdown temperatures would presumably be somewhere in between, as the southern part of the MCR, from which the blowdown (Outfall 001) would flow, represents a partially-cooled condition. STPNOC's TPDES permit limits the temperature of the discharge (Outfall 001) to a daily maximum of 97°F. Blowdown would not occur when the water temperature is outside of the discharge limits set by the TPDES permit. As discussed in ER Section 5.3.2.2.1, due to the 12.5% discharge to river flow established in the TPDES permit the effect on the river temperature downstream of the blowdown line would be negligible.

As outlined in RAI Response 5.3.2-1, the thermal plume [5 degrees (F) over ambient] resulting from blowdown could extend across the river in the vicinity of Outfall 001. However, the plume's buoyancy would restrict the thermally-impacted portion of the river to the upper 8.2 feet of the water column at this location. The temperature in the bottom 7.2 feet of the river would

not be elevated above the natural ambient temperature creating a zone of passage for aquatic organisms. STPNOC fully intends to discharge during periods of higher river flow (above the minimum flow rate of 800 cfs), which would result in a substantially smaller plume. Once a blowdown operation has been completed, the thermal plume would dissipate rapidly. STPNOC has determined blowdown would be infrequent and only during periods of higher river flow (greater than the current permit value of 800 cfs). Therefore impacts from thermal discharge would be SMALL and not warrant further mitigation.

STPNOC has determined that due to projected infrequent blowdowns, limits on the discharge rates, and the 12.5% of blowdown to river flow, that impacts would be SMALL and not warrant mitigation.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**RESTATEMENT OF QUESTION PART 9:**

Describe the impact of a prolonged drought on water quality in the MCR and how this may affect the water quality impact on the Colorado River during a subsequent blowdown.

**RESPONSE TO QUESTION PART 9:**

During an extended period of drought, the level of the MCR would likely drop due to limited makeup to compensate for the operational losses of the MCR. Makeup to the MCR could be limited to periods of high river flow directly associated with storm events when river flow is adequate for pumping to occur within the limits of the STPNOC current contract with the Lower Colorado River Authority (LCRA) and the STPNOC/LCRA permit with the Texas Commission on Environmental Quality (TCEQ). If the MCR level drops and there is insufficient river flow for STPNOC to perform makeup operations, blowdown would not be likely to occur to maintain short-term water quality standards in the MCR for cooling operations. STPNOC would elect to use all of the available water in the MCR for continued cooling operations and would not blow down until makeup water was available and operations warranted blowdown operations to occur.

Under the additional water options available through the LCRA contract, the LCRA would release an additional amount of water up to 40,000 acre-feet to STPNOC for four-unit operations. Should this water not be available and river flow is not adequate for makeup operations to occur, STPNOC also has the means to seek an exemption to its river water permit which would allow STPNOC the right to pump water from the river as needed to continue operations regardless of river flow.

Water level in the MCR would drop without makeup operations due to MCR operational losses. Evaporation could cause the total dissolved solids to increase in concentration. When makeup water is available and pumped, dilution of the analytes within the MCR would occur. The water quality within the MCR would depend on several factors, the primary one being the water quality of the river during makeup operations. STPNOC would make every effort to perform makeup operations during periods of high flow (greater than 1200 cfs which is the flow rate STPNOC has determined meets the operations water quality requirements) to promote dilution within the MCR. If blowdown were determined to be necessary, the current TPDES permit discharge limits, which STPNOC assumes would remain in place for Units 3 & 4 operation, would require a maximum discharge flow of 12.5% of river flow creating a minimum dilution factor of 8.

Therefore, STPNOC has determined that impacts to the Colorado River from blowdown activities would be SMALL due to infrequent blowdown, and a minimum dilution factor of 8.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**REFERENCES:**

Certificate of Adjudication, Number 14-5437, TWC (Texas Water Commission), June 28, 1989

Water Conservation Plan, STP Nuclear Operating Company South Texas Project Electric Generating Station, Certificate of Adjudication 14-5437, Rev. 1, May 1, 2005

Amended and Restated Contract by and between the Lower Colorado River Authority and STP Nuclear Operating Company, Effective as of January 1, 2006

Texas Commission on Environmental Quality, Permit to Discharge Wastes under Provisions of Section 402 of the Clean Water Act and Chapter 26 of the Texas Water Code-Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0001908000, Austin, Texas, July 21, 2005

“STP Updated Final Safety Analysis Report, Revision 13,” May 1, 2006

Environmental Report-Construction Phase (ER-CP) STPNOC Units 1 and 2

**Question Number: 2.4.1-1****QUESTION:**

Provide information regarding terrestrial species composition and abundance by habitat type on the STP site.

**Full Text (Supporting Information):**

Provide a description of the dominant and common vegetation and wildlife species found in the habitats existing on the STP site, either as shown in Figure 2.4-1 of the ER, or as described and displayed at the site audit in draft documentation for habitat mapping conducted by ENSR for the applicant. Include information on large and small mammals (including bat species potentially present), common reptiles and amphibians found in the habitats on the STP site and the section of the Hillje transmission corridor to be upgraded. Some of this information is contained in the May 2007, ENSR Corporation Report: 10720-008, but habitat descriptions are not consistent between the ER and the ENSR 2007 report. During the site audit, contractor and applicant staff indicated that a new report describing the habitats on site and the wildlife commonly found in those habitats was under preparation. Provide the finished report.

**RESPONSE:**

STP has previously submitted the following reports pertaining to potential wildlife species and vegetative communities at the site in letter # ABR-AE-08000027. These reports included: Ecological Survey Report: Threatened and Endangered Species (ENSR March 2007), Ecological Survey Report (ENSR March 2007), and 1987-1988 Special Ecological Studies for the South Texas Nuclear Project (HL&P March 1989). With this RAI Response, STPNOC submits a copy of the report "Ecological Survey Report-Habitat Assessment" (ENSR June 2008) as Enclosure 1 on the attached CD.

Based on these reports, portions text of the ER will be revised as described below.

3 additional tables will be added and one figure (2.4-1) will be modified

Additional information regarding terrestrial resources within the Hillje corridor was provided in RAI 4.3.1-1.

**CANDIDATE COLA REVISION:**

Please note the revisions indicated below respond to RAIs 2.4.1-1 and 2.4.1-2.

**4.3.1.1 Site Habitats and Communities**

The STP site is located within the coastal prairie ecosystem of east Texas, the southernmost tip of the tallgrass prairie system prevalent in the Midwest (Reference

2.4-1). This area is typified by low elevation, generally less than 60 feet above mean sea level (MSL), with open prairie habitat interspersed with creek and river drainages flowing toward the Gulf Coast marshes. The larger drainages often have bottomland forests. Much of the original coastal prairie in Matagorda County has been converted to croplands or is now in pasture. The STP site is immediately west of the Colorado River, approximately 10 miles from the river's confluence with Matagorda Bay. The STP site lies in a largely rural area, with the dominant land use being agricultural fields and pasture.

### Habitats

A recent assessment of habitats/land uses within the 12,220-acre STP site reported 14 different habitats (Figure 2.4-1; Reference 2.4-2a). Two of these are open water habitats that occupy a majority of the STP site. The dominant feature of the site is the approximately 7,000-acre main cooling reservoir (Figure 2.4-1) that was established on the property by the construction of tall earthen embankments. The reservoir side of this embankment was lined with "soil-cement" to prevent erosion. Approximately seven miles of interior dikes were placed within the MCR (Figure 2.4-1) to enhance circuitous water flow, maximizing cooling. The Essential Cooling Pond is an approximate 46-acre impoundment immediately to the east of STP 1 & 2, and also is surrounded by an earthen embankment that is covered with reinforced concrete and/or soil cement for erosion protection (Reference 2.4-2b). The external side of the embankment of both reservoirs (approximately 760 additional acres) was planted with grass and is regularly maintained by mowing.

Wetlands are another aquatic habitat category listed for the STP site (Figure 2.4-1; Reference 2.4-2a). There are three components of this category. A managed 110-acre shallow wetland area (Texas Prairie Wetlands Project) was built in the northern portion of the site adjacent to FM 521 in 1996 to enhance the property for waterbirds (Reference 2.4-3). STPNOC cooperated with Ducks Unlimited, Texas Parks and Wildlife Department (TPWD), U.S. Fish and Wildlife Service (USFWS) and U.S. Department of Agriculture Natural Resources Conservation Service to construct impoundments designed to create foraging habitat for wintering waterfowl, wading birds, and shorebirds. These impoundments are included on the Great Texas Coastal Birding Trail that spans the entire Texas Gulf (Reference 2.4-4). Another component is the 34-acre Kelly Lake in the eastern portion of the site (Reference 2.4-2a). It consists of open water areas surrounded by a band of cattail (*Typha* spp) and arrowhead (*Sagittaria* spp.). The third wetland component is made up of 20 delineated wetlands totaling 11 acres. Sixteen of these are less than 0.50 acre in size while the remaining four range from 0.63 to 3.78 acres in size. The dominant vegetation within these sites includes cattail, spikerush (*Eleocharis* spp.), water hyssop (*Bacopa rotundifolia*), bluestem (*Andropogon* spp.), sea myrtle (*Baccharis halimifolia*) and rattlebox (*Sesbania drummondii*). Surface and storm water ditches are common throughout the site (Reference 2.4-5a), including Little Robbins Slough, a stream that was relocated in connection with Units 1 & 2 construction (Reference 2.4-2b).

Bottomland forest areas are another major habitat category within the STP site (Figure 2.4-1; Reference 2.4-2a). Approximately 1,176 acres of bottomlands exist along the eastern border with the Colorado River. Once a lush, deciduous forest, portions of this area were historically modified through clearing and herbicide application to promote forage production for livestock (Reference 2.4-2b). Dominant tree species include pecan (*Carya illinoensis*), sugarberry (*Celtis laevigata*), live oak (*Quercus virginian*) and American elm (*Ulmus americana*). Shrubs and herbaceous plants include yaupon (*Ilex vomitoria*), American beautyberry (*Callicarpa americana*), southern dewberry (*Rubus* spp.), broomsedge (*Andropogon* spp.), and poison ivy (*Rhus radicans*). Embedded within this habitat is a 133-acre dredge material disposal impoundment (Figure 2.4-1), which has received dredge material from the RMPF and barge slip areas since 1972. Because of the negative impacts of the spoil accumulation on survival of woody vegetation, this activity has resulted in a semi-permanent marsh that provides habitat for waterbirds and other wildlife species (Reference 2.4-2b).

An additional forested habitat community is found adjacent to Kelly Lake (Figure 2.4-1; Reference 2.4-2a). This 53-acre habitat consists of live oak, sugarberry and yaupon. Immediately east of this community is a 91-acre forest/mixed pasture habitat component that is leased for cattle. It contains sugarberry and a few live oaks with a herbaceous layer consisting of carpetgrass (*Axonopus compressus*), Bermuda grass (*Cynodon dactylon*), and *Paspalum* species.

Scrub-shrub habitat dominates the northern and western portions of the site (Figure 2.4-1; Reference 2.4-2a). This land was agricultural land prior to construction of units 1&2 (Reference 2.4-2b). The 976 acres of this habitat are dominated by sea myrtle, southern dewberry, and patches of bluestem grasses (*Andropogon* spp.), all plants common to disturbed or abandoned agricultural land in this region (Reference 2.4-2b).

Approximately 486 acres of the STP site are covered in a mixed grass community (Figure 2.4-1; Reference 2.4-2a). This community is located along the southern site boundary, north and east of the ECP, and in two parcels between the MCR and the bottomland areas. The primary grass species include angleton bluestem (*Dicanthium aristatum*), King Ranch bluestem (*Bothriochloa ischaemum*), bristle grass (*Setaria* spp.), and Bermuda grass.

There are approximately 468 acres of the maintained and disturbed areas habitat type (Figure 2.4-1; Reference 2.4-2a). Most of these areas were lands associated with construction of Units 1&2, and include the heavy haul road corridor to the barge slip and the discharge line corridor. This habitat generally consists of grass species (Bermuda grass, bluestems, etc.) and is regularly mowed to a height of approximately 6 inches.

Existing facilities make up approximately 300 acres of the STP site (Figure 2.4-1; Reference 2.4-2a). The habitat category consists of buildings, parking lots, switchyards, and storage yards. Most of these areas are paved or have crushed rock surfaces, although small bare-ground areas may support mixed grasses. In addition, a

41-acre construction spoil area associated with Units 1 & 2 is located west of proposed Units 3&4, although it has not been used since that construction. The existing vegetative cover on this spoil area is typical of that found on disturbed soils in Texas: sea myrtle, southern dewberry, and bluestem grasses.

There are 536 acres of leased agricultural lands, primarily in the northwest corner of the STP site west of FM 521. This area typically contains row crops, although it is occasionally left fallow for livestock grazing.

~~Current land use at the approximate 12,220-acre STP site is discussed in Section 2.2 and shown in Figure 2.2 1. Approximately 65 acres of the STP site consist of generating facilities, buildings, parking areas, a switchyard, and transmission line corridors associated with STP 1 & 2 (Subsection 2.2.1.1). Based on National Wetland Inventory coverage, there are approximately 7,600 acres of various types of wetlands within the STP boundary. These include 7,068 acres of lake habitat (including the Main Cooling Reservoir [MCR] and Essential Cooling Pond), 369 acres of freshwater emergent wetland, 119 acres of freshwater forested/shrub wetland, 25 acres of freshwater pond, and 10 acres of riverine wetlands. The dominant feature of the STP property is the approximately 7000-acre MCR (Reference 2.4 2), which occupies most of the lower two thirds of the site.~~

~~The STP site landscape can be generally divided into bottomland and upland components (Figure 2.4 1). The bottomlands occupy approximately 1166 acres (9%) and occur along the site boundary with the Colorado River. Once a lush, deciduous forest, this area was historically modified through clearing and herbicide application to promote forage production for livestock. Although large patches of dense trees still exist, particularly near the river, much of the area is now present as pasture with dispersed individual or small patches of trees. Tree species found in the bottomlands include sycamore (*Platanus occidentalis*), pecan (*Carya illinoensis*), sugarberry (*Celtis laevigata*), cedar elm (*Ulmus carrassifolia*), and red ash (*Fraxinus pennsylvanica*). Depressions and sloughs within the bottomlands receive drainage from the upland portions of the site, providing shallow wetland habitat used by many species of waterbirds and alligators (*Alligator mississippiensis*). One slough draining the uplands feeds the 34-acre Kelly Lake, located northeast of the MCR. Also within the bottomland area is a 133-acre U.S. Army Corps of Engineers (USACE) spoil impoundment that has received spoil from dredging operations on the Colorado River since 1972. Because of the negative impacts of the spoil accumulation on survival of woody vegetation, this activity has resulted in a semi-permanent marsh that provides habitat for waterbirds and other wildlife species (Reference 2.4 2).~~

~~Uplands make up the remaining 90% of the STP site (Figure 2.4 1) and consist of scrubland (primarily sea myrtle, *Baccharis halimifolia*) and upland prairie/abandoned cultivated lands (Reference 2.4 2). There are non-jurisdictional wetlands (pending approval from USACE) and other water bodies, primarily surface water and storm water ditches, within these uplands (Reference 2.4 3). Embedded within the upland component are assorted impoundments and a managed wetland.~~

~~The MCR is an approximate 7000 acre impoundment (Figure 2.4-1) that was established on the property by the construction of tall earthen embankments. The reservoir side of this embankment was lined with "soil cement" to prevent erosion, whereas the exterior was sodded and is maintained by periodic mowing. Approximately seven miles of interior dikes were placed within the MCR (Figure 2.4-1) to enhance circuitous water flow, maximizing cooling. The Essential Cooling Pond is an approximate 47-acre impoundment immediately to the east of STP 1 & 2, and also is surrounded by an earthen embankment that is covered with reinforced concrete and/or soil cement for erosion protection (Reference 2.4-2).~~

~~A managed 110-acre shallow wetland area (Texas Prairie Wetlands Project) was built in the northeastern portion of the site adjacent to FM 521 in 1996 to enhance the property for waterbirds (Reference 2.4-4). STPNOC cooperated with Ducks Unlimited, Texas Parks and Wildlife Department (TPWD), U.S. Fish and Wildlife Service (USFWS) and U.S. Department of Agriculture Natural Resources Conservation Service to construct impoundments designed to create foraging habitat for wintering waterfowl, wading birds, and shorebirds. These impoundments are included on the Great Texas Coastal Birding Trail that spans the entire Texas Gulf Coast (Reference 2.4-5).~~

The construction of STP Units 3 & 4 will impact small portions of many habitat types. The proposed 6554-acre power block area for STP 3 & 4 consists of industrial land (existing facilities buildings and parking areas) and a mowed maintained field containing a large drainage ditch running east-west through the site. The ditch is approximately 15 to 20 feet wide, and approximately 5 to 10 feet deep, although the water is restricted to a more narrow channel (approximately 5 to 10 feet wide) approximately 1 to 2 feet deep. Portions of the ditch margins are mowed to the water level, other portions are vegetated with small shrubs (sea myrtle) and aquatic grasses/rushes. Smaller lateral ditches drain into this ditch. The site of the ~~both the proposed mechanical draft cooling towers (14 acres) and switchyard (12 acres) is in~~ are relatively open scrub-shrub habitat, dominated by bluestem grasses (*Andropogon* spp.), dewberry/blackberry (*Rubus* spp.) and sea myrtle, all plants common to disturbed or abandoned agricultural land in this region (Reference 2.4-2b). Approximately 35 acres will be associated with two laydown areas located immediately west of Units 3&4. These areas will occupy maintained areas (19 acres), scrub-shrub habitat (15 acres), and 1 acre of existing facilities. Two construction parking areas (87 12 total acres) will be located immediately north of Unit 4 within a maintained habitat area and a construction borrow/spoils area (36 acres) will be located north of the ECP in scrub-shrub habitat. ~~are located to the west and southwest of the proposed STP 3 & 4 power block area on open fields and lowlands.~~ A 4-acre concrete batch plant will be built on mixed grass habitat northwest of the ECP. Several non-jurisdictional wetlands (pending confirmation by the USACE) and water bodies (ditches) exist in these areas (Reference 2.4-35a).

#### **Wildlife**

Wildlife species found within the STP site are typical of those found in the east Texas coastal prairie system. Mammals observed on the STP site include white-tailed deer (*Odocoileus virginianus*), feral pigs (*Sus scrofa*), gray fox (*Urocyon cinereoargenteus*), eastern cottontail (*Sylvilagus floridanus*), swamp rabbit (*S. aquaticus*), fox squirrels (*Sciurus niger*), gray squirrels (*S. carolinensis*), and hispid cotton rat (*Sigmodon hispidus*) (References 2.4-2a and 2.4-5b3, and 2.4-4). Deer are considered common on STP whereas hogs, rabbits and squirrels are less frequently seen (Reference 2.4-4a). Mammal species that are found in the region and may be present on the STP site are indicated in Table 2.4-1a. Hunting and/or trapping of game animals is not allowed on the STP site. However, contractors are hired to remove feral pigs from the STP site due to their tendency to disturb soils on the reservoir embankment and destroy more preferred habitats. Alligators were monitored for 11 years (1978-1988) in connection with construction of STP Units 1 & 2 (Reference 2.4-6). Amphibians and other reptiles found in the region that may be present on STP are indicated in Table 2.4-1b.

Species of resident birds at the STP site include turkey vultures (*Cathartes aura*), black vultures (*Coragyps atratus*), crows (*Corvus* spp.), grackles (*Quiscalus* spp.), cardinals (*Cardinalis cardinalis*), red-winged blackbirds (*Agelaius phoeniceus*), bobwhite quail (*Colinus virginiana*) and mourning doves (*Zenaida macroura*). Wild turkeys (*Meleagris gallopavo*) and ring-necked pheasant (*Phasianus colchicus*) have been observed on the STP site; however, they are thought to be released, pen-reared birds that crossed over to the site. Many different species of wading birds were observed ~~have foraged~~ in STP wetlands during construction of STP Units 1 & 2 including wood storks (*Mycteria americana*), roseate spoonbills (*Ajaia ajaja*), great blue herons (*Ardea herodias*), great egrets (*Ardea alba*), white-faced ibis (*Plegadis chihi*), white ibis (*Eudocimus albus*), and little blue herons (*Egretta caerulea*) (Reference 2.4-2b). Other waterbirds using the site included white pelicans, laughing gulls (*Larus atricilla*), cormorants (*Phalacrocorax* spp.), anhingas (*Anhinga anhinga*), and kingfishers (*Ceryle alcyon*). A variety of waterfowl species use STP wetlands, including American coots (*Fulica americana*), teal (*Anas* spp.), and shovellers (*Anas clypeata*) (Reference 2.4-2b). Waterfowl observed on the MCR in 1987 included 16 duck species and 3 species of geese (Reference 2.4-6). These observations confirmed that the waterfowl community of the reservoir was shifting from dabbling ducks to diving ducks as a response to initial reservoir filling. Avian species observed during more recent surveys (2006 and 2007) are indicated in Table 2.4-1c.

Waterbirds were first observed nesting on the MCR dikes in 1986. The dikes in the MCR have been monitored annually since 2000 for the occurrence of nesting waterbirds as part of the Texas Colonial Waterbird Surveys (Reference 2.4-7). Waterbirds nest on terminal ends of the "Y" dike (see Figure 2.4-1) used to direct water flow in the reservoir. The STP colony has been dominated by nesting laughing gulls (*Larus atricilla*) and gull-billed terns (*Sterna nilotica*), which constitute approximately 53% and 31% of the nesting birds in the STP colony (Table 2.4-1d). Lower numbers (with typically <100 nests each) of seven additional bird species nest with them on the reservoir. Matagorda County contains many other water bird

colonies (Reference 2.4-7). In 2005, there were five total colonies in Matagorda County containing approximately 11,500 total water bird nests. Total waterbird nests observed in the county during the period from 2000–2004 were even higher, with estimates of approximately 20,000 nests each year.

The east coast of Texas, including Matagorda County and STP, is at the terminus of the Central Flyway migration route, resulting in the occurrence of many different species of avifauna during the fall, winter, and spring months (Reference 2.4-8). Thousands of migrating birds, especially waterfowl, from the cooler regions of the North American continent visit or winter in the coastal zone of Texas. Other migrants traveling to or from Central and South America use this region of Texas as an important stopover point before continuing their travels.

The STP site is part of the Matagorda County – Mad Island Christmas Bird Count (CBC). The Mad Island CBC has been among the top five CBCs nationwide every year since 1993 in regards to total number of species observed (References 2.4-8 and 2.4-9). In 2006, 233 bird species were observed in the 15-mile diameter circle including the STP site (circle center: 28° 40.99'N, 95°58.99'W). Since 2000, the total number of species observed in the circle has ranged from 231–250 avian species. Within the STP site, 215 total avian species have been documented during this CBC from 1993 through 2007 (Reference 2.4-2a). During this 15-year period, an average of 122 bird species was observed on-site per year, with a range of 60 to 142 species per year. Bird/habitat associations for STP included woodland (101 bird species observed), shoreline (48 species), open-water (40 species), grassland (24 species), and scrub-shrub (2 species). These species were classified by their habitat of occurrence (where they were observed), but realizing that these birds likely frequent multiple habitats and these associations do not denote habitat restrictions. Total individuals counted on the STP site ranged from 1,274 to 8,630,645 birds. These totals were largely dependent on observations of red-winged blackbirds and brown-headed cowbirds which had maximum annual counts of 4,300,270 and 4,300,000, respectively (both occurred in 2003).

A measure of avian migration in the spring, the Great Texas Birding Classic, occurs annually in mid-April. ~~The Great Texas Birding Classic is held annually in mid-April during spring migration~~ along the Texas Gulf Coast. Matagorda County is in the “central coast” region of this Classic, along with 18 other counties to the south and west, including the Corpus Christi area. Classic participants visit the STP site but do not classify their bird sightings as specific to the STP site. In 2006, 190 avian species were observed in the central coast region (Reference 2.4-10).

The USFWS is responsible for designating lands as “critical habitat” for federally listed endangered and threatened species. Such lands are protected to aid the recovery of the species and may require special management activities. No area designated by the USFWS as critical habitat is found within or adjacent to the STP site. The nearest critical habitat is a wintering area for federally threatened piping plovers (*Charadrius melodus*) along Matagorda Bay and Matagorda Peninsula, approximately 7-8 miles south of STP (Reference 2.4-11). Wintering habitat for the

endangered whooping crane (*Grus americana*) is located approximately 35 miles southwest of the STP site in Aransas and Calhoun Counties (Reference 2.4-12).

Historically, only two federally listed species have been observed within the STP site boundary (Reference 2.4-2)—the bald eagle (*Haliaeetus leucocephalus*) and the American alligator. The bald eagle was recently delisted under the Endangered Species Act (Reference 2.4-13), but remains listed as threatened by the state of Texas. The bald eagle will remain federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald eagles are present year-round throughout Texas as spring or fall migrants, breeders, or winter residents. Breeding eagles are primarily found in the eastern half of Texas. Nesting occurs in Matagorda County, with a typical nesting season of October through July. A single nest, first reported in 2004, is located in remote woodlands within the southeastern boundary of the STP site, near the Colorado River. There have been other active nests near the STP site since at least 1992. The productivity (i.e., number of young fledged) of the nest on the STP site and nearby nests has not been reported by state and/or federal agencies. American alligators are listed as threatened by the USFWS due to similarity of appearance to the endangered crocodile (*Crocodylus acutus*), which is found only in Florida. Alligators have been observed in the MCR and most wetland portions of the STP site.

A more recent visitor to the STP site is the federally threatened brown pelican (*Pelecanus occidentalis*), which nests as close as Matagorda Bay (Reference 2.4-7). This species has been observed at the MCR, where it is visiting presumably to drink fresh water, rest, and/or possibly forage.

State-listed (as threatened) species observed on the STP site include wood storks, reddish egret, white-tailed hawk and white-faced ibis (References 2.4-4a and 2.4-2b). Wood storks were documented within the riverine bottomlands during Units 1 & 2 construction, but have not been observed in recent surveys. The remaining three state-listed species have been observed on-site during winter (CBC) surveys. No nesting by these species has been observed on the STP site nor is it anticipated.

Matagorda County has 23 animal species that are either federally or state listed as endangered or threatened, including the bald eagle, brown pelican, and alligator (References 2.4-14 and 2.4-15). It should be noted that information about federally listed species on the state and federal Web sites occasionally differ, with the state including all counties within the historical range of these species and the federal listing including only counties with sightings. As a conservative approach, STPNOC has included species in counties from both listings. Also, STPNOC acknowledges that these listings reflect only recorded or historical occurrences and the possibility exists that other (unrecorded) rare species might occur in this county. STPNOC has initiated consultations with the USFWS, the National Oceanographic and Atmospheric Administration (NOAA), and TPWD regarding endangered and threatened species (References 2.4-16, 2.4-17, and 2.4-18).

Several species listed for Matagorda County have been subject to loss of their specific habitats as humans settled the area and altered the natural landscape to a more open

and managed agricultural landscape. Once found throughout eastern Texas, the red wolf's (*Canis rufus*) decline was linked to these land use changes which reduced their more forested habitats and enhanced that of the coyote (*Canis latrans*), resulting in a population overlap. Subsequent interbreeding between the two canine species has effectively resulted in the extirpation of the red wolf from Texas (Reference 2.4-19). The ocelot (*Leopardus pardalis*) was a neotropical cat found in large, dense thickets of thorny shrubs. With the loss of vast areas of this habitat, ocelots are now limited to a few isolated areas in southern Texas (Reference 2.4-20). The Louisiana black bear (*Ursus americanus luteolus*), one of 16 subspecies of American black bear, was once common in the forested area of the eastern region of Texas. Due to hunting and habitat loss, this subspecies was presumed to be extirpated from this area by the 1940s, and any recent sightings are thought to be dispersing juveniles from Louisiana (Reference 2.4-20). The Eskimo curlew (*Numenius borealis*), a victim of over-hunting and the conversion of open and coastal prairie habitats to agriculture, was once an abundant migrant of the Texas prairie. It may now be extinct. The last verified sighting of an Eskimo curlew occurred on the "coast of Texas" in 1987 (Reference 2.4-20). Five species of sea turtles are federally listed for Matagorda County, including: loggerhead sea turtles (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricate*), and the Kemp's ridley sea turtle (*Lepidochelys kempii*). All nest on seaward sandy beaches and thus are not affected by STP, its operation or proposed expansion. Given the changes to habitats in and around the STP site, it is highly unlikely that any of these listed species would be impacted by activities on the STP site.

"Important species" are defined in the Environmental Standard Review Plan for Environmental Reviews for Nuclear Plants (NUREG-1555) (Reference 2.4-21) as those that are federally or state listed as threatened or endangered, proposed for listing as threatened or endangered (see Table 2.4-2), commercially or recreationally valuable, essential to the maintenance or survival of species that are rare or commercially or recreationally valuable, critical to the structure and function of the local terrestrial ecosystem, or that serve as biological indicators. Game species fall within the "commercially or recreationally valuable" species category. The primary game species at the STP site are white-tailed deer, feral pigs, rabbits, gray squirrel, northern bobwhite, mourning dove, and numerous species of waterfowl (Reference 2.4-2a). Deer, waterfowl, and mourning doves are considered common on the STP site whereas hogs, rabbits, squirrels, and bobwhite quail are less frequently seen (Reference 2.4-2a). No travel corridors for game species cross the STP site, with the exception that migratory waterfowl use the MCR and other site impoundments and wetlands during migration.

Important habitats, as defined under NUREG-1555, include wildlife refuges, sanctuaries, or preserves, habitats identified by federal or state agencies as rare or to be protected, wetlands, floodplains, other resources specifically protected by federal or state regulation, or land areas identified as critical habitat for threatened or endangered species. The Texas Prairie Wetland Project in the northeast portion of the site is the closest refuge-like habitat to the proposed construction site, being

approximately 200 yards from the new switchyard site. Wetlands exist on the STP site; however, there are no jurisdictional wetlands within the proposed construction and laydown/spoils sites (Reference 2.4-5a3).

The Mad Island Wildlife Management Area is approximately three miles due south of the STP site and was established to preserve coastal wetland habitat for wintering waterfowl. It is also beneficial to cranes, alligators, and other local wildlife. It occupies 7200 acres of fresh-to-brackish marsh with sparse brush and flat coastal prairie (Reference 2.4-22).

The 7063-acre Clive Runnells Family Mad Island Marsh Preserve is approximately four miles southwest of the STP site and contains both upland prairie and a variety of coastal wetlands (Reference 2.4-8). The preserve, operated by the Runnells family and The Nature Conservancy, is actively managed to enhance ricefields and wetlands for resident and migratory waterbirds.

The Big Boggy National Wildlife Refuge borders Matagorda Bay, approximately nine miles southeast of the STP site. It consists of 5000 acres of rice fields, managed impoundments, and salt marsh habitat, and was established to preserve habitat for neotropical migrating birds in the fall and spring, wintering waterfowl, and other bird life (Reference 2.4-23). Within the refuge, Dressing Point Island is an important bird rookery for many species of waterbirds, including the federally listed brown pelican.

Although the STP site hosts such potential disease vectors as ticks and mosquitoes, no vector-borne diseases have been reported to STPNOC.

**\*\*End of edited section, skip to References\*\***

#### 4.3.2 References

- 2.4-1 "Coastal prairie. USGS FS-019-00," USGS (U.S. Geological Survey) 2000.
- 2.4-2a "Ecological Survey Report – Habitat Assessment, Unit 3 and 4 Licensing Project, South Texas Project Electric Generating Station," Prepared for STP Nuclear Operating Company by ENSR Corporation, Houston, Texas, June 2008.
- 2.4-2b "South Texas Project, Units 1 and 2, Environmental Report," Docket Nos. 50-498 and 50-499, July 1, 1974, and Subsequent Amendments.
- ~~2.4-3 "Ecological Survey Report Unit 3 and 4 Licensing Project, South Texas Project Electric Generating Station," Prepared for STP Nuclear Operating Company by ENSR Corporation, Houston, Texas, March 2007.~~
- 2.4-34 "Texas prairie wetlands dedicated today at South Texas Project," STP News Release, March 10, 1997.
- 2.4-45 "Great Texas Coastal Birding Trail – Central Texas Coast (CTC)," TPWD 2006. Available at

[http://www.tpwd.state.tx.us/huntwild/wild/wildlife\\_trails/central](http://www.tpwd.state.tx.us/huntwild/wild/wildlife_trails/central), accessed on May 8, 2007.

- 2.4-5a “Ecological Survey Report Unit 3 and 4 Licensing Project, South Texas Project Electric Generating Station,” Prepared for STP Nuclear Operating Company by ENSR Corporation, Houston, Texas, March 2007.
- 2.4-5b “Ecological Survey Report – Threatened and Endangered Species, Unit 3 and 4 Licensing Project, South Texas Project Electric Generating Station,” Prepared for STP Nuclear Operating Company by ENSR Corporation, Houston, Texas, March 2007.
- 2.4-6 “1987–1988 Special ecological studies for the South Texas Project Matagorda County, Texas. Houston Lighting and Power Company, Environmental Department,” Baker, W. B. Jr. and G. N. Greene, Houston, Texas, 1989.
- 2.4-7 USFWS (U.S. Fish and Wildlife Service) 2007. Most recent Texas colonial waterbird database. Available at <http://www.fws.gov/texascoastalprogram/TCWC.htm>, accessed February 5, 2007.

**\*\*All references after 2.4-5b require no revisions.\*\***

\*\*Table Revisions: The original Table 2.4-1 was renumbered as 2.4-1d and given a modified title. Tables 2.4-1a, 2.4-1b, and 2.4-1c were added. There are no modifications to subsequent tables. \*\*

**Table 2.4-1a. Potential Wildlife Associated With STP: Mammal Species [1]**

<b>Common Name</b>	<b>Scientific Name</b>
Southern short-tailed shrew	<i>Blarina carolinensis</i>
Coyote	<i>Canis latrans</i>
Armadillo	<i>Dasypus novemcinctus</i>
Opossum	<i>Didelphis virginiana</i>
Eastern red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>
Northern yellow bat	<i>Lasiurus intermedius</i>
Seminole bat	<i>Lasiurus seminolus</i>
Jack rabbits	<i>Lepus spp.</i>
Otter	<i>Lutra canadensis</i>
Bobcat	<i>Lynx rufus</i>
Striped skunk	<i>Mephitis mephitis</i>
Mink	<i>Mustela vison</i>
Nutria	<i>Myocaster coypus</i>
Southeastern Myotis	<i>Myotis austroriparius</i>
Evening bat	<i>Nycticeius humeralis</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Northern rice rat	<i>Oryzomys palustris</i>
Javelina	<i>Pecari tajacu</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Eastern pipistrelle	<i>Pipistrellus subflavus</i>
Raccoon	<i>Procyon lotor</i>
Roof rat	<i>Rattus rattus</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Feral hogs	<i>Sus scrofa</i>
Swamp rabbit	<i>Sylvilagus aquaticus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>
Gray fox	<i>Urocyon cinereoargenteus</i>

[1] Source: Reference 2.4-19

**Table 2.4-1b. Potential Wildlife Associated With STP: Amphibian and Reptile Species [1]**

<b>Common Name</b>	<b>Scientific Name</b>
<b>Amphibians</b>	
Gulf coast toad	<i>Bufo valliceps</i>
Green tree frog	<i>Hyla cinerea</i>
Red-spotted newt	<i>Notophthalmus viridescens</i>
Bullfrog	<i>Rana catesbeinana</i>
Southern leopard frog	<i>Rana sphencephala</i>
<b>Reptiles</b>	
Copperhead	<i>Agkistrodon contortrix</i>
Cottonmouth	<i>Agkistrodon piscivorus</i>
Alligator	<i>Alligator mississippiensis</i>
Green anole	<i>Anolis carolinensis</i>
Snapping turtle	<i>Chelydra serpentina</i>
Eastern racer	<i>Coluber constrictor</i>
W. diamondback rattlesnake	<i>Crotalus atrox</i>
Corn snake	<i>Elaphe guttata</i>
Eastern rat snake	<i>Elaphe obsoleta</i>
Five-lined skink	<i>Eumeces fasciatus</i>
Eastern hog-nosed snake	<i>Heterodon platyrhinos</i>
Diamondback terrapin	<i>Malaclemys terrapin</i>
Southern water snake	<i>Nerodia fasciata</i>
Diamondback watersnake	<i>Nerodia rhombifer rhombifer</i>
Fence lizard	<i>Sceloporus undulates</i>
Eastern box turtle	<i>Terrapene caroliniana</i>
Ornate box turtle	<i>Terrapene ornata</i>
Red-eared pond slider	<i>Trachemys scripta elegans</i>

[1] Source: Reference 2.4-5b.

**Table 2.4-1c. Wildlife Associated With STP: Avian Species Observed During Recent (2006-2008) Ecological Surveys [1]**

Common Name	Scientific Name	Habitat Observed
Red-winged blackbird	<i>Agaelaius phoeniceus</i>	Grassland/Scrub-shrub
Roseate spoonbill	<i>Ajaia ajaja</i>	MCR
Anhinga	<i>Anhinga anhinga</i>	MCR
Great blue heron	<i>Ardea herodias</i>	Wetland/MCR
Cattle egret	<i>Bubulcus ibis</i>	Grassland/Wetlands
Red-tailed hawk	<i>Buteo jamaicensis</i>	Grassland/Scrub-shrub
Red-shouldered hawk	<i>Buteo lineatus</i>	Grassland/Scrub-shrub
Crested caracara	<i>Caracara plancus</i>	Grassland
Turkey vulture	<i>Cathartes aura</i>	Grassland/Scrub-shrub/Developed
Belted kingfisher	<i>Ceryle alcyon</i>	Wetlands
Killdeer	<i>Charadrius vociferous</i>	Grassland/Developed
Northern harrier	<i>Circus cyaneus</i>	Grassland/Scrub-shrub
Northern bobwhite	<i>Colinus virginianus</i>	Grassland/Scrub-shrub
Black vulture	<i>Coragyps atratus</i>	Grassland/Scrub-shrub/Developed
American crow	<i>Corvus brachyrhyncos</i>	Grassland/Scrub-shrub
Bluejay	<i>Cyanocitta cristata</i>	Scrub-shrub
Fulvous whistling-duck	<i>Dendrocygna bicolor</i>	Wetland
Little blue heron	<i>Egretta caerulea</i>	Wetlands
Snowy egret	<i>Egretta thula</i>	Wetland/MCR
Tri-colored heron	<i>Egretta tricolor</i>	Wetland/MCR
White ibis	<i>Eudocimus albus</i>	Grassland/Wetlands
American coot	<i>Fulica americana</i>	Wetlands
Common yellowthroat	<i>Geothypis trichas</i>	Scrub-shrub
Barn swallow	<i>Hirundo rustica</i>	Grassland/Developed
Laughing gull	<i>Larus atricilla</i>	MCR/Developed
Mockingbird	<i>Mimus polyglottos</i>	Grassland/Scrub-shrub/Developed
Brown-headed cowbird	<i>Molothrus ater</i>	Grassland/Scrub-shrub
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	Wetland
Osprey	<i>Pandion haliaetus</i>	MCR
White pelican	<i>Pelecanus erythrorhynchos</i>	MCR
Brown pelican	<i>Pelecanus occidentalis</i>	MCR
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	MCR
Purple martin	<i>Progne subis</i>	Grassland/Scrub-shrub/Developed
Boat-tailed grackle	<i>Quiscalus major</i>	Grassland/Scrub-shrub/Developed
Eastern meadowlark	<i>Sturnella magna</i>	Grassland/Scrub-shrub
Robin	<i>Turdus migratorius</i>	Grassland
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	Grassland/Scrub-shrub
Mourning dove	<i>Zenaida macroura</i>	Grassland/Developed

[1] Source: References 2.4-2a, 2.4-5a, and 2.4-5b.

**Table 2.4-1d. Wildlife Associated With STP: Waterbird Species Observed Nesting on the MCR Interior Dikes During Texas Colonial Waterbird Surveys [1]****~~Waterbird Species Observed Nesting on the MCR Interior Dikes at STP During Texas Colonial Waterbird Surveys [1]~~**

Common Name	Scientific Name	Nests per Species per Year					
		2005	2004	2003	2002	2001	2000
Laughing gull	<i>Larus atricilla</i>	769	759	685	733	1,127	787
Gull-billed tern	<i>Sterna nilotica</i>	423	438	184	424	744	650
Caspian tern	<i>Sterna caspia</i>	21	17	59	69	34	0
Forster's tern	<i>Sterna forsteri</i>	18	2	60	68	226	116
Black-necked stilt	<i>Himantopus mexicanus</i>	17	1	0	0	0	0
Black skimmer	<i>Rhynchips niger</i>	15	56	142	94	73	6
Least tern	<i>Sterna antillarum</i>	9	66	44	17	71	35
Royal tern	<i>Sterna maxima</i>	0	0	0	0	0	30
Killdeer	<i>Charadrius vociferous</i>	0	0	0	0	0	3
<b>Total Nesting Birds</b>		<b>1,272</b>	<b>1,339</b>	<b>1,174</b>	<b>1,405</b>	<b>2,275</b>	<b>1,627</b>

[1] Source: Reference 2.4-7

**\*\*ALL OF THE TABLES THAT FOLLOW THIS ONE ARE RE-NUMBERED AND TITLED CORRECTLY\*\***

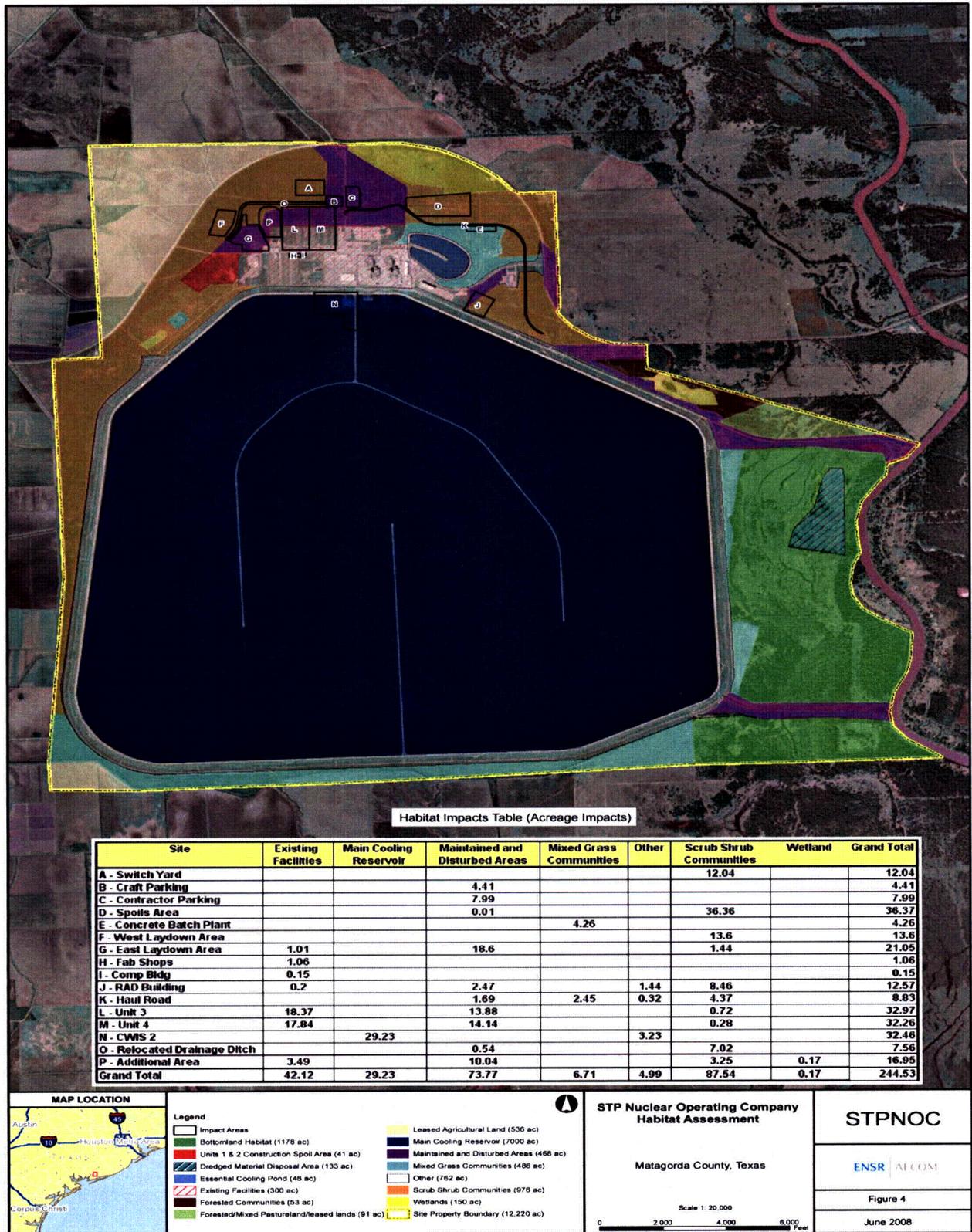


Figure 2.4-1 Landscape Features and Habitat Types of the STP (Source: Reference 2.4-2a)

**Question Number: 2.4.1-2****QUESTION:**

Provide current information on the type and relative abundance of migratory bird species and waterfowl using the habitats on the STP site, potential impacts to these populations, and proposed mitigation measures to limit impacts during construction and operation.

**Full Text (Supporting Information):**

Provide current information on the type and relative abundance of migratory bird species and waterfowl using the habitats on the STP site. Discussions between the applicant and NRC at the site audit indicated that the current and past five years of site-specific data for the Matagorda County Christmas Bird Count for count stations on and adjacent to STP, can be summarized to provide information on the relative abundance of these birds. Further discussions indicated that radar data describing preferred migration pathways may be available to determine impacts to migratory species from STP construction and operations. Describe any data and information that can be used to address these issues. Also, provide information on any management or operational practices that STP plans to implement to limit adverse effects to migrating birds during facility construction and operation (e.g., downward pointing lighting on buildings, roads, structures).

**RESPONSE:**

Migratory bird data were examined for occurrence on the STP site during Christmas Bird Counts (CBC) from the last 15 years. Occurrences were examined relative to general habitats present on the STP site, based on the ENSR 2008 Habitat Assessment (provided to NRC with RAI response 2.4.1-1).

Important migration stopover habitat information based on radar data was compared to habitats impacted by construction activities, and incorporated into the text (2.4.1.1 & 4.3.1.1).

Information on recommended management and operational practices was incorporated into the text of Subsection 4.3.1.2.

These responses result in suggested revisions in Subsections 2.4.1.1, 4.3.1.1, and 4.3.1.1.2.

**CANDIDATE COLA REVISION:****4.3.2.1 Site Habitats and Communities****Habitats**

All revisions previously discussed under RAI Response 2.4.1-1

**Wildlife**Skip 3 paragraphs, corrected in RAI 2.4.1-1

The east coast of Texas, including Matagorda County and the STP site, is at the terminus of the Central Flyway migration route, resulting in the occurrence of many different species of avifauna during the fall, winter, and spring months (Reference 2.4-8). Thousands of migrating birds, especially waterfowl, from the cooler regions of the North American continent visit or winter in the coastal zone of Texas. Other migrants traveling to or from Central and South America use this region of Texas as an important stopover point before continuing their travels. Radar studies of migratory birds along the Gulf Coast indicated their important stopover areas were floodplain forests and forested wetland habitats.

The STP site is part of the Matagorda County – Mad Island Christmas Bird Count (CBC). The Mad Island CBC has been among the top five CBCs nationwide every year since 1993 in regards to total number of species observed (References 2.4-8 and 2.4-9). In 2006, 233 bird species were observed in the 15-mile diameter circle including the STP site (circle center: 28°40.99'N, 95°58.99'W). Since 2000, the total number of species observed in the circle has ranged from 231–250 avian species. Within the boundary of the STP site, 215 total avian species have been documented during this CBC from 1993 through 2007 (Reference 2.4-2a). During this 15-year period, an average of 122 bird species was observed on-site per year, with a range of 60 to 142 species per year. Bird/habitat associations on the STP site during these counts found that, as expected based on regional radar studies, woodland habitats supported over twice as many species (101 bird species observed) as the next highest habitat, and was followed by shoreline (48 species), open-water (40 species), grassland (24 species), and scrub-shrub (2 species) habitats. These species were classified by their habitat of occurrence (where they were observed), but realizing that these birds likely frequent multiple habitats and these associations do not denote habitat restrictions. Total individuals counted on the STP site ranged from 1,274 to 8,630,645 birds per year. These totals were largely dependent on observations of red-winged blackbirds and brown-headed cowbirds which had maximum annual counts of 4,300,270 and 4,300,000, respectively (both occurred in 2003).

A measure of avian migration in the spring, the Great Texas Birding Classic, occurs annually in mid-April. ~~The Great Texas Birding Classic is held annually in mid-April during spring migration~~ along the Texas Gulf Coast. Matagorda County is in the “central coast” region of this Classic, along with 18 other counties to the south and west, including the Corpus Christi area. Classic participants visit the STP site but do not classify their bird sightings as specific to the STP site. In 2006, 190 avian species were observed in the central coast region (Reference 2.4-10).

#### 4.3.1.1 The Site and Vicinity

##### 1<sup>st</sup> four paragraphs unchanged

Based on information received from the Texas Parks and Wildlife Department, an active bald eagle nest is located on the STP site near its eastern boundary. Although recently delisted under the Endangered Species Act (Reference 4.3-7), the bald eagle remains protected under the Bald and Golden Eagle Protection Act (References 4.3-7). On June 1, 2007, new national management guidelines for bald eagles, which established a single recommended protection zone to extend out 660 feet from each eagle nest, were enacted for all bald eagles in the lower 48 states (Reference 4.3-8). No activities related to construction of STP 3 & 4 will occur within one mile of the eagle nest.

As discussed in Subsection 2.4.1, the STP site lies within a major migratory corridor for neotropical migrants and other birds. Radar studies indicate that floodplain forests and other forested wetlands are important stopover habitats. These habitats on the STP site will not be impacted by construction activities associated with Units 3 & 4 and thus construction impacts on migratory birds should not be significant.

#### 4.3.1.1.2 Other Construction Impacts

Noise is another potential construction-related activity that could impact wildlife at the proposed STP 3 & 4 construction site. Although noise levels in construction areas can be high (up to 100 dBA at 100 feet from sources of noise) and of varying duration, these high local noise levels would not be expected to propagate far beyond the boundaries of the construction site (Reference 4.3-9). Table 3.9S-2 shows the rapid attenuation of construction noise over relatively short distances. For example, at 400 feet from the source of 100 dBA construction noise, noise levels have generally dropped to 60–80 dBA, below levels known to startle small mammals and waterfowl (Reference 4.3-9). Even with this attenuation, some displacement of local small mammals and birds due to noise is expected during construction activities. This displacement may be permanent for some species and temporary for others. These impacts are considered SMALL, generally short-term, localized, and not ecologically significant.

Avian mortality because of collisions with man-made structures is sometimes a concern with very tall structures, although it varies relative to species characteristics such as size, flight behavior, and habitat use, and other characteristics including weather, landscape features, and size/type of equipment/structures (Reference 4.3-10). While poor conditions occasionally result in major bird kills, such mortalities are not thought to significantly impact common/abundant bird species. STP Units 1 & 2 have not experienced any such major bird kills. The proposed facilities are similar to existing STP facilities and there should be little additional impact. Avian

collisions during STP 3 & 4 construction should be negligible and these impacts SMALL.

Light pollution during facility construction and operation can disorient flying birds and bats. Possible mitigation measure could include turning off un-necessary lights at night, lights could be turned downward or hooded (directing light downward), and lower-powered lights could be used as appropriate to minimize impacts on wildlife. Given the sparseness of wildlife populations in the construction areas, impacts of lights are considered SMALL.

**Question Number: 2.4.1-3**

**QUESTION:**

Provide information and maps depicting all wetlands identified on the STP site during field surveys in 2006, 2007 and 2008.

**Full Text (Supporting Information):**

Information provided at the site audit and during communications with the applicant indicates that additional wetland surveys and delineations have been conducted since the March 2007 Ecological Survey Report (ER Reference 2.4-3) and the ER was issued. Please provide field data sheets that describe the wetland identification and delineation for surveys done on the site. Please provide maps and tables indicating the locations, acreages and type of each of these wetlands. Include information describing whether each wetland would be impacted, either permanently or temporarily, by the project.

**RESPONSE:**

STP has completed additional wetland surveys on a broader portion of the STP site. These surveys include additional wetlands (above and beyond the 2007 report) and multiple ditches, including the 11 ditches that feed the east-west ditch within the construction footprint (all to be impacted by construction). The results of these surveys were submitted in a preliminary report to USACE on April 9, 2008. The classifications of these wetlands and water bodies are pending confirmation of the STPNOC determination by USACE. Requested data from these sites will be submitted after receipt of the USACE response.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 2.4.1-4**

**QUESTION:**

Provide updated information describing and mapping water features and related wetland features on the STP site

**Full Text (Supporting Information):**

During site audit field visits, NRC staff observed wetland indicators in and along the edges of drainage ditches within the project sites. Were these areas investigated for wetland features or surveyed for delineation during any of the wetland surveys conducted on the site?

Were surveys completed for the eleven ditches which feed into the large drainage ditch that will be rerouted around the power block for Units 3 and 4? If so, please provide survey information.

Were other water features identified that were not identified as wetlands? If so, please describe the locations and characteristics of such water features in detail and include maps.

Based on recent survey information, please explain how the re-located portion of Little Robbins Slough was considered; is it identified as a wetland or on-site water feature? Please clarify with maps and text whether any upstream portion of Little Robbins Slough exists in a natural condition on the STP site. If so, is this upstream portion on STP identified as a wetland or on-site water feature?

**RESPONSE:**

STP has completed additional wetland surveys on a broader portion of the STP site. These surveys include additional wetlands (above and beyond the 2007 report) and multiple ditches, including the 11 ditches that feed the east-west ditch within the construction footprint (all to be impacted by construction). The upper reaches of Little Robbins Slough were included in this survey.

The results of these surveys were submitted in a preliminary report to USACE on April 9, 2008. The classifications of these wetlands and water bodies (primarily ditches) are pending confirmation of the STPNOC determination by USACE. Requested data from these sites will be submitted after receipt of the USACE response.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 2.5-4****QUESTION:**

Provide a discussion of important community social structures and organizations.

**Full Text (Supporting Information):**

Most community structure information such as non-profits, faith-based outreach, and social service organizations appears to be omitted. No organizations were identified. Provide analysis or describe how social service organizations, and membership and volunteer organizations, would be affected, by a population increase or an influx of the construction workforce, for example. How would it be different for the operations phase?

**RESPONSE:**

The *social structure* information, including major community structures, as suggested by NUREG 1555 guidance, does not refer to non-profits, faith based outreach, or social service organizations. Social structure, instead, is the relationship and identification of designated local governments such as cities, parishes, boroughs, townships, and counties to one another: how society is organized. It reflects how the various units of governorships are linked and what those units are called. For example, some states have cities within counties and hence a single county may have residents that live in both a city and a county while other states organize themselves by townships where a "city" and the "county" are synonymous (i.e. there is one unit of government, not two). Social structure is not social service (state and local agencies that serve an in-need clientele for example). Although acknowledged to be a misnomer, NUREG 1555 identifies "*social services* and public health facilities" to be: water and sewer/sewage disposal facilities; police, fire and emergency planning capabilities; and hospitals, medical doctors. Faith based organizations and other traditional non-profits (United Way or Habitat for Humanity, for example) are not a part of the community analysis used to develop a profile of the affected environment (community) in a social-economic study. There is no reliable basis for determining how a in-migrating workforce, be they construction workers or operations workers, may affect the utilization rates or the level of financial/in-kind support of such services or organizations.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 2.5-6****QUESTION:**

Provide a discussion of non-zoning controls on land development.

**Full Text (Supporting Information):**

Provide a discussion of local infrastructure and transportation plans that also control the location of housing and business, such as constraints on water hookups. Provide copies of cities' land use plans.

**RESPONSE:**

No regulatory obstacles to the development of new housing or the conversion of land to new uses have been identified in the incorporated or unincorporated portions of either Matagorda or Brazoria County. Public services and infrastructure (i.e. police protection, schools, water and sewer, roads etc) are generally provided in both counties on an "as demanded" basis. Two exceptions to the "on demand basis" were uncovered. The City of Angleton has restrictions in regards to water supplies that are enforced on a case-by-case basis and dependant upon water availability and Palacios has limitations on new water and sewer connections, depending on location or whether line extensions are required. All jurisdictions have permitting authority on the development of land where the conversions impact some public services. The permitting processes provide an oversight opportunity, but except in the case noted above, the processes are designed to ensure adherence to prescribed standards and not controls that limit development. Developers of housing subdivisions present transportation specs to applicable authorities for concurrence and permitting, build roads to approved specifications, and then turn the roads over to the city, county, or state. Adopted land use plans (and zoning codes) in the jurisdictions in Matagorda and Brazoria County have been reviewed. The Texas Department of Transportation (TXDOT) Planning Division and the TXDOT Design Division have been interviewed to confirm that transportation issues do not impede land development in Texas. No city, county, or state codes or plans are considered obstacles to development (such as a no-growth policy or arduous impact fees as are found in some other jurisdictions within the nation).

In Texas, the zoning ordinance (which controls the use of property through restrictions and development standards) applies to all areas within the city limits. As a city annexes land, that property then becomes zoned as well. The extra-territorial jurisdiction (added land) of the municipality is not subject to zoning regulations. There are no zoning restrictions outside the city limits. Texas counties cannot pass zoning ordinances.

The State of Texas does have requirements for counties and cities regarding fiscal management, but they do not require any kind of land use planning/zoning.

Only the City of Palacios, in Matagorda County, has adopted a zoning ordinance for the area within its city limits, created by the Palacios Economic Development Corporation. Neither Matagorda County nor Bay City has zoning at this time.

### **Matagorda County**

#### Palacios, TX

Palacios has a Land Use Ordinance (established December 17<sup>th</sup>, 2007). Palacios has limitations on new water and sewer connections, depending on location or whether line extensions are required.

#### Bay City, TX

Since Bay City has no city zoning, locations of housing and businesses and constraints on water hook-ups are decided on a case-by-case basis, and depend primarily on what utilities are required and available to serve the proposed units(s). However, Bay City has room for expansion of housing and business. It has available land, can annex more, and has utility plant capacity (including water and sewer system capacity) for more hook-ups. The highway system has additional capacity to accommodate residential type traffic. The Economic Development Designations (shown below) have been created to encourage businesses and second home owners to move to the area.

#### Bay City Economic Development Designations:

- Strategic Investment Area
- Historically Underutilized Business (HUB) zone
- Foreign Trade Sub-Zone agreement
- Freeport exemption
- Clean Air Attainment County
- No county or city zoning
- Tax free industrial bonds

### **Brazoria County**

#### Angleton, TX

The City of Angleton has zoning restrictions in regards to water supplies that is enforced on a case-by-case basis and dependant upon water availability. The Code of Ordinances for the City of Angleton, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=10361&sid=43>

#### Alvin, TX

The City of Alvin requires an application for water service or water connections. The Code of Ordinances for the City of Alvin, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=10357&sid=43>

#### Clute, TX

The City of Clute requires a development plan to be submitted and approved by the Planning and Zoning Commission and/or the City Council before construction of each sewer connection for

house or building or tie-in to existing lines may begin. The Code of Ordinances for the City of Clute, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=10570&sid=43>

#### Freeport, TX

The City of Freeport is divided into districts. All buildings, structures or land shall used or occupied, as well as buildings or structures to be erected, constructed, reconstructed, moved or structurally altered must be in conformity with all of the regulations specified for the district in which it is located. The Code of Ordinances for the City of Freeport, TX is available online at:

[http://www.amlegal.com/nxt/gateway.dll/Texas/freeport\\_tx/cityoffreeporttexascodeofordinances?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:freeport\\_tx](http://www.amlegal.com/nxt/gateway.dll/Texas/freeport_tx/cityoffreeporttexascodeofordinances?f=templates$fn=default.htm$3.0$vid=amlegal:freeport_tx)

#### Lake Jackson, TX

The City of Lake Jackson requires a plat (a plan or map) or a certificate stating the property is exempt from the platting process, submitted to the city council, before construction of any sewer connection for house or building or tie-in to existing lines may begin. The Code of Ordinances for the City of Lake Jackson, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=11118&sid=43>

#### Manvel, TX

The City of Manvel requires a plat (a plan or map) or a certificate stating the property is exempt from the platting process, submitted to the city's operator, before construction of any sewer connection for house or building or tie-in to existing lines may begin. The Code of Ordinances for the City of Manvel, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=14024&sid=43>

#### Pearland, TX

The City of Pearland has been divided into 17 land use districts to aid in development. Any person or persons wishing to build commercial or residential structures must first submit the necessary applications to the City Council for approval. The Land Use and Urban Development Ordinance Plan for the City of Pearland, TX is available online at:

<http://www.cityofpearland.com/vertical/Sites/{CA80BAF8-A883-4878-AB6D-7FC8DAE7D62E}/uploads/{AB683C6D-6F82-46F2-9D3D-55ADC0227882}.PDF>

#### Richwood, TX

The City of Richwood requires that any person or persons wishing to build commercial or residential structures must first submit the necessary applications to the City Works Department and pay in full all applicable fees, before approval. The Code of Ordinances for the City of Richwood, TX is available online at:

<http://www.municode.com/Resources/gateway.asp?pid=12434&sid=43>

#### **CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 2.5-11****QUESTION:**

Confirm whether the 2000 Census is the most recent data available for housing availability in the counties near STP.

**Full Text (Supporting Information):**

Confirm whether data on number of units, vacancies, and tenure from the 2000 Census are the most recent data available. If more recent data are available (for example, price and vacancy data) use them to supplement the data currently shown.

**RESPONSE:**

The U S Census Bureau's 2000 decennial census provides the most recent data available across all jurisdictions analyzed in this document. The 2000 Census gathered detailed information about housing characteristics and tenure. Information presented as a result of the 2000 Census represents a complete, direct survey of 100% of households, rather than a sampling coupled with the use of information proxies. The American Community Survey, conducted mid-decade, gathers less detailed information, in far fewer jurisdictions, and relies on sampling. For consistency in methodology and reporting across all jurisdictions, reliability, and to secure the necessary level of detailed information, the U S Census Bureau 2000 data is considered the most appropriate source of information. Although the cited values are dated, all the cited characteristics are from the same time-base-line and can reasonably be assumed to have changed in approximately the same proportion. For example, while the absolute number of owner-occupied housing units has undoubtedly increased; the percentage that those units represent of the inventory will not have changed substantially. Because there are no known aberrations that would alter this assumption in the ROI (unlike, for example, New Orleans after Hurricanes Katrina and Rita), the Census Bureau decennial statistics provide the most defensible data base in a socioeconomic analysis.

**CANDIDATE COLA REVISION:****2.5.2.6.1 Permanent Housing. Fourth paragraph**

Table 2.5-25 provides the number of housing units and housing unit vacancies for Matagorda and Brazoria Counties for 1990 and 2000. The U S Census Bureau's 2000 Census provides the latest, reliable information at the county and sub-county level of the detailed information required for this analysis. The 2000 data include detailed housing characteristics such as age and size of housing units, value or rental cost, tenure, and other characteristics that are important in determining impacts. The Census data are based on methodologies that are consistent across geopolitical boundaries, and are available for all jurisdictions. In 2000...

**Question Number: 2.5-12**

**QUESTION:**

Discuss non-governmental service organizations located in Matagorda County and adjacent counties.

**Full Text (Supporting Information):**

Discuss the major non-governmental social services organizations in Matagorda and nearby counties, and identify services they provide. Include faith-based organizations which provide local social services to low-income residents in your discussion.

**RESPONSE:**

Non-government social service agencies are not included in a socioeconomic analysis because they are not directly impacted by project-induced changes to employment and, hence, changes in population which in turn drive changes to other resources studied in the analysis (education, housing, transportation, recreation, land use, transportation). Sometimes, new jobs in a community offer direct and indirect employment opportunities for clients of some traditional social service agencies. This reality is captured in the reporting of an area's labor force unemployment rate (new employment opportunities may serve to lower a high unemployment rate). The presence/absence of faith-based organizations is not directly linked to changes in employment, population, the economy, government spending, or personal income (the major socioeconomic variables). Traditional social services are an important part of a community's comprehensive profile and character, but not a variable generally incorporated in determining an area's economic status.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 4.2-13****QUESTION:**

Provide information regarding dewatering discharge locations, any required ditches and retention ponds and associated permits, storm water outfalls, storm water treatment, and water bodies into which storm water will be discharged.

**Full Text (Supporting Information):**

Describe the dewatering discharge (e.g., quantity, frequency, and locations) for all ground and surface water including precipitation and storm water that would be collected in the excavation pit for Units 3 and 4. Provide details of any ditches and retention ponds needed for discharge from dewatering. Provide details of any required permitting for discharge from dewatering and when these permits will be obtained by STPNOC.

**RESPONSE:**

A dewatering plan is currently not available that would contain the information requested for the environmental report. An Engineering Evaluation Report which details the engineering aspects of the proposed dewatering project has been developed by the selected construction contractor. STPNOC would, in conjunction with the construction contractor, determine how best to proceed with construction activities and the development of site construction related plans. The final locations of any required ditches and/or retention ponds have, therefore, yet to be determined.

As discussed in RAI 4.2-3 Response, STPNOC in conjunction with the chosen construction contractor would develop the necessary Storm Water Pollution Prevention Plan and a Spill Prevention Plan for the proposed activities. STPNOC will apply for the necessary permits, including well permits for the necessary dewatering and groundwater monitoring systems as well as TPDES permits once a final construction plan has been developed and a determination made to where TPDES outfalls would be located.

The locations of site water bodies which have the potential to be used as outfalls under TPDES permit requirements for water from the dewatering activities are discussed in RAI 4.2-6. However, the primary option for the disposal of this water is for the water to be pumped to the Main Cooling Reservoir (MCR). A berm would be installed around the construction area for STP 3 & 4. A storm water retention basin would be located within the berm, between STP 3 & 4 and the MCR and west of the new circulating cooling lines. Storm water from this basin would also be pumped to the MCR. Pumping of the water to a sedimentation basin prior to it being pumped to the MCR could be necessary. No decision has been made as to the location of any potential site storm water or sedimentation basins other than the potential location within the bermed area.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 4.3.1-2****QUESTION:**

Provide information and figures describing the proposed locations of various construction project areas and activities and describe associated impacts to terrestrial resources.

**Full Text (Supporting Information):**

Discussions held at the site audit and subsequent conference calls indicated that there may be changes to the proposed locations of various construction activities and construction materials sites. For example, it is unclear whether the proposed activities at the locations given in the ER for the laydown yard and spoils piles (both from construction activities and dredging) will continue in the locations described in the ER. Provide information and figures describing the proposed locations of these areas if the planned locations have changed from ER Rev. 1, or if they have not changed, so indicate. In addition, provide information on the associated impacts from construction if the planned locations are different than stated in ER Rev. 1.

**RESPONSE:**

Most portions of this question were covered in the response for RAI # 4.3.2-4 which included ER changes in subsections 4.3.1.1, 4.3.1.1.1, and 4.3.1.2. Additional revisions in response to this RAI are included below.

Changes in the locations of various construction activities (spoil piles, laydown yards, buildings, etc.) have occurred since ER Rev.1. The map showing these construction activities (ER Figure 3.9S-1) will be revised. Text has been altered in Section 4.3.1 and is indicated below. No changes are necessary in 4.3.2.

**CANDIDATE COLA REVISION:****4.3.2.2 The Site and Vicinity**

Impacts of construction on land use are discussed in Subsection 4.1.1. Construction of STP 3 & 4, as discussed in Section 3.9S, will result in approximately ~~244770~~ acres being disturbed during the construction phase due to construction of new facilities and a new heavy haul road (see Figure 3.9S-1). Approximately 71 of these 244 acres are existing facilities and the MCR. Of the remaining 170 acres, approximately 74 acres are classified as maintained and disturbed areas (see habitat descriptions in Subsection 2.4.1). At the conclusion of the construction activity, any temporarily disturbed soil will be graded, landscaped to match the surrounding area, and revegetated (see Subsection 3.1.2). Clearing methods, disposal of construction waste, and methods for control of erosion, runoff, and siltation are discussed in Subsection 3.9S.2.

#### 4.3.2.2.1 Wetlands

Twenty wetlands throughout the STP site have been delineated and assessed relative to their jurisdictional status (see details in Subsection 2.4.1). The status of twelve of these wetlands within or near the construction footprint (including laydown and spoil areas) was assessed by ENSR in 2006/2007 (Reference 4.3-1). ENSR used U.S. Army Corps of Engineers 1987 wetland delineation criteria to classify the 12 sites, based on environmental parameters such as hydrology, soils, and vegetation, as well as history of land use. Given that the twelve wetlands were not directly connected to waters of the United States, and did not fall within the 100-year floodplain, there was no historic evidence that the wetlands existed before site construction, and that ENSR classified these wetlands as isolated, all wetlands were classified as non-jurisdictional. One of these wetlands (Wetland No. 001 – Reference 4.3-1), which is ~~0.165~~ 0.17 acre in size, is located in the ~~cooling tower~~ construction footprint and will have to be filled. This is less than 5% of the total wetland acreage (~~3.9 acres~~) within the construction footprint and temporary laydown and spoil areas. These remaining 11 sites are not within the construction footprint and will receive no direct or indirect impacts of construction. ~~will be avoided during the construction phase, thus limiting direct impacts~~ (see Figure 3.9S-1).

Several surface water and storm water drainage ditches are likely to be impacted and/or filled during construction. The east-west drainage ditch (Figure 2.4-3) in the power block footprint is approximately 10 to 20 feet wide, and approximately 4 to 5 feet deep, although the water is normally restricted to a more narrow channel (approximately 5 to 10 feet wide) approximately 1 to 2 feet deep. This ditch has several perpendicular ditches draining into it from the industrial land between the ditch and the berm. Portions of the ditch margins are mowed to the water level, other portions are vegetated with small shrubs (primarily sea myrtle) and semiaquatic grasses/rushes. This ditch will be relocated 650–700 feet north of its present position, just north of the new power block, and should impact only approximately 7 acres of scrub/shrub habitat and less than 0.5 acres of maintained/disturbed land.

Another man-made ditch within the construction area is Little Robbins Slough (Figure 2.4-1). Its upstream reaches are found near the proposed laydown areas ~~in the proposed borrow and spoils area~~, and it then flows south past the western edge of the Main Cooling Reservoir (MCR) toward the marsh. This slough was relocated to its present location during STP 1 & 2 construction in the late 1970s to replace the drainage function of the original slough that was filled to create the MCR (Reference 4.3-2). STP is committed to employing best construction management practices (see Subsection 3.9S.2) to reduce the amount of construction-area erosion and limit the sediment entering the site drainages, such as Little Robbins Slough, thus minimizing downstream sedimentation effects on flora and fauna. Aside from Little Robbins Slough, other storm water and surface water ditches created on historically upland habitat were routinely maintained and thus were not considered jurisdictional waters (Reference 4.3-1).

#### 4.3.2.3 Summary

In summary, construction will result in the loss of approximately 170 acres of some common habitats for local wildlife, including 88 acres of scrub-shrub, 74 acres of maintained and disturbed land, and 7 acres of mixed grass communities. However, although the impacts cannot be quantitatively assessed because population data for species on and near the STP site are not available. However, approximately 244 800 acres of the construction impacted areas (borrow and spoil, parking, etc.) will be available as wildlife habitat when construction is complete, and relatively similar open habitats will remain on site and are present offsite. Construction activities should not reduce local biodiversity or impact threatened or endangered species. Potential impacts of construction noise and bird collisions during construction should be negligible. Therefore, construction-related impacts to terrestrial resources are considered SMALL.

**Question Number: 4.4-3****QUESTION:**

Re-calculate wage impacts using more realistic wage rates.

**Full Text (Supporting Information):**

The construction wages for skilled nuclear construction workers are likely to be significantly higher than the existing average annual construction wage in Matagorda County. Revise impacts using more realistic rates and cite sources.

**RESPONSE:**

As described in Section 2.5.2.1 of the ER, STPNOC used the average annual wage of a construction worker in 2005 in Matagorda County of \$35,988 for calculation of impacts presented in Section 4.4 of the ER. The average annual pay in 2005 for a construction worker in Matagorda County was \$35,988 and \$40,640 in Brazoria County.

As noted in this RAI, construction wages for skilled nuclear construction workers are likely to be substantially higher than these values. To determine a more realistic value, STPNOC has identified the 2006 average annual wage for heavy and civil engineering construction worker in Matagorda County as \$43,639, and in Brazoria as \$53,746. To be conservative, STPNOC will use the weighted average annual wage of a heavy and civil engineering construction worker in the two counties (weighted based on the number of heavy and civil engineering construction workers in each county) of \$53,406 in its analysis.

**CANDIDATE COLA REVISION:**

Section 4.4.2.2.1 of the ER will be revised as follows:

The employment of up to 2975 movers over a 7- to 8-year period could have SMALL to LARGE economic impacts on the surrounding region. The creation of these jobs could inject between ~~\$67.6 and \$676~~ \$100.3 and \$1,003.3 million dollars into the regional economy during the life of the construction project, reduce unemployment by up to 20%, and create business opportunities for housing and service-related industries. However, after construction completion, a total of 50% of the movers would be expected to migrate back out of the 50-mile region. The estimated economic impact of this out-migration could be as high as ~~\$6,691,519~~ \$9,930,175 per month (during peak). These estimates are analyzed below.

Table 4.4-5 lists the estimated number of movers on site, by month, during construction. The number of movers is 50% of the total labor force on site per month. STPNOC obtained construction worker wage data for Matagorda and Brazoria Counties from the Department of the Interior's Bureau of Labor Statistics. In 2005, the average annual pay for a construction worker in Matagorda County was \$35,988, and, in Brazoria County, \$40,640 (Subsection 2.5.2.1). In

2006, the average annual for a heavy and civil engineering construction worker in Matagorda County was \$43,639, and in Brazoria \$53,746. To be conservative, STPNOC used the weighted average annual wage of a heavy and civil engineering construction worker in the two counties (weighted based on the number of heavy and civil engineering construction workers in each county) Matagorda County—\$35,988, \$53,406, in its analysis. In Table 4.4-5, the average annual wage was divided by 12 to calculate an average monthly wage of \$2,999 \$4,450. The monthly wage was multiplied by the number of movers each month and then summed to calculate total dollars earned by the movers.

A sensitivity analysis, as shown in Table 4.4-5, was performed to further assess the impacts of the mover wages on the region. Because of uncertainty surrounding the amount of mover wages that would be spent in the 50-mile region, STPNOC provided a table depicting the dollar impact on the 50-mile region by percentage of the wages spent within the region. Additionally, an earnings multiplier for the construction industry in the two-county region was applied to the wages. According to these calculations, the total economic impact of mover wages on the 50-mile region would be between \$67.6 million and \$676-\$100.3 and 1,003.3 million dollars over the life of the construction project. (Note: STPNOC acknowledges that, although this earnings multiplier is for the two-county region, it reasonably represents the balance of counties within the 50-mile radius.) At construction peak, wages would total \$8,922,025 \$13,240,233 dollars per month. Multiplying \$8,922,025 \$13,240,233 by the earnings multiplier (1.5) would generate a monthly economic impact during peak construction activity of \$13,383,038 \$19,860,350 (if 100% of the earnings were spent within the region). This would be considered a positive impact.

After construction is completed, approximately 50% of the movers would remain in the 50-mile radius and the remainder would migrate out. Assuming a 50% decrease in the mover labor force, there would be a corresponding decrease in the economic impact to the 50-mile region. A 50% decrease in the mover labor force would reduce the monthly economic impact to the region by up to \$6,691,519, \$9,930,175, half of the monthly economic impact of the mover labor force during peak construction (if 100% of the earnings were spent within the region) (Table 4.4-5). This would be considered a negative impact. However, Figure 3.10-1 indicates that the outmigration would occur gradually over a 2-year period. The gradual reduction in labor force would assist in mitigating the impact to the community from the destabilizing effects of a sudden decrease in households.

**Question Number: 4.4-14****QUESTION:**

Provide a copy of any studies of the socioeconomic impacts on Calhoun and Jackson Counties.

**Full Text (Supporting Information):**

The applicant has assumed that the construction and operations labor forces will be geographically distributed in the same percentages as the labor force for Units 1 & 2. This is perhaps a reasonable assumption, but has there been any assessment of what would happen if significant labor force numbers settled in Calhoun and Jackson Counties? These counties are both close by and have low populations. Provide a copy of any studies conducted on this topic.

**RESPONSE:**

Defining the ROI for a socioeconomic analysis is critical component of the socioeconomic analysis. All counties that lay within a fifty-mile radius of the proposed site are initially considered for inclusion in the ROI. Variables used to determine which counties are ultimately included in an ROI are based on the economic links to the host county.

In socioeconomics, the determination of a region of influence (ROI) for a nuclear power plant site is dependent on many factors, which can include, but are not necessarily limited to the following:

- The residential locations of the current South Texas Project (STP) operations workforce, which are as follows: 60.7 percent in Matagorda County, 22.4 percent in Brazoria County, 4.5 percent in Wharton County, 4.1 percent in Fort Bend County, 1.6 percent in Calhoun County, 1.3 percent in Jackson County, 1.2 percent in Victoria County, 0.8 percent in Harris County, and less than 0.1 percent in any other Texas county
- Population size and density of each county within 50 miles of the proposed site
- Identification of largest population center and its location within each county within 50 miles of the proposed site
- Population size of the largest population center (city or town) within those counties
- Estimated driving distances to the proposed plant site from the largest population centers
- Mean travel time to work (minutes) for each county
- Total employment for each county
- Construction employment for each county
- Worker commuting patterns from the counties within the 50-mile region to the county containing the proposed site

Once these types of variable are gathered and analyzed, the ROI is objectively defined. The potential socioeconomic impacts arising from a proposed project are than assumed to be largely confined to the identified ROI. Because such care goes into correctly defining the ROI, the impact analysis does not discuss impacts outside the ROI. Data used to determine the ROI is

public, from a common source, and available at a needed level of detail across the jurisdictions being considered for the ROI. The data source generally included the U S Census Bureau, the Bureau of Economic Analysis (BEA), and the Bureau of Labor States (BLS). Data from private and quasi-public/private sources (such as chambers of commerce and economic development foundations) are not used because the methodology used to gather their information varies widely.

The specific analysis and results for Jackson and Calhoun Counties is presented below. No studies were prepared, as a part of this Environmental Report, which discuss the potential socioeconomic impacts arising from the proposed project in either Calhoun or Jackson County.

### **Jackson County**

In 2000, Jackson County had a population of 14,391 and a density of 16.79 persons per square mile. The county's largest population center was Edna, with a 2000 population of 5,899. The estimated driving distance from Edna to STP is 50 miles. Jackson County's mean travel time to work is 23.6 minutes (Table 1).

In 2005, Jackson County's total employment was 7,823. Of that total, construction employment was 781 (10 percent) (Table 2).

In 2000, 5,967 Jackson County residents traveled to a workplace. Of those, 3,805 residents (63.8 percent) traveled to a workplace in Jackson County. One hundred and fifty-six Jackson County residents (2.6 percent) traveled to Matagorda County for employment (Table 3).

### *Conclusion*

In 2000, Jackson County provided Matagorda County with 156 workers, making it Matagorda County's fourth highest supplier of workers. However, 156 workers represent only 1.1 percent of the 13,828 workers employed in Matagorda County, and 1.1 percent of Jackson County's 2000 population of 14,391. Additionally, only 1.3 percent of the current South Texas Project operations workers reside in Jackson County. Therefore, Jackson County was not included in the socioeconomic ROI for the ER.

### **Calhoun County**

In 2000, Calhoun County had a population of 20,647 and a density of 20.01 persons per square mile. The county's largest population center was Port Lavaca, with a 2000 population of 12,035. The estimated driving distance from Port Lavaca to STP is 47 miles. Calhoun County's mean travel time to work is 19.6 minutes (Table 1).

In 2005, Calhoun County's total employment was 12,787. Of that total, construction employment was 1,854 (14.5 percent) (Table 2).

In 2000, 8,121 Calhoun County residents traveled to a workplace. Of those, 6,799 residents (83.7 percent) traveled to a workplace in Calhoun County. Eighty-six Calhoun County residents (1.1 percent) traveled to Matagorda County for employment (Table 3).

*Conclusion*

In 2000, Calhoun County provided Matagorda County with 86 workers, making it Matagorda County's sixth highest supplier of workers. However, 86 workers represent only 0.6 percent of the 13,828 workers employed in Matagorda County, and 0.4 percent of Calhoun County's 2000 population of 20,647. Additionally, only 1.6 percent of the current South Texas Project operations workers reside in Calhoun County. Therefore, Calhoun County was not included in the socioeconomic ROI for the STP ER.

**Table 1 - County Characteristics - Population, Income, and Commuting Time**

Texas County	FIPS	Population (2000) [1]	County Population Density (2000) [2]	County's Largest Population Center		Est. Driving Distance to STP [4]	Median HH Income (1999) [1]	Mean Travel Time to Work (Minutes) [1]
				Name [2]	Population [3]			
Calhoun	48057	20,647	20.01	Port Lavaca	12,035	47	35,849	19.6
Jackson	48239	14,391	16.79	Edna	5,899	50	35,254	23.6

**Table 2 - County Employment Characteristics**

Texas County	Total Employment (2005) [5]	County Construction Employment (2005) [5]	Construction Workers as % of Total Employment
Calhoun	12,787	1,854	14.5%
Jackson	7,823	781	10.0%

**Tables 1 and 3 Data Sources**

1 USBC 2000a

2 Texas Workforce Commission TBD

3 USBC 2000b

4 Mapquest 2007

5 BEA 2007

**Notes**

\*\*Calculated by Texas Workforce Commission, Labor Market Career Information Dept.

Values are based on employment diversification among industrial sectors and are presented as above average, average, or below average.

**Table 3 - Summary of Commuting Patterns for County of Residence and County of Employment**

WHERE RESIDENTS WORK ("Outflow")		
	Calhoun	Jackson
<b>Total resident workforce</b>	8,121	5,967
<b># Residents working within own County</b>	6,799	3,805
<b>% Residents working in own County</b>	83.7%	63.8%
<b># of Residents working in other county 1</b>	605	826
<b>% of Residents working in other county 1</b>	7.4%	13.8%
<b>Name of that county</b>	Victoria	Victoria
<b># of Residents working in other county 2</b>	339	698
<b>% of Residents working in other county 2</b>	4.2%	11.7%
<b>Name of that county</b>	Jackson	Calhoun
<b># of Residents working in Matagorda County</b>	86	156
<b>% of Residents working in Matagorda County as % of other county's resident workforce</b>	1.1%	2.6%

Source: USCB 2000

**REFERENCES:**

BEA (Bureau of Economic Analysis). 2007. "CA25 – Total full-time and part-time employment by NAICS industry." Available online at <http://www.bea.doc.gov/>. Accessed August 6, 2007.

Mapquest. 2007. "Mapquest." Available online at <http://www.mapquest.com/>. Accessed August 13, 2007.

Texas Workforce Commission. Undated. "County Narrative Profile." Available online at <http://socrates.cdr.state.tx.us/CNP/ASP/cnp.asp>. Accessed July 27, 2007.

USCB (U.S. Census Bureau). 2000a. "DP-1. Profile of General Demographic Characteristics: 2000." Available online at <http://factfinder.census.gov/>. Accessed August, 2007.

USCB (U.S. Census Bureau). 2000b. "Texas -- Place. GCT-PL. Race and Hispanic or Latino: 2000. Data Set: Census2000 Redistricting Data (Public Law 94-171) summary File." Available online at <http://www.factfinder.census.gov/>. Accessed August 15, 2007.

USCB (U.S. Census Bureau). 2000a. "County-to-County Worker Flow Files." Available online at <http://www.census.gov/population/www/cen2000/commuting.html>. Accessed August, 2007.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 5.3.1.2-3****QUESTION:**

What is the magnitude of impingement and entrainment of aquatic species at the RMPF for the species of fish currently found in the Colorado River compared to species present prior to 1993 when the diversion channel directed the river into East Matagorda Bay?

**Full Text (Supporting Information):**

Provide one year of impingement/entrainment results for the RMPF or justify why impingement/entrainment results for the RMPF are not necessary for assessing impacts of RMPF operation on the aquatic communities in the Colorado River.

Section 5.3.1.2.1 is based on impingement and entrainment of Colorado River species described in Section 2.4.2 that have not been evaluated since the river was changed by the construction of a diversion channel into East Matagorda Bay. Describe the species in the river traveling from the bay that may now be affected by impingement and entrainment at the RMPF. Describe seasonal differences in the species in the Colorado River that may be impinged or entrained at the RMPF.

Estimate susceptibility of species to be entrained in the MCR and provide bases for assumptions about species mortality upon entrainment as discussed in Section 5.3.1.2.2 Main Cooling Reservoir.

**RESPONSE:**

Aquatic communities of the lower Colorado River in the area of the STP site are dominated by both riverine (freshwater) and bay (estuarine) species. During periods of high river flow, freshwater organisms move downstream and estuarine species move into the bay. When river flows are low, estuarine conditions prevail near the STP site, and freshwater species are replaced by more salt-tolerant species from Matagorda Bay.

Dominant species reported in aquatic surveys near the STP site vary from one sampling period to the next, largely due to the influence of river flow on salinity. Species composition can change from estuarine-dominated to freshwater-dominated within a matter of hours, when heavy rain upriver creates a sudden increase in river flow and volume. Three separate studies provide historical data for this report: (1) the 1973-74 Environmental Report; (2) the 1975-76 Phase 1 I&E Monitoring Study; and (3) the 1984-85 Phase 2 I&E Monitoring Study.

To build on the historical data, and investigate conditions that prevail now that the Colorado River diversion structure has been in place for several years, STPNOC has just concluded a one-year sampling program of a 9-mile stretch of the lower Colorado River extending from the ICWW north to the FM 521 bridge, which is approximately 1.5 miles east of the STPEGS facility. Sampling for fish and invertebrates was conducted monthly from June 2007 to May 2008 using gill nets, hoop nets, trawls, and bag seines to collect fish and invertebrate species

within this 9-mile reach of the river (ENSR 2008). The river stretch was divided into three segments, each 3 miles in length. Segment A extended from the ICWW to NMM 3; Segment B extended from NMM 3 to NMM 6, and Segment C extended from NMM 6 to NMM 9. The STPEGS facilities included the RMPF located adjacent to NMM 8 and the blowdown structure located adjacent to NMM 6, both located in Segment C (ENSR 2008).

Biological and environmental data were used to characterize spatial and temporal patterns of species richness and diversity, relative abundance, and fish and macroinvertebrate size relationships. Species richness, diversity, and relative abundance were estimated by gear type for the entire study area as well as within each river reach. Unfortunately, a single species list was compiled for each 3-mile stretch of river, limiting the site-specific analysis of change in species composition since the 1985 sampling. The conclusions below are based on data for the 3-mile sampling area that includes the STP site.

The evidence, summarized below, suggests that plant operation has had no adverse effect on the aquatic community of the lower Colorado River. In fact, overall biodiversity is higher than during previous studies. The three previous studies are described at some length in Section 5.3.1.2.1 of the ER, and so results are not repeated here. Those studies covered various salinity and flow regimes, and provide a comprehensive framework within which the recent 12-month survey results can be interpreted. The long term effect of the Colorado River diversion on species distribution and abundance in the Lower Colorado River has not been directly studied. Monitoring of important species in Matagorda Bay near the mouth of the river before and after the diversion indicated that local populations of brown shrimp and Atlantic croaker declined during the three years following the diversion, but that abundances of blue crab and white shrimp were unchanged (Wilbur and Bass 1998, page 309). No surveys have focused strictly on the riverine component of these wider geographic distributions.

Estimates of overall species richness, diversity and evenness based on 2007-2008 data are higher than in either 1974 or 1984, suggesting increased diversity over the intervening period. The number and assortment of fish and invertebrate organisms collected during this study indicate that this portion of the lower Colorado River supports a diverse aquatic assemblage. The regular occurrence of both fresh and saltwater species, the range of macroinvertebrate and finfish, and the sheer number of species captured among various sampling gears and river reaches provide evidence of a healthy, dynamic ecosystem (ENSR 2008).

Temporal trends in salinity demonstrated seasonal lows during winter and highs during spring. Salinity readings at the surface were fairly stable ranging from 0.0 ppt to about 7 ppt, with the highest salinities occurring downstream, below NMM 2, and the lowest occurring above NMM 8 (the location of STP). Salinities at mid-water depths were the most variable of all three depths recorded. Bottom salinities were generally highest, ranging from 0.0 ppt to a high of 25 ppt, and declined toward upstream stations in nearly all months. Relationships between catch rate and DO or salinity were variable and did not show any strong trends; however, bag seine catch rates did appear to show a slight positive trend with salinity (ENSR 2008)

Important aquatic species in the vicinity of STP, including red drum and white shrimp, can tolerate low salinities, but preferentially seek out higher salinity waters when available. Red

drum juveniles and adults prefer salinities from 20 to 40 ppt. White shrimp juveniles prefer salinities less than 10 ppt, while adults are typically found offshore in waters with salinities greater than 27 ppt. Both of these species spawn in the Gulf of Mexico, and rear in the Matagorda Bay estuary (Patillo et al. 1997). Eggs and young larvae are not expected to occur at the site. Older larvae and juveniles may occur near the site in low numbers, but are expected to occur predominantly in the higher salinity vegetated backwaters that they prefer.

During the 12-month period ending in April, 2008, STPNOC conducted quarterly sampling of fish and macroinvertebrates in the Main Cooling Reservoir (MCR) using gill nets, trawls, beach seines, and plankton nets (ENSR 2008, page ES-1). Sampling yielded 25 species of fish and invertebrates, represented by more than 11,000 individuals (ENSR 2008, page ES-1). Dominant fish species include threadfin shad, inland and rough silversides, blue catfish, common carp, and Atlantic croaker (ENSR 2008, Table 3). Numerous large schools of both crevalle jack and red drum were observed in the reservoir during the study (ENSR 2008, page 4-1). Previous sampling by hook and line also yielded largemouth bass, which was not collected in this study. Plankton samples were comprised predominantly of mud crab larvae (*Rhithropanopeus harrissii*), as well as a small number of shad and goby larvae (ENSR 2008, page ES-1)

Extensive data from 1974, 1983-84, and 2007-08 show that impingement and entrainment at the RMPF intake are not of significant concern. The lower Colorado River experiences extreme perturbations in temperature, salinity, dissolved oxygen, and flow on a seasonal and annual basis. Species composition at the intake varies tremendously in response to these environmental parameters, as shown in the overall dataset encompassing the past 30 years. The reach of the river near the RMPF is not particularly notable as fish habitat – upstream areas offer superior freshwater habitat for those fishes that do not tolerate salt water, and downstream reaches provide a complex mesohaline habitat and connection to the Gulf of Mexico for those estuarine-dependent species that make up the majority of important species in the vicinity. The river near the STP site does not offer extensive submerged aquatic vegetation, oyster beds, or other topographic relief that enhances habitat value for fishes. Both the 1974 and the 1983-84 data show that ichthyoplankton are rare near the intake, and adults of important species are uncommon. In contrast, red drum, shrimp, and other important species are abundant at downstream, more estuarine stations.

Recent surveys show that species diversity and abundance in the lower Colorado River overall are higher today than in the 1970s or 1980s, which compels the conclusion that operations at STPEGS have not caused any substantive declines in important species due to either impingement or entrainment. The area sampled in 2007-08 represents both downstream estuarine and upstream freshwater habitats. No impacts to any important or typical species in this area can be documented. In fact, life history traits of the key species near the site make entrainment extremely unlikely – most larvae and post-larvae of red drum and white shrimp occur well downstream of the site. Entrainment studies will not shed any additional light on this subject, as the basic life history and ecology of these commercially valuable species are very well understood. The existing data leave very little question about the SMALL impact that the intake has had, and can be expected to continue to have, on important aquatic resources in the lower Colorado River.

**REFERENCES:**

ENSR Corporation. 2008. Aquatic Ecology - Colorado River Monitoring Report. Unit 3 and 4 Licensing Project. Final.

Patillo, M. E., T. E. Czapla, D. M. Nelson, and M. E. Monaco. 1997. *Distribution and Abundance of Fishes and Invertebrates in Gulf of Mexico Estuaries, Volume II: Species Life History Summaries*. ELMR Report No. 11, NOAA/NOS Strategic Assessments Division, 1997.

Wilbur, D. H. and R. Bass. 1998. "Effect of the Colorado River Diversion on Matagorda Bay Epifauna." *Estuarine, Coastal, and Shelf Science*, Volume 47(3):309-318.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 5.3.1.2-4****QUESTION:**

What is the impact of operation of the RMPF on managed species included in the Fisheries Management Plans for the Gulf of Mexico?

**Full Text (Supporting Information):**

Initial information on sampling the Colorado River in 2007 demonstrates that the species associated with essential fish habitat identified in the Fisheries Management Plans for the Gulf of Mexico are being found in the vicinity of the RMPF. What level of impact to those species (and their life stages) and their prey species is likely to be experienced in association with the RMPF? What characteristics of the essential fish habitat (e.g., river substrate) are likely to be impacted by operation of the RMPF?

**RESPONSE:**

The generic amendment of the Fishery Management Plans for the Gulf of Mexico prescribes and describes Essential Fish Habitat (EFH) for federally managed species, including shrimp, red drum, reef fish, and coastal migratory pelagic species. Habitats in the lower Colorado River estuarine system include estuarine water column, estuarine mud and sand bottoms (unvegetated estuarine benthic habitats), estuarine shell substrate (oyster reefs and shell substrate), estuarine emergent wetlands, and seagrasses. Managed species that are considered important with respect to this ER include brown shrimp, white shrimp, and red drum.

STPNOC recently concluded a one-year sampling program of a 9-mile stretch of the lower Colorado River extending from the Gulf Intracoastal Waterway north to the FM 521 bridge, which is approximately 1.5 miles east of the STP facility. Fish and invertebrates were sampled monthly from June 2007 to May 2008 (ENSR 2008). The evidence, summarized below, suggests that operation of STP has had no significant adverse effect on the aquatic community in general, or on managed species in particular. No elements of EFH appear to have been significantly affected by plant operation.

Aquatic communities of the lower Colorado River in the area of the STP site are dominated by both riverine (freshwater) and bay (estuarine) species. Dominant species reported in aquatic surveys near the STP site vary from one sampling period to the next, largely due to the influence of river flow on salinity. Species composition can change from estuarine-dominated to freshwater-dominated within a matter of hours, when heavy rain upriver creates a sudden increase in river flow and volume. During periods of high river flow, freshwater organisms move downstream and estuarine species move into the bay. When river flows are low, estuarine conditions prevail near STP, and freshwater species are replaced by more salt-tolerant species from Matagorda Bay.

Estimates of overall species richness, diversity and evenness based on 2007-2008 data are higher than in either 1974 or 1984, suggesting increased diversity over the intervening period. The number and assortment of fish and invertebrate organisms collected during this study indicate that this portion of the lower Colorado River supports a diverse aquatic assemblage. The regular occurrence of both fresh and saltwater species, the range of macroinvertebrate and finfish, and the sheer number of species captured among various sampling gears and river reaches provide evidence of a healthy, dynamic ecosystem (ENSR 2008).

Federally managed aquatic species in the vicinity of the STP site, including red drum, brown shrimp, and white shrimp, can tolerate low salinities, but preferentially seek higher salinity waters when available. Red drum juveniles and adults prefer salinities from 20 to 40 ppt. Juvenile brown shrimp prefer salinities of from 10 to 20 ppt. Adult brown shrimp are found in neritic waters where salinities range from 24 to 39 ppt. White shrimp juveniles prefer salinities less than 10 ppt, while adults are typically found offshore in waters with salinities greater than 27 ppt. These species spawn in the Gulf of Mexico, and rear in the Matagorda Bay estuary (Patillo et al. 1997). Eggs and young larvae are not expected to occur at the site. Older larvae and juveniles may occur near the site in low numbers, but are expected to occur predominantly in the vegetated backwaters that they prefer.

Extensive data from 1974, 1983-84, and 2007-08 show that impingement and entrainment at the Reservoir Makeup Pumping Facility (RMPPF) are not of significant concern. The lower Colorado River experiences extreme perturbations in temperature, salinity, dissolved oxygen, and flow on a seasonal and annual basis. Species composition at the RMPPF varies tremendously in response to these environmental parameters, as shown in the overall dataset encompassing the past 30 years. The reach of the river near the RMPPF is not particularly notable as estuarine fish habitat – downstream reaches provide a complex mesohaline habitat and connection to the Gulf of Mexico for those estuarine-dependent species that make up the majority of important species in the vicinity. The river near the STP site does not offer extensive submerged aquatic vegetation, oyster beds, or other topographic relief that enhances habitat value for estuarine fishes. Both the 1974 and the 1983-84 data show that ichthyoplankton are rare near the intake, and adults of important species are uncommon. Red drum, brown shrimp, and white shrimp occur throughout the tidal reaches of the river.

Recent surveys show that species diversity and abundance in the lower Colorado River overall are higher today than in the 1970s or 1980s, which compels the conclusion that operations at STP have not caused any substantive declines in important species due to either impingement or entrainment. The area sampled in 2007-08 represents both downstream estuarine and upstream freshwater habitats. In fact, life history traits of the managed species near the site make entrainment extremely unlikely – most larvae and post-larvae of red drum and penaeid shrimp occur well downstream of the site. The impact of the RMPPF on managed species, and the EFH that sustains them, has been shown to be SMALL during the period of operation. Additional impacts from the new units are likewise expected to be SMALL.

**REFERENCE:**

ENSR Corporation. 2008. Aquatic Ecology - Colorado River Monitoring Report. Unit 3 and 4  
Licensing Project. Draft.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 5.3.1.2-5**

**QUESTION:**

Please describe the proposed bank stabilization project and its impact on terrestrial and aquatic resources.

**Full Text (Supporting Information):**

At the STP site audit, NRC staff learned that there will be a bank stabilization project in the area of the discharge to prevent diffuser outlet boxes from falling into the river.

**RESPONSE:**

STPNOC has requested approval from the U.S. Army Corps of Engineers (USACE) to restore damaged revetment along 1,600 feet of shoreline on the west bank of the Colorado River, beginning at the Main Cooling Reservoir (MCR) spillway and extending down-river to the STP site property line. STPNOC has requested that this work be authorized under an amendment to the existing USACE permit or under Nationwide Permit No. 13 for bank stabilization activities. The revetment was installed in 1982 to prevent erosion of the river bank and ensure the structural integrity of the MCR discharge piping, valves/valve boxes, and the seven discharge pipes that extend into the river. Over the intervening 25-plus years, high river flows associated with floods have eroded and undercut the base of the revetment and damaged associated rigid matting.

STPNOC proposes to install an improved revetment to stabilize the riverbank and protect the discharge structure. Although some in-stream portions of the revetment/discharge structure have been affected to some degree by erosion, the diffuser (valve) boxes, which are higher on the (naturally-eroding) shoreline, have never been at risk of "falling into the river." The current project schedule calls for work to begin in 2009 and be completed in 2010. Impacts to terrestrial and aquatic resources are expected to be negligible. The bank stabilization project is a maintenance project associated with the operation of STP Units 1 and 2, and is unconnected to the proposed action, construction and operation of new units 3 and 4 at the STP site.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 5.3.2-1****QUESTION:**

Provide information on how aquatic resources may be impacted by discharges at outfall 001.

**Full Text (Supporting Information):**

The information provided in Sections 3 and 5 does not provide enough information to determine the water quality characteristics of the MCR and how these characteristics will be monitored to be in compliance with the discharge criteria in TCEQ permit # WQ0001908000. More information is needed in order to evaluate impacts to the aquatic resources in the Colorado River from discharges at outfall 001. The characteristics of the water being discharged from the MCR and the characteristics of the water in the Colorado River that is receiving the water from the MCR are needed to evaluate the discharge plume. This information is needed to evaluate the potential of the discharge plume to impede passage of aquatic resources in the river.

What are the temperature and water quality characteristics in the MCR at the discharge structure?

What are the flow and temperature conditions of the Colorado River when discharges from the MCR are likely to happen? Section 5.3.4 states that the blowdown will likely occur during high river flow periods during the winter and the spring.

What is the cross-section distance of the Colorado River at outfall 001? How far will the maximum temperature plume from the discharge at outfall 001 reach across the surface of the river? This calculation should be provided at the greatest temperature extremes of the discharge plume and the river water temperature and flow conditions.

**RESPONSE:**

Blowdown from the Main Cooling Reservoir (MCR) would be discharged to the Colorado River via TPDES Outfall 001, which is permitted to discharge "recirculated cooling water, cooling reservoir blowdown, previously monitored effluents, storm water, and makeup water from the Colorado River." The current TPDES permit requires continuous monitoring of Outfall 001 flow and temperature "when discharge occurs." The permit also contains limits for Total Residual Chlorine and pH at Outfall 001. Whole effluent biomonitoring, which takes into account the synergistic effects of effluent constituents and receiving stream water quality characteristics, is the most direct measure of potential toxicity to resident aquatic organisms. Biomonitoring of the effluent is required as a condition of the permit to assess potential toxicity.

Another ER RAI response (5.3.4-1) summarizes historical flow data from the USGS gaging station at Bay City and water temperature data from an LCRA water quality monitoring station at Selkirk Island, adjacent to the STP site as follows:

Mean flow over the 1948-2004 period at this gaging station was 2,628 cubic feet per second (cfs). Highest annual mean flow over this period was 14,270 cfs (1992); lowest annual mean flow was 375 cfs (1964). Flows in the vicinity of the STP site would be higher, owing to a larger watershed (drainage area).

Water temperatures at a Lower Colorado River Authority water quality monitoring station at Selkirk Island, adjacent to the STP site, ranged from 6.41°C (44°F) to 33.41°C (92°F) over the January 2000-November 2007 period (<http://waterquality.lcra.org/>).

If blowdown from the MCR to the Colorado River becomes necessary during four-unit operation, it would be discharged to the river through up to seven 3-foot diameter ports. These ports are spaced approximately 250-feet apart along the near river bank.

All seven ports could be valved open for the maximum blowdown flow of 308 cfs (44 cfs per port). The minimum river flow into which blowdown would be discharged is 8 times the blowdown flow, or 2464 cfs for the maximum blowdown flow.

Because the MCR has only been blown down once, during a system test in 1997, there is no available data on blowdown temperatures. MCR water temperatures from the cold side of the reservoir provide a reasonable surrogate, however, for the purpose of modeling blowdown temperatures. Monthly water temperatures (for 2003-2005 meteorology) in the MCR at the circulating water system intake ("CWS Intake") are given in ER Table 3.4-3. Grab-sample river temperatures during the same years are given in ER Table 2.3.3-1(a). Relating the river grab-sample temperatures to the concurrent monthly average blowdown temperatures (using MCR temperatures as a surrogate) yielded a maximum  $\Delta T_{\text{discharge}}$  (blowdown – ambient river) of 20.41°F ( $T_{\text{blowdown}} = 75.38^\circ\text{F}$ ,  $T_{\text{river}} = 54.97^\circ\text{F}$ ) in March 2003. ER subsection 5.2.3.1 discusses MCR water quality characteristics.

A typical river cross-section at the MCR discharge to the river (taken at the approximate middle of the seven-port system) has a surface width of 309 feet, with a cross-sectional area of 4760 ft<sup>2</sup>. The average river depth (cross-sectional area/ width) is 15.4 feet.

CORMIX, version 5.0 (reference: [www.cormix.info](http://www.cormix.info)) is the state of the art in hydrologic discharge plume modeling. CORMIX results for a single MCR blowdown port show that the discharge acts as a bottom-attached jet, which lifts off the bottom after about 50-feet and eventually impinges the surface after about another 50-feet with a small (approximately 7.5-foot) upstream intrusion wedge. The plume then undergoes buoyant spreading as it is transported downstream with the ambient river flow until it becomes laterally fully mixed (end of buoyant spreading region). Input/Output files from the model are included as Enclosure 2 on the attached CD.

The seven-port discharge system plume temperature excess (determined by superposition of the temperature distribution from each of the seven individual ports) of 5°F was found to lie in the laterally fully mixed portion of the plume (i.e., across the entire width of the river) at a

downstream distance of 5000 feet from the furthest upstream port (3,500 feet from the furthest downstream port). Although the plume is laterally fully mixed, the plume's buoyancy restricts the thermally impacted portion of the river to the upper 8.2 feet of the river's depth at this location; the temperature in the bottom 7.2 feet of the river, therefore, is not elevated above natural ambient temperatures. The discharge becomes fully mixed with the river (laterally and vertically) approximately 2.5 miles from the downstream end of the discharge system, where the fully mixed temperature excess is 2.3°F.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 5.3.4-1****QUESTION:**

What are the annual maximum and minimum flow rates and temperatures for the Colorado River in the vicinity of the blowdown structure on the Colorado River? What is the frequency planned for discharging at outfall 001?

**Full Text (Supporting Information):**

The description of the discharge from the MCR into the Colorado River in ER Sections 3.4.2.2, 5.3.2, and 5.3.4 includes information on the TPDES Permit No. WQ0001908000, but there is no information that relates the permit conditions to those at the discharge. Describe the process for evaluating the flows and temperatures of the Colorado River to the size of the thermal plume in support of the assessment that thermophilic microorganisms are not likely to be a risk to public health. Describe how often discharges will occur at outfall 001 and create an opportunity for thermophilic microorganisms to interact with the public.

**RESPONSE:**

The nearest USGS gaging station (and downstream-most gaging station on the Colorado River) is near Bay City, Texas, approximately 20 miles upriver from the STP site. Mean flow over the 1948-2004 period at this gaging station was 2,628 cubic feet per second (cfs). Highest annual mean flow over this period was 14,270 cfs (1992); lowest annual mean flow was 375 cfs (1964). Flows in the vicinity of the STP site would be higher, owing to a larger watershed (drainage area).

Water temperatures at a Lower Colorado River Authority (LCRA) water quality monitoring station at Selkirk Island, adjacent to the STP site, ranged from 6.41°C (44°F) to 33.41°C (92°F) over the January 2000 – November 2007 period (<http://waterquality.lcra.org/>).

CORMIX, an EPA-recommended model, was used to estimate the size of the thermal plume. The modeling assumed the maximum blowdown flow currently allowed by STPNOC's TPDES permit (and plant procedure), which is 308 cubic feet per second (cfs). Because the STPNOC TPDES permit stipulates that "...the discharge from the cooling pond shall not exceed 12.5% of the Colorado River flow", the CORMIX modeling assumed a river flow of 2,464 cfs. Input temperatures for the CORMIX modeling, which were taken from Table 2.3.3-1(a) of the Environmental Report, ranged from 6.41°C (44°F) to 33.41°C (92°F). As discussed in the previous paragraph, these data were from an LCRA monitoring station at Selkirk Island.

New Units 3 & 4 will share the Main Cooling Reservoir (MCR) with the two existing units. As discussed in a response to a related RAI (5.3.4-2), the current TPDES permit for STP 1 & 2 contains limits on daily average (95°F) and daily maximum (97°F) discharge temperatures, limits that are anticipated to be applied to the new units as they are based on state water quality standards. Thermophilic microorganisms grow at 55°C (131°F) and show optimal growth at 55-

65°C (131-140°F) (Sigeo 2005). Given that the maximum temperature of the discharge at Outfall 001 would be approximately 97°F, which is well below the temperature at which thermophilic microorganisms grow (131°F) and thrive (131-140°F), the potential for residents of streamside houses or recreational users of the Colorado River to be exposed to thermophilic pathogens appears to be remote.

As discussed in a response to related RAI 5.3.4-3, Mr. Jeff Taylor, Manager-Epidemiology and Disease Surveillance Unit, Texas Department of State Health Services, was contacted on 7/16/07 and asked about any outbreaks of disease related to thermophilic microorganisms, specifically *Naegleria*-caused primary amebic meningoencephalitis (PAM), in the vicinity of the STP site. Mr. Taylor reported that outbreaks are rare and that none have occurred in the last 10 years in the vicinity of the STP site.

The CDC issued a report in the Morbidity and Mortality Weekly Report (MMWR May 30, 2008) discussing an increase in PAM cases in 2007. Two cases occurred in Texas, resulting in the death of both individuals. Both cases were traced to a lake in central Texas and were not linked to the Colorado River.

In order to update the 7/16/2007 response, Mr. Taylor of the Texas Department of State Health Services was contacted again on 6/24/2008. He confirmed the two cases reported in the MMWR and stated that there have been less than 10 cases of PAM in Texas during the last ten years, including the two cases in 2007. For a large portion of the 1990s, Texas reported no cases. He also reconfirmed that there have been no reported cases in the vicinity of the STP site.

STPNOC has not blown down the MCR since 1997, when the discharge system was last tested. During four-unit operation, blowdown of the MCR will take place as often as is necessary to maintain suitable water quality in the reservoir, in accordance with the Water Delivery Plan, (Exhibit 1 to the amended and restated contract by and between the LCRA and STPNOC) which was transmitted to NRC on February 28, 2008 as Appendix 21 of ABR-AE-08000027.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 10.5S-1**

**QUESTION:**

Describe groundwater conservation and other mitigative measures as noted in Section 10.5S.1.2.

**Full Text (Supporting Information):**

Section 10.5S.1.2 of the ER states: "The maximum withdrawal rate required ... will be maintained below the withdrawal rate permitted by the CPGCD through water conservation or other mitigative measures." Describe the water conservation and other mitigative measures.

**RESPONSE:**

The STP Nuclear Operating Company (STPNOC) is permitted to appropriate waters of the State of Texas in the Colorado River Basin as provided for in a Certificate of Adjudication issued to STPNOC and the Lower Colorado River Authority (Reference 1).

The water conservation and other mitigation measures referred to in Section 10.5S.1.2 are described in a Water Conservation Plan that has been developed by STPNOC to meet the operating conditions established by the Certificate of Adjudication 14-5437 and associated permit requirements (Reference 2). Reference 1 was supplied to the NRC as Appendix 11 while Reference 2 was supplied to NRC as Appendix 15 of ABR-AE-08000027 dated February 28, 2008.

The water conservation plan addresses specific and general water conservation measures for all of the water usage processes at STP. Because the water supply may come from the Colorado River or from the groundwater supply system, the water conservation measures are applicable to water supplied by both surface water and groundwater supply systems.

**REFERENCES:**

1. Certificate of Adjudication, Number 14-5437, TWC (Texas Water Commission), June 28, 1989.
2. Water Conservation Plan, STP Nuclear Operating Company South Texas Project Electric Generating Station, Certificate of Adjudication 14-5437, Rev. 1, May 1, 2005.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 10.5S-2****QUESTION:**

Describe the analytical process used to determine cumulative impacts to downstream surface water users.

**Full Text (Supporting Information):**

Section 10.5S.2.2 of the ER states: “Compliance with these limits assures that the cumulative impacts on downstream users due withdrawal of water from the Colorado River to support 4-unit operation will be SMALL, not warrant mitigation, and not have a regional effect.” Describe the analytical process used to arrive at the conclusion that the cumulative impact on downstream water users will be SMALL. Impacts that may be SMALL still warrant consideration of mitigation; identify the mitigation measures that were not considered to be warranted based on an assessment of benefits.

**RESPONSE:**

STP is permitted to remove up to a maximum total of 102,000 acre-feet/year of water from the Colorado River based on the Certificate of Adjudication 14-5437 (Reference 1). STP is permitted to remove water at a rate of up to a maximum rate of 1,200 cfs from the Colorado River. However, STP is limited to withdrawing no more than 55% of the flows of the Colorado River in excess of 300 cfs base flow at the authorized diversion point on the Colorado River. As discussed in ER Section 5.2, this permitted withdrawal rate is sufficient to support the operation of all four STP units.

As stated in ER RAI Response 2.3-4, as of February 2008, there were no existing or pending permits to withdraw surface water from Colorado River Segment 1401 downstream of the Reservoir Makeup Pumping Facility (RMPF). As stated in ER Section 10.5S.2.2, the MCR has sufficient storage to allow flexibility in scheduling of diversions from the Colorado River, and that the combined operations of STP 1 & 2 and STP 3 & 4 will continue to comply with the existing limits on diversion of water from the river.

The water conservation and other mitigation measures are described in a Water Conservation Plan that has been developed by STP to meet the operating conditions established by the Certificate of Adjudication 14-5437 and associated permit requirements (Reference 2). Because the water supply may come from the Colorado River or from the groundwater supply system, the water conservation measures are applicable to water supplied by both surface water and groundwater supply systems. To aid in the mitigation of water usage at STP, the Water Conservation Plan addresses specific and general water conservation measures for all of the water usage processes at STP such as:

- Flush Valves: Automatic and manual flush valves have been installed to help maintain a minimum chlorine residual in the far reaches of the potable water systems while minimizing water use.
- Landscape Irrigation: Most of the area around the generating station is not watered. Limited watering is conducted at the east entrance and certain office buildings.
- Reuse of HVAC Condensate: Modifications were implemented to re-route the Mechanical Auxiliary Buildings and Fuel Handling Buildings HVAC condensate from sanitary waste to the Essential Cooling Pond.
- Re-use of Stormwater: The majority of the stormwater collected in the berms that provide secondary containment for oil bearing equipment is treated and discharged to the MCR for re-use.
- Rainwater Harvesting: Rainwater is collected in the 7,000 acre MCR and 47 acre Essential Cooling Pond for reuse. (Reference 2)

Because there are no surface water users on the Colorado River downstream of the STP diversion point; water will not be withdrawn when the river flow is below the specified minimum flow rate; and the MCR capacity provides flexibility in scheduling withdrawals from the river, it can be concluded that the cumulative impact to downstream users will be SMALL.

**REFERENCES:**

1. Certificate of Adjudication, Number 14-5437, TWC (Texas Water Commission), June 28, 1989.
3. Water Conservation Plan, STP Nuclear Operating Company South Texas Project Electric Generating Station, Certificate of Adjudication 14-5437, Rev. 1, May 1, 2005.

**CANDIDATE COLA REVISION:**

No COLA revision is required as a result of this response.

**Question Number: 10.5S-3****QUESTION:**

Limited Work Authorization for Nuclear Power Plants.

**FULL TEXT (supporting information):**

The ER provides evaluations of the cumulative impact of construction and preconstruction activities; however, the impacts of the construction and preconstruction activities need to be broken down or separated. As explained in the Interim Staff Guidance (ISG) dated March 31, 2008, the level of analysis necessary to estimate the breakdowns should be commensurate with the level of impact.

Simple analyses should be sufficient for most impact areas. These breakdowns are necessary to allow the NRC staff to properly assess the impacts of the construction activities—the activities for which NRC authorization is requested.

**RESPONSE:**

For the reasons discussed in Enclosure 2 to the letter dated May 8, 2008, from the Nuclear Energy Institute to NRC regarding *Industry Comments on NRC Interim Staff Guidance for Limited Work Authorizations*, there is no legal requirement under the National Environmental Policy Act or NRC regulations to separate the environmental impacts of construction and preconstruction activities, and it is permissible to provide a bounding analysis that addresses both impacts, as provided in Chapter 4 of the Environmental Report of the COL application. Nevertheless, to cooperate with the Interim Staff Guidance, we are providing a table for Chapter 4 that provides a separate discussion of construction and preconstruction activities. Table 4.6-1 presents the cumulative impacts attributable to the construction of STP 3 & 4. In addition to the cumulative impacts associated with the construction of two new units at the STP site, Table 4.6-2 presents a segregation of estimated “construction” and “preconstruction” environmental impacts. The “construction” impacts are those that are specifically attributable to the construction of structures, systems, and components (SSCs) that meet the criteria in 10 CFR 50.10(a)(1). All other construction activities can be considered to be either “preconstruction” or “other than construction” as defined in 10 CFR 50.10(a)(2). This RAI response does not address any additional impacts due to construction or any reevaluation of the existing discussion of impacts. For this reason, there are no revisions proposed to any COLA sections except for Section 4.6.

**CANDIDATE COLA REVISION:**

In order to delineate the percentage of impacts associated with construction and preconstruction activities, insert the following addition at the end of the second paragraph of ER Section 4.6:

Table 4.6-2 provides estimates of the construction and preconstruction related environmental impacts and a summary of the basis for the estimates. The estimated
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percentages of construction versus preconstruction related impacts presented in the table were based primarily on two criteria; first, the land area associated with the construction of structures, systems, and components (SSCs) and second, the labor hours associated with the construction of the SSCs. These criteria are named "Land Area Disturbance Basis" and "Labor Hours Basis".

The calculation of the estimated percentages was based upon an assessment of the differences for construction versus preconstruction impacts for each individual impact listed in the Table 4.6-2. These two criteria are defined as follows:

**Land Area Disturbance Basis:**

The STP site consists of approximately 12,220 acres, exclusive of off-site linear facilities (heavy haul road, water pipelines, electric transmission lines, and rail corridors) or other supporting facilities. Approximately 540 acres would be disturbed for long-term or short-term construction activities associated with the construction of STP Units 3 and 4 and their supporting facilities. Of these disturbed areas, approximately 210 acres will be developed for SSCs that meet the criteria in 10 CFR 50.10(a)(1), which will constitute "construction" activities. The area that will be developed for the construction of these SSCs therefore represents approximately 40 percent of the total area that will ultimately be disturbed. The estimated impact percentages based upon the land area disturbance were calculated based upon the specific type of impact and the relative impact for construction and preconstruction.

**Labor Hours Basis:**

Based on preliminary construction estimates for all phases of development of the STP site, the estimated labor hours associated with the construction of SSCs that meet the criteria in 10 CFR 50.10(a)(1) is approximately 90 percent of the total labor hours associated with the development of the entire STP site. The estimated impact percentages based upon the labor hours were calculated based upon the specific type of impact and the relative impact for construction and preconstruction.

Insert the following table, Table 4.6-2 after Table 4.6-1 in ER Section 4.6

Table 4.6-2 Summary of Construction and Preconstruction Impacts

IMPACT	DESCRIPTION OF POTENTIAL IMPACT	POTENTIAL IMPACT SIGNIFICANCE	ESTIMATED IMPACTS (%)		BASIS OF ESTIMATE
			CONSTRUCTION	PRECONSTRUCTION	
<b>4.1.1 The Site and Vicinity</b>	Ground-disturbing activities including excavating and recontouring the landscape.	S	50%	50%	Land Area Disturbance Basis (Based on Unit 3 construction leading Unit 4 by approx. 1 year)
	Removal of vegetation within the temporary and permanent impact areas.	S	25%	75%	Land Area Disturbance Basis (Based on Unit 3 construction leading Unit 4 by approx. 1 year)
	Stockpiling of soils on site including spoil mounds and borrow pit soils.	S	50%	50%	Land Area Disturbance Basis (Based on Unit 3 construction leading Unit 4 by approx. 1 year)
	Construction of new permanent structures and the creation of impervious surface within the existing STP site (i.e., the haul road and the parking area). The site is designated for industrial land use.	S	10%	90%	Land Area Disturbance Basis (Based on Unit 3 construction leading Unit 4 by approx. 1 year)
	Impacts to wetlands and other surface waters (e.g., removal of onsite drainage ditch).	S	5%	95%	Land Area Disturbance Basis All wetlands including manmade and non-jurisdictional wetlands have been identified and mapped. One non-jurisdictional wetland (Wetland No. 001) will have to be filled as a result of construction activities. Other non-jurisdictional wetlands are located in areas that have been designated as temporary laydown and spoil areas. In order to limit impacts, these sites will be avoided during the construction phase.
	Construction activities conducted within the Coastal Management Zone.	S-M	25%	75%	Land Area Disturbance Basis The STP property is located almost entirely within the coastal zone as defined by the Texas Coastal Management Program (CMP). For the plant areas located within the coastal zone, the basis of separation for the construction versus preconstruction impacts is best determined by using the land area disturbance basis. Mitigation measures for this impact are described in ER Section 4.1.1.1 and will be applied during preconstruction and construction activities.
	Construction activities (e.g., crossing of a pipeline, installation of discharge pipe, etc.) conducted within the designated flood zone and other sensitive areas.	S	25%	75%	Land Area Disturbance Basis (Based on Unit 3 construction leading Unit 4 by approx. 1 year)
	Potential short-term land use changes in the vicinity of the project due to development of employee housing.	S-M	50%	50%	Labor Hours Basis The basis for segregating this impact is the Labor Hours Basis, since the erection of temporary housing (see corresponding entry in Table 4.6-1) should roughly follow the addition of labor to the jobsite. Consideration was given to adjusting the Labor Hours Basis so as to acknowledge the need to erect housing prior to labor arrival; however, the erection period for temporary housing does not warrant such an adjustment. As noted in Table 4.6-1, the mitigation of this impact would be to convert the land to pre-project conditions upon completion of construction.
The increase in traffic during shift change and increased truck deliveries will impact traffic on existing roads during peak times.	S	80%	40%	Labor Hours Basis	
<b>4.1.2 Transmission Corridors and Offsite Areas</b>	Potential short-term physical land use changes due to the addition of a 345 kilovolt (kV) switchyard and rerouting of one 345 kV transmission line that is currently connected to Bay No. 1 of the existing switchyard for STP 1 and 2.	S	85%	15%	Land Area Disturbance Basis

Table 4.6-2 Summary of Construction and Presconstruction Impacts (Continued)

IMPACT	DESCRIPTION OF POTENTIAL IMPACT	POTENTIAL IMPACT SIGNIFICANCE	ESTIMATED IMPACTS (%)		BASIS OF ESTIMATE
			CONSTRUCTION	PRECONSTRUCTION	
<b>4.1.3 Historic Properties</b>	Ground-disturbing activities including grading, excavation, recontouring, and construction may expose historic resources. (NOTE: Based on SHPO determination, this is unlikely.)	S	25%	75%	The South Texas Project site has been surveyed and a determination of no adverse effect to historic properties was asserted and concurred with by the Texas Historical Commission (THC) on January 19, 2007. However, in the unlikely event that cultural resources are discovered during ground-disturbing activities for STP 3 & 4, specific actions would be undertaken by STPNCC as outlined in Addendum #5 to STP Procedure No. OPGP03-ZC-0025 (Unanticipated Discovery of Cultural Resources), which was forwarded to the NRC on June 9, 2008.  If any historical properties are discovered it will be during preconstruction activities such as land clearing, excavating, grading, installation of environmental mitigation measures, and/or construction of roads and laydown areas. Therefore, the impacts would occur only during preconstruction.
<b>4.2.1 Hydrologic Alterations</b>	Impacts to onsite surface water drainage flows by diverting or filling several unnamed onsite drainage features.	S	25%	75%	Land Area Disturbance Basis
	Increase in surface water as a result of dewatering and excavation activities.	S	10%	90%	Land Area Disturbance Basis
	Impacts to local hydrology resulting from the excavation through the shallow aquifer and subsequent dewatering of the shallow aquifer.	S	10%	90%	Land Area Disturbance Basis
<b>4.2.2 Water Use Impacts</b>	Potential for water pressure reduction within the local water table due to dewatering activities for dust abatement, concrete mixing, potable water use.	S	5%	95%	Land Area Disturbance Basis
<b>4.2.3 Water Quality Impacts</b>	Potential impacts on surface water quality from accidental release of fuel, oils, or other chemicals associated with construction activities into onsite wetlands and drainage features.	S	80%	20%	Land Area Disturbance Basis
	A potential impact to Little Robbins Slough, Kelly's Pond, and subsequently the Colorado River due to turbidity and sedimentation caused by soil erosion from ground disturbance.	S	20%	80%	Land Area Disturbance Basis
<b>4.3.1 Terrestrial Ecosystems</b>	Construction activities will result in habitat loss and will displace animals such as birds and mammals that currently inhabit the construction site. The mortality rate of less mobile animals may increase.	S	10%	90%	Land Area Disturbance Basis
	Filling of drainage areas and ditches may impact foraging and roosting habits of wetland-dependent species.	S	10%	90%	Land Area Disturbance Basis
	Impacts to biota from use of wetlands as laydown areas or spoil areas.	S	10%	90%	Other non-jurisdictional wetlands are located in areas that have been designated as temporary laydown and spoil areas. In order to limit impacts, these sites will be avoided during the construction phase.
	Potential impacts to local bird population from bird collisions with man-made structures (cranes, buildings) during construction.	S	10%	90%	Labor Hours Basis
	Wildlife may be startled or frightened away by construction noises.	S	10%	90%	Labor Hours Basis
	Potential disturbance to nesting birds caused by noise/movement during transmission line upgrades. The disturbance impacts will increase during the nesting season.	S	10%	90%	Labor Hours Basis

Table 4.6-2 Summary of Construction and Presconstruction Impacts (Continued)

IMPACT	DESCRIPTION OF POTENTIAL IMPACT	POTENTIAL IMPACT SIGNIFICANCE	ESTIMATED IMPACTS (%)		BASIS OF ESTIMATE
			CONSTRUCTION	PRECONSTRUCTION	
<b>4.3.2 Aquatic Ecosystems— Construction Impacts</b>	Potential impacts on aquatic ecology from accidental release of fuel, oils, or other chemicals associated with construction activities into onsite wetlands and drainage features.	S	10%	90%	Land Area Disturbance Basis
	Potential impacts to aquatic plants, benthic macroinvertebrates, and fish as a result of water turbidity and sedimentation caused by soil erosion from construction activities such as road construction, excavation, grading, temporary storage of soil piles, and use of heavy machinery.	S	10%	90%	Land Area Disturbance Basis
	Impacts to the benthic community resulting from suspended sediments from erosion of surface soil. Impacts may include blockage of light for photosynthesis, interference in respiration in invertebrates, smothering of eggs, and degradation of the quality of spawning grounds.	S	20%	80%	Land Area Disturbance Basis
	Impacts to fish populations due to the loss of invertebrates from suspended sediments.	S	20%	80%	Land Area Disturbance Basis
	Displacement of fish, aquatic species, crustaceans, and insects due to filling of drainage features on site.	S	10%	90%	Land Area Disturbance Basis
	Temporary decline in insect population from rerouting of onsite drainage features.	S	10%	90%	Land Area Disturbance Basis
<b>4.4.1 Physical Impacts</b>	Potential temporary impacts to construction workers, STP personnel, people living or working adjacent to the construction area, and transient populations caused by exposure to elevated noise levels.	S	50%	20%	Labor Hours Basis
	Potential temporary impacts to construction workers, STP personnel, people living or working adjacent to the construction area, and transient populations caused by fugitive dust and fine particulate matter emissions.	S	80%	20%	Labor Hours Basis
	Potential temporary impacts to construction workers, STP personnel, people living or working adjacent to the construction area, and transient populations caused by exhaust emissions.	S	50%	50%	Labor Hours Basis
	Degradation of roads in the vicinity of the project due to increased traffic and an increase in heavy, wide-bodied trucks and equipment.	S	50%	50%	Labor Hours Basis
<b>4.4.2 Social and Economic Impacts</b>	Increased traffic congestion in the vicinity of STP due to construction activities.	M-L	75%	25%	Labor Hours Basis The amount of traffic congestion will be directly proportional to the number of plant workers traveling on the local roads. The number of workers traveling the roads is directly related to the total labor hours worked. Therefore, the segregation of impacts between construction and preconstruction is best determined by comparing the total labor hours worked. Mitigation measures for this impact are described in ER Section 4.4.2.2.4.

Table 4.6-2 Summary of Construction and Preconstruction Impacts (Continued)

IMPACT	DESCRIPTION OF POTENTIAL IMPACT	POTENTIAL IMPACT SIGNIFICANCE	ESTIMATED IMPACTS (%)		BASIS OF ESTIMATE
			CONSTRUCTION	PRECONSTRUCTION	
	Potential short-term housing shortage in Matagorda County.	M-L	75%	25%	Labor Hours Basis (for workers relocating to area) The impact on housing in Matagorda County will depend on the number of workers that would relocate to the area and require housing. The basis of estimate for the impact on housing is best determined by using the estimate of the total number of workers that would relocate to the area and the percentage of those workers that will be engaged in construction and preconstruction tasks. The estimated number of relocating workers is contained in ER Section 4.4.2.2.6. Mitigation measures for this impact are described in ER Section 4.4.2.2.6.
	Water shortages in Matagorda County as a result of the in-migrating construction workforce.	M-L	75%	25%	Labor Hours Basis (for workers relocating to area) The impact on water shortages in Matagorda County will depend on the number of workers that would relocate to the area and require housing. The basis of estimate for the impact on water shortages is best determined by using the estimate of the total number of workers that would relocate to the area and the percentage of those workers that will be engaged in construction and preconstruction tasks. The estimated number of relocating workers is contained in ER Section 4.4.2.2.6. Mitigation measures for this impact are described in ER Section 4.4.2.2.7.
	Shortage of wastewater treatment plants in Matagorda County as a result of the in-migrating construction workforce.	M-L	75%	25%	Labor Hours Basis (for workers relocating to area) The impact on the shortage of wastewater treatment plants in Matagorda County will depend on the number of workers that would relocate to the area and require housing. The basis of estimate for the impact on the shortage of wastewater treatment plants is best determined by using the estimate of the total number of workers that would relocate to the area and the percentage of those workers that will be engaged in construction and preconstruction tasks. The estimated number of relocating workers is contained in ER Section 4.4.2.2.6. Mitigation measures for this impact are described in ER Section 4.4.2.2.7.
	Potential impacts to police and fire services in Matagorda County.	M	75%	25%	Labor Hours Basis (for workers relocating to area) The impact on police and fire services in Matagorda County will depend on the number of workers that would relocate to the area and require housing. The basis of estimate for the impact on police and fire services is best determined by using the estimate of the total number of workers that would relocate to the area and the percentage of those workers that will be engaged in construction and preconstruction tasks. The estimated number of relocating workers is contained in ER Section 4.4.2.2.6. Mitigation measures for this impact are described in ER Section 4.4.2.2.7.
	Potential impacts to medical services in Matagorda County.	S	75%	25%	Labor Hours Basis
	Potential impacts to social services in Matagorda County.	S	75%	25%	Labor Hours Basis
	Potential impact on the short-term ability of schools in Matagorda	M-L	75%	25%	Labor Hours Basis (for workers relocating to area)

Table 4.6-2 Summary of Construction and Presconstruction Impacts (Continued)

IMPACT	DESCRIPTION OF POTENTIAL IMPACT	POTENTIAL IMPACT SIGNIFICANCE	ESTIMATED IMPACTS (%)		BASIS OF ESTIMATE
			CONSTRUCTION	PRECONSTRUCTION	
	County to accommodate the increase in student population.				The impact on the short-term ability of schools in Matagorda County to accommodate the increase in student population will depend on the number of workers that would relocate to the area and require housing. The basis of estimate for the impact on the short-term ability of schools in Matagorda County to accommodate the increase in student population is best determined by using the estimate of the total number of workers that would relocate to the area and the percentage of those workers that will be engaged in construction and preconstruction tasks. The estimated number of relocating workers is contained in ER Section 4.4.2.2.6. Mitigation measures for this impact are described in ER Section 4.4.2.2.8.
<b>4.4.3 Environmental Justice</b>	Low-income rental housing rates could increase due to increased demand for housing, potentially displacing low-income renters in Matagorda County.	S	75%	25%	Labor Hours Basis
<b>4.5 Radiation Exposure to Construction Workers</b>	Construction workers may be exposed to radiation sources (through direct radiation, gaseous effluents, or liquid effluents) from the routine operations of STP 1 and 2.	S	75%	25%	Labor Hours Basis
<b>4.7S Non-Radiological Health Impacts</b>	Potential of construction accidents requiring first aid or medical treatment.	S	75%	25%	Labor Hours Basis

**Enclosures**

Enclosure 1 for RAI 02.04.01-01. Ecological Survey Report – Habitat Assessment. Unit 3 and 4 Licensing Project. South Texas Project Electric Generating Station, Wadsworth, Texas. June 2008.

Enclosure 2 for RAI 05.03.02-01. CD/DVD Containing data files in Folder entitled “Enclosure\_05.03.02-01”

Prepared for:  
STP Nuclear Operating Company  
Wadsworth, Texas



# **Ecological Survey Report –Habitat Assessment**

Unit 3 and 4 Licensing Project

South Texas Project Electric Generating Station,  
Wadsworth, Texas

ENSR Corporation  
June 2008

ENSR | AECOM

Prepared for:  
**STP Nuclear Operating Company**  
Wadsworth, Texas

# **Ecological Survey Report –Habitat Assessment**

Unit 3 and 4 Licensing Project

South Texas Project Electric Generating Station,  
Wadsworth, Texas



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Prepared By Kurtis K. Schlicht



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Reviewed By Robert D. Carpenter

ENSR Corporation  
June 2008

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# 1.0 Introduction

This report summarizes the results of ENSR's habitat assessment completed for STP Nuclear Operating Company's (STPNOC) proposed Unit 3 and 4 Combined Operating License (COL) application. The proposed Project is located at the South Texas Project Electric Generating Station (STPEGS) in Matagorda County, Texas, Figure 1. The scope of work included conducting an analysis of current and historic mapping and biological data using Geographic Information System (GIS) data sets and data collected during onsite wetland delineations surveys, threatened and endangered species surveys, and routine site visits. In addition to the habitat assessment, this report provides a summary of bird species and relative important species (RIS) associated with the documented habitats within the STPEGS property. Data in this report will be used to supplement information in the Environmental Report for the COL application.

## 1.1 Project and Site Description

STPNOC is currently proposing to license, construct, and operate two additional generating units (Units 3 and 4) at its STPEGS facility located on FM 521 approximately 8 miles west of Wadsworth, Texas. The STPEGS property currently consists of approximately 12,220 acres of land located adjacent to the Colorado River, Figure 1. The geographical and ecological region associated with the facility is referred to as the coastal plains, which historically was comprised of tall grass prairies, open grasslands, and bottomland habitat areas near creeks and rivers. The current setting and habitat of the region consists almost entirely of agricultural farmland, pastureland, and bottomlands. The plant property is currently occupied by approximately 7,346 acres of existing plant facilities which include an approximate 7,000-acre Main Cooling Reservoir (MCR), 300 acres for the existing Units 1 and 2 and associated buildings and warehouses, and 46 acres for the Essential Cooling Pond. The remaining property (approximately 4,874 acres) is comprised of undeveloped lands that include bottomland habitat, leased agriculture/pastureland, managed wetlands, scrub shrub and mix habitats. A detailed description of habitat areas is provided in Section 3 of this report.

The proposed construction of Units 3 and 4 will require the additional use of approximately 244 acres of land. Figure 2 provides an overview of the proposed project layout for each of the following components. The current project scope includes the following construction and operating activities for Units 3 and 4:

- Construction and operation of Units 3 and 4;
- Construction of a new switchyard;
- Clearing and maintenance of additional storage and materials laydown yards;
- Clearing and maintenance of a new heavy haul road;
- Construction of a radioactive waste storage building;
- Relocation and construction of the existing drainage ditch;
- Construction of a concrete batch plant;
- Clearing and maintenance of materials spoil area;
- Construction of a new Cooling Water Intake Structure (CWIS) and discharge system; and
- Clearing and maintenance of additional contractor and craft parking areas for the construction of Units 3 and 4.

## 2.0 Methods

The following section describes methods implemented by ENSR's biologists for completing the habitat assessment and summarization of bird species and relatively important species (RIS) at STPEGS. Data in this report were compiled using available GIS data, data collected during onsite wetland delineations, threatened and endangered species surveys, Christmas Bird Counts, and routine site visits from 2006 through 2008. GIS data sets were compiled using available data from the following sources:

- U.S. Geological Survey (USGS) 7.5-minute Topographic Quadrangle Maps;
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps;
- Aerial Photographs (1974 and 2004);
- Natural Resources Conservation Service (NRCS) Soil Surveys for Matagorda County, Texas; and
- Texas General Land Office (GLO) Land Use Classification Data.

GIS data were then incorporated into ArcGIS programs to create a geo-referenced base map for the property. Acreages were calculated by assigning GIS polygons to each of the different habitats by interpreting changes in vegetation and land use. These calculations are considered approximations or estimates of the acreage based on aerial coverage of each polygon. Identified features in the GIS data set were then field verified during routine site visits to document actual habitat types.

Field surveys were conducted in conjunction with the wetland delineations and threatened and endangered species surveys which occurred in December 2006, February 2007, and April 2008. Pedestrian surveys were performed by walking transects spaced 200 ft apart in areas where vegetative cover had distinct changes and 500 feet apart in areas where vegetation remained similar. Data from these surveys were compiled into individual reports and submitted to the Habitat Assessment Branch of the Texas Parks and Wildlife Department (TPWD) in March 2007 and then to the TPWD Resource Protection and U.S. Fish and Wildlife Service in December of 2007 (ENSR 2007). Habitats documented during these surveys were used to develop a habitat map for the STPNOC property, Figure 3. Upon completion of the habitat map, areas were further surveyed by ENSR, NRG biologists, and a biologist from the Natural Resource Conservation Service (NRCS) to verify vegetative communities within the construction areas of the project.

Data from the STP Section of the Audubon Society Mad Island Christmas Bird Counts, 1993-2007, were used for the bird evaluation. Data were summarized on an annual basis to determine yearly trends in species richness and relative abundance. Bird counts at the STPEGS facility were collected from multiple locations associated with each of the different habitats. Documented species were grouped based on their known habitat assemblages and then categorized according to those habitats documented at STPEGS to identify key areas associated with the project.

A qualitative assessment of wildlife species at the STPEGS facility was completed by documenting wildlife species during multiple field activities conducted from 2006 to 2007 (ENSR 2007). Emphasis was placed on documenting relative important species and their known habitats. Relative important species include those species that belong to any of the following groups:

- Those species listed as state or federal threatened and endangered species;
- Species proposed for listing as a threatened and endangered or is a candidate for listing;
- Commercially or recreationally valuable species;
- Species that are critical to the structure and function of local terrestrial ecosystems; and

- Species that may serve as biological indicators to monitor the effects of the proposed facilities on the terrestrial environment.

During the initial licensing phase for Units 1 and 2 (1974-1987) species considered as "important" included the whitetail deer, American alligator, bald eagle, and all waterfowl.

## 3.0 Results

The results of the habitat assessment for the proposed Unit 3 and 4 licensing project are presented in the following sections. Descriptions of habitat types and vegetation communities are discussed. Table 1 provides a summary of the habitat types, vegetation communities, and acreages for each identified community within the STPEGS facility and provides an overview of the habitats that will potentially be impacted by the project.

### 3.1 Habitat Descriptions

Fourteen habitats types were documented within the STPEGS property. Figure 3 illustrates the locations of each of the identified habitats and provides a summary of the potential habitat impacts. The documented habitat types include:

1. Main Cooling Reservoir (MCR);
2. Bottomland;
3. Scrub Shrub;
4. Maintained and disturbed areas;
5. Forested communities;
6. Forested/mixed pastureland/leased land;
7. Mixed grass communities;
8. Wetlands;
9. Existing facilities;
10. Unit 1 & 2 construction spoil area;
11. Essential Cooling Pond (ECP);
12. Reservoir levee system;
13. Dredge materials disposal area; and
14. Leased agricultural land.

#### Main Cooling Reservoir and Essential Cooling Pond

The MCR is an approximately 7,000-acre reservoir originally designed to provide closed cycle cooling for four generating units. Make-up water for the reservoir is pumped from the Reservoir Make-up Pumping Facility (RMPF) approximately 1 mile from the Colorado River to the MCR. The MCR is a perched system constructed of earthen levees covered by grasses on the outside slopes and sandcrete on the inside slopes. There are a series of levees inside the MCR which lengthen the flow path, providing extended circulation and cooling of the water. The MCR is designed to handle a capacity of 49 ft MSL; however, it is currently maintained at a water level of 47 ft MSL. Water depth in the MCR averages 25 ft with the exception of a few deep holes that reach 35 ft. These deep holes are associated with soil borrow areas used in the construction of the levees. Salinity in the reservoir remains constant at approximately 1.6 ppt. Fishery studies conducted on the MCR indicate that both freshwater species and saltwater species are present (ENSR MS). There is little to no natural habitat within the MCR and any areas considered habitat are confined to the steep levee shorelines and the areas associated with the cooling water intake structure.

The Essential Cooling Pond (ECP) is a 46-acre perched pond designed to supply water to cool crucial plant components. The pond is constructed of earthen levees covered by grasses on the outside slopes and sandcrete on the inside slopes providing a hard substrate surface. The ECP is considered openwater habitat and contains no natural structure. A fish study completed in 2002 indicated that the ECP supports a significant population of sheepshead minnows, mosquito fish, and sailfin mollies. No large aquatic organisms such as sunfishes or catfishes were documented.

The MCR and ECP consist of both external and internal levees that are constructed of earthen materials covered by sandcrete on the inside slopes and grasses on the outside slopes. The internal levees for both areas are covered entirely by sandcrete materials. The footprint of all the levees combined comprises approximately 759 acres. The grasses on the outside of the levees consist primarily of angleton bluestem, King Ranch bluestem, dallisgrass, Bermuda grass, and perennial rye grass. These are mowed on a routine basis and provide limited habitat to wildlife. The shoreline around the MCR and ECP provides roosting and nesting habitat for a variety of colonial shore birds.

#### Bottomland and Forested Habitats

Approximately 1,176 acres of bottomland forest habitat exists along the eastern boundary of the STPEGS property. This habitat borders the Colorado River and is comprised of a mixture of trees, shrubs, and grasses. The dominant tree species include sugarberry/hackberry, pecan, cottonwood, water oak, live oak, American elm, willow, and Chinese tallow. Shrub species include yaupon, Chinese privet, McCartney Rose, and American beautyberry. Grasses include woodoats, carpet grass, crab grass, broomsedge, and Bermuda grass. Vines include greenbriar, poison ivy, and southern dewberry.

Three important components of the STPEGS facility are located within the bottomland area. These include the RMPF, the dredge materials disposal area, and the spillway/blowdown area. The RMPF is located in the northern portion of the bottomland area and occupies approximately 6 acres. The dredge materials disposal area is a 133 acre area located just south of the RMPF. The area is used for the placement of dredged materials from the RMPF and barge slip. The spillway/blowdown area consists of an approximate 1 mile long, man-made canal that is designed to provide emergency release of water from the MCR to the river.

Additional forested communities are located on the east side of the property north of the heavy haul road and on the southeast section of the property between the MCR spillway and the Colorado River. The area north of the heavy haul road includes 53 acres of forested habitat that includes live oak, sugarberry/hackberry, and yaupon. This area surrounds Kelly Lake and extends north to FM 521. Just east of this section is approximately 91 acres of forested/mixed pastureland habitat that is currently leased for cattle grazing. Trees in this area are comprised predominantly of sugarberry/hackberry with a few live oaks mixed throughout. Grasses in this area include Bermuda grass, carpet grass, crabgrass, smut grass, dallisgrass, and paspalum spp. The forested area near the spillway is a component of the bottomland habitat and contains similar species as described in the bottomland habitat.

#### Scrub Shrub

Scrub shrub habitats dominate the western and northern portions of the property totaling 976 acres. The scrub shrub communities are comprised mostly of sea myrtle, goldenrod, ragweed, aster, southern dewberry, peppervine, sumpweed, and in some areas McCartney rose. Very few grass species are included in this habitat primarily due to the dense coverage of the shrub vegetation. Grasses that are present include broomsedge, bushy bluestem, paspalum spp., and bristle grass.

#### Mixed Grasses

Approximately 486 acres of the STPEGS property are comprised of predominantly mixed grass communities. These areas are located along the southern boundary of the MCR, north of the essential cooling pond (ECP), and two areas within the bottomland habitat. Grasses in all three areas are comprised predominately of angleton bluestem, King Ranch bluestem, bristle grass, brownseed paspalum, vasey grass, smut grass, and Bermuda grass. Part of the area north of the ECP includes several small disturbed areas with vegetation that includes goldenrod, aster, ragweed, and sumpweed.

## Wetlands

Wetland habitats located within the STPEGS property include Kelly Lake (34 acres), the managed wetlands area (110 acres), and delineated wetlands (11 acres). Kelly Lake is located on the northeast portion of the property and consists of open water areas surrounded by fringing wetland plants including cattails and arrowhead. The managed wetland area is located on the northern portion of the property along FM 521. This area was developed in a partnership between STPNOC and Ducks Unlimited and various other agencies to provide prairie wetland habitat for waterfowl and coastal wading birds. Delineated wetlands include 20 small wetlands located in various locations around the property. Sixteen of the wetlands are less than 0.5 acres in size while the other four wetlands range from 0.63 acres up to 3.78 acres in size. None of the identified wetlands are associated with or have a significant nexus to waters of the U.S. Dominant wetland vegetation associated with these wetlands includes: spikerush, cattail, water hyssop, knotgrass, bushy bluestem, sea myrtle, and rattlebox.

## Existing Facilities

Approximately 300 acres of the STPEGS property is associated with the existing plant facilities for Units 1 and 2. These facilities include the generating units, warehouses, storage yards, switchyard, intake structure, Nuclear Support Center (NSC) building and parking areas. Most of these areas are comprised of paved and crushed rock surface areas that have some mixed grasses growing sporadically throughout the area. An additional component of the existing facilities includes the 41 acre Unit 1 and 2 construction spoil area located on the west side of the property. This area was used during the initial construction phase for stockpiling soils. The area is not currently being used and has established vegetative cover that includes grasses such as angleton bluestem, bushy bluestem, dallisgrass, and broomsedge. Other species present in the construction spoil area include sea myrtle, sugarberry/hackberry, peppervine, and southern dewberry.

## Maintained and Disturbed Areas

Maintained and disturbed habitats are associated with portions of the STPEGS that were used initially in the construction of Units 1 and 2. These areas consist of approximately 468 acres of land that are routinely mowed and the vegetation layers are kept less than 6 inches in height. Species include a dallisgrass, brownseed paspalum, carpet grass, Bermuda grass, crabgrass, King Ranch bluestem, plantain, muhly grass, poa, broomsedge, bushy bluestem, angleton bluestem, sumpweed, and clover.

## Leased Agricultural Land

Approximately 536 acres of the STPEGS property is leased out for agricultural purposes. These lands are located north and west of FM 521 and are routinely used for growing cotton and soybean. Periodically the lands are changed from agricultural use over to cattle grazing. Habitat within these areas will vary during the year due to the type of crop and frequency of growth and planting. The areas will provide vegetative cover during growing season and open field habitat during the non-growing seasons.

## **3.2 Bird Data**

The annual Audubon Society Christmas Bird Count (CBC) is a volunteer effort conducted to take a census of birds across the western hemisphere. The Mad Island CBC is a single day event occurring between mid-December and early January, over a 15 mile area that includes Mad Island Marsh Preserve and also includes the STPEGS facility. CBC data for STP has been collected over a 15 year period from 1993 through 2007. Species richness during this time period has remained relatively stable averaging 122 species and ranging from a low of 60 species in 1993 and a high of 142 in 2006, Figure 4. The low in 1993 was followed by an increase to a 112 species in 1994 then followed by stable trend for the remainder of the survey years. Total number of birds surveyed varies significantly from year to year, Figure 5. The lowest total of birds counted was 1,274 in 1993 and the highest number of total birds was 8,630,645 in 2003. Number of individuals per species also varies significantly from year to year and ranges from 0 to as many as 700,000 for species such as the red-winged black bird and the brown-headed cowbird. Red-winged black birds and the brown-headed cowbirds comprise 47% and 46% of the overall total birds counted for the entire period, Figure 6. These two species also account for the greatest variation in total number of birds for each of the years counted. For

example, 0 brown-headed cowbirds were counted in 1999, 2000, and 2001, twelve were counted in 2002, and then a significant increase was documented in 2003, when a total count of 4,300,000 was recorded. A similar trend occurred for the red-winged blackbird, where low counts were recorded in 2000 at 1,950 birds, increasing to a high of 4,300,270 birds in 2003.

A total of 28 waterfowl species have been documented annually during the Mad Island CBC. Annual counts for waterfowl are highly variable with numbers ranging from a low of 442 birds in 1998 to a high of 19,906 in 2004, Figure 7. Snow geese demonstrated the greatest variability from year to for all the species documented. The Snow goose, Cackling goose, and the Greater White-fronted goose represent the dominant species for all years counted, Figure 8.

### **3.3 Habitat Use**

Relatively important species and birds species documented during the CBC were grouped based on their known habitat associations and observations of these species on the STPEGS property. Five habitat groups were designated including openwater, woodland, grasslands, shoreline, and scrub shrub. Table 2 provides a summary of those species found in each of the groups. Many species will be included in more than one group due to the overlap in habitat use. Openwater species include waterfowl such as ducks, geese, pelicans, and cormorants. Woodland species include those that commonly occur in habitats associated with forest communities such as the woodpeckers, flycatchers, vireos, bluejays, and wrens. Grasslands birds include those species that commonly occur in open grassland areas such as the bobwhite quail, dove, vultures, and many of the hawk species. Shoreline birds include species such as plovers, sandpipers, killdeer, stilts, terns, and egrets. Scrub shrub birds include the groove-billed ani and the pyrrhuloxia. Other common species listed from some of the other groups and associated with the scrub shrub include: the sparrows, wrens, dove, grackle, and cowbirds. The largest numbers of species are associated with woodlands and openwater habitats.

Relative important species evaluated during this assessment included those species previously identified during the initial licensing phase as well as those species considered to be commercially or recreationally important. Table 3 provides a summary of these species and their associated habitats. Species considered relative important species based on their threatened and endangered or listed status were addressed as part of the threatened and endangered species review and included in a separate report (ENSR 2007).

## 4.0 Summary and Conclusions

This document provides the results of ENSR's desktop review and field investigation for the proposed STPNOC licensing project located in Matagorda County, Texas. A total of fourteen habitat types comprising approximately 12,220 acres of land were identified and verified within the STPEGS property. The largest component of habitat consists of the 7,000-acre Main Cooling Reservoir which provides aquatic habitat for a variety of freshwater and saltwater species, as well as nesting and feeding habitat for waterfowl and shore birds. The 1,176 acres of bottomlands provides the most diverse habitat located within the plant property. This area supports a variety of wildlife including whitetail deer, wild hogs, squirrels, raccoons, song birds, and migratory birds. The scrub shrub habitat, maintained and disturbed areas, and the construction spoil area are considered low quality habitats. Vegetative communities present in each of these areas are comprised mostly of weeds or invasive species that have characteristically low food and habitat values due to their lack of seeds and fruits and thick spatial coverage. Approximately 34 acres of the MCR (including the levee system) and 87.5 acres of the scrub shrub habitat will be impacted, Figure 3.

The forested communities, forested/mixed pastureland, and mixed grass lands provide a moderate to high quality habitat. These areas provide suitable food and cover essential for sustaining wildlife populations. The forested and forested/mixed pastureland areas will not be impacted by the proposed project; however, approximately 7 acres of the mixed grass communities will be impacted.

Wetland communities within the STPEGS property are considered low to high quality habitats. The managed prairie wetlands and the Kelly Lake wetland are considered high quality wetlands based on the diversity of plant species present and the quantity of bird species and other wildlife that utilize the areas. The remaining wetlands are considered to be low quality wetlands based on the lack of plant species diversity, location of wetlands within the overall habitat setting, and lack of extensive wetland functions. In addition, these wetlands do not appear to support any aquatic life. One small palustrine wetland totaling 0.17 acres located near where Unit 3 will be located will be impacted by the project. The remaining 19 wetlands will not be impacted.

The Essential Cooling Pond provides low aquatic habitat value. There is no natural habitat cover in the pond and aquatic life is limited to a few species of small fish including sheepshead minnows, mosquitofish, and sailfin mollies. However, the hard substrate surrounding the pond does provide good roosting habitat for shoreline birds. No impacts to the ECP are proposed.

Habitats within the existing facilities and the maintained and disturbed areas are considered low quality based on the limited food and cover. Additionally, the daily operational activities and continued disturbances within these areas limits the amount of wildlife that are present. Some of the abandoned parking or storage areas covered with gravel do provide nesting habitats for bird species such as the killdeer and roosting habitats for other shore birds. Approximately 42 acres of the existing facilities and 73 acres of the maintained and disturbed areas will be impacted during construction of Units 3 and 4.

The leased agricultural lands provide a low quality habitat based on the overall use of the land. These lands are routinely altered, and depending on the type of crop, may only provide a resting area or temporary cover for wildlife. No impacts from construction or operation of Units 3 and 4 will occur to the leased agricultural lands.

Bird data from the Mad Island Christmas Bird Counts indicate that more than 140 species of birds totaling as many as 8.6 million individuals are documented in a given year at the STPEGS facility. These birds are associated primarily with five different habitats including openwater, woodlands, shoreline, scrub shrub, and grasslands. The largest numbers of birds are associated with woodlands and openwater habitats. There will be no impacts to the woodland habitat and a 29 acre impact to the openwater habitat. The impact to the openwater habitat will be associated with the construction and operation of the new Cooling Water Intake

Structure for Unit 3 and 4 that will also include an approximate 5 acre loss of shoreline habitat. The remaining impacts will be temporary disturbances associated with noise and moving equipment.

Relatively important species and their associated habitats will have minimal to no impacts associated with the construction or operation of Units 3 and 4. Of the seven habitats being impacted only the scrub shrub, MCR, and mixed grass communities support any of the RIS. Impacts to RIS will be through habitat loss and not from direct impacts. It is anticipated that displacement of these species into other areas of the STPEGS facility, as well as to adjacent properties, will occur resulting in minimal impacts to RIS.

STPNOC is proposing to license, construct, and operate two new electric generating units (Units 3 and 4) at the STPEGS facility. Construction of Units 3 and 4 and the associated plant features will impact seven of the fourteen identified types of habitats totaling approximately 244 acres. These habitats include existing facilities, maintained and disturbed areas, scrub shrub habitats, mixed grass communities, the MCR, wetlands, and the reservoir levee system (Other). All seven habitats are considered to be of low to moderate quality based on their value as a food source for wildlife, their dense vegetative cover prohibiting adequate space for wildlife movement, and vegetative cover only providing suitable nesting habitat for a small variety of bird species. Based on these facts, impacts to wildlife are anticipated to be small.

## 5.0 References

### 5.1 Reference Documents

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## Tables

**Table 1. - Habitat/Land Use Assemblages STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

<b>Habitat</b>	<b>Habitat Description*</b>	<b>Acreage (Approximate)</b>	<b>Area Of Impact (Acres)</b>	<b>Percentage of Impact**</b>	<b>Comment</b>
Bottomland	Forest communities comprised of sugarberry/hackberry, cottonwood, pecan, Chinese Tallow, yaupon, greenbriar, American beautyberry, Chasmanthium spp., Carex spp.	1,176	0	0	The bottomland area was set aside during the initial licensing of STP to preserve overall habitat. No impacts anticipated.
Units 1 & 2 Construction Spoil Area	Area covered mostly by grasses – Angleton bluestem, King Ranch bluestem, vaseygrass, and Johnson grass. Other vegetation includes baccharis, southern dewberry and peppervine.	41	0	0	Construction Spoil Area was used for spoil storage during the original construction of Units 1 & 2. No longer used.
Essential Cooling Pond (ECP)	Open freshwater pond. Concrete lined pond with no aquatic vegetation.	46	0	0	The ECP provides cooling water for crucial components for Units 1 and 2. No impacts anticipated.
Existing Facilities – Buildings, Units 1&2, Switchyard, NSC, Warehouses, old laydown yards	Most of these areas are significantly disturbed and/or maintained. Small areas of vegetation exist in isolated areas. These include a variety of grass species – Paspalum spp., Angleton bluestem, King Ranch bluestem, Bermuda grass as well as weeds including ragweed, sow thistle, goldenrod, and clovers.	300	42	14.0	Units 3&4 will be located in an area already disturbed by previous construction. Some additional modifications will be made to the existing infrastructure for new laydown, warehouses, parking etc.

**Table 1. - Habitat/Land Use Assemblages STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

Habitat	Habitat Description*	Acreage (Approximate)	Area Of Impact (Acres)	Percentage of Impact**	Comment
Forested Communities	This area is comprised of live oak, pecan, and mixed stands of sugarberry/hackberry. Scrub species includes mostly yaupon and privet.	53	0	0	Area is adjacent to the existing Kelly Lake. Area may be subject to temporary noise and dust from heavy equipment. No significant construction or operational impacts are anticipated.
Forested/Mixed Pastureland (leased lands)	This area is comprised of open grassland areas intermixed with forested communities. Grasses include: Paspalum spp., Bermuda grass, St. Augustine, rattail smutgrass, broomsedge, bushy bluestem, and Angleton bluestem. Forested species include sugarberry/hackberry, live oak, and yaupon.	91	0	0	Area is adjacent to the existing heavy haul road. Area may be subject to temporary noise and dust from heavy equipment. No significant construction or operational impacts are anticipated.
Leased Agricultural lands	Land is currently used for cattle pasture and various agricultural practices.	536	0	0	No plans to expand these areas. No impacts anticipated.
Main Cooling Reservoir (MCR)	Open water habitat. Average depth is 25 ft. Water is mostly fresh to brackish (salinity averages 1.6 ppt). No aquatic vegetation present.	7,000	29	0.4	The shoreline inside the reservoir provides nesting and feeding habitat for a variety of shore birds species. Water level in the MCR is designed for 49 ft MSL but is currently at 47 ft MSL.

**Table 1. - Habitat/Land Use Assemblages STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

Habitat	Habitat Description*	Acreage (Approximate)	Area Of Impact (Acres)	Percentage of Impact**	Comment
Maintained and Disturbed Areas	Most of these areas are significantly disturbed and/or maintained. Vegetation is comprised of grasses and weeds – Paspalum spp., Angleton bluestem, King Ranch bluestem, broomsedge, bushy bluestem, Poa, burclover, geranium, sow thistle, southern dewberry, ragweed spp.	468	74	16.0	Portions of these areas will be impacted by the construction of the new units, east laydown area, and crew and contractor parking areas.
Mixed Grass Communities	Areas are comprised of a variety of vegetation dominated by grasses – Paspalum spp., Angleton bluestem, King Ranch bluestem, broomsedge, and bushy bluestem. Other species include goldenrod, sumpweed, aster spp., and wild sunflower.	486	7	1.0	Areas are periodically mowed. The area south of the MCR will not be impacted. Areas north of the ECP will be used for a new spoil area.
Scrub Shrub Communities	Area is comprised of mostly Baccharis dominated shrub habitat. Southern dewberry and peppervine comprise a significant amount of cover below the shrub overstory. Additional species include golden rod, sump weed, and ragweed. Few grasses are present – broomsedge, bushy bluestem and Paspalum spp.	976	87	9.0	Portions of area will be impacted by relocation of the stormwater ditch, construction of heavy haul road, switch yard, and west laydown area.

**Table 1. - Habitat/Land Use Assemblages STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

Habitat	Habitat Description*	Acreage (Approximate)	Area Of Impact (Acres)	Percentage of Impact**	Comment
Wetlands	Wetland communities are broken down by 3 different areas – <ul style="list-style-type: none"> <li>• Kelly Lake (Stream/Pond dominated by cattails);</li> <li>• Managed Wetlands (prairie wetlands), and</li> <li>• Other (small isolated wetlands with mixed grasses, rushes and sedges).</li> </ul>	155 Total Acreage <ul style="list-style-type: none"> <li>• Kelly Lake – 34;</li> <li>• Managed Wetlands – 110;</li> <li>• Other – 11</li> </ul>	0.17	0.1	No construction or operational impacts will occur to Kelly Lake or Managed Wetlands. Approximately 0.17 acres of impact will occur to a wetland near where Units 3&4 will be constructed.
Other – Reservoir levee systems (MCR and ECP).	Levees are comprised of earthen materials covered by grasses on outside and sandcrete on the inside.	759	5	0.6	Small area of impact associated with the construction of the new CWIS which will be built on the central dike adjacent to the existing CWIS.
Dredge Materials Disposal Area	Area is located in the bottomland habitat along the Colorado River. Vegetation is comprised of mixed grasses (bushy bluestem and broomsedge), rattlebox, and stands of cattail.	133	0	0	Area is only utilized when maintenance dredging of the River Make-up Pumping Facility and/or barge slip takes place. STP has a USACE dredge maintenance permit for these activities.
<b>TOTALS</b>		12,220	244	(2.0)***	

\*Habitat descriptions are derived from on-site pedestrian surveys.

\*\* Percent Impacts are based on potential impacts for each habitat/land use type.

\*\*\*Value represents total percentage impact for entire property. Values representing individual percentage impacts in the table are not cumulative.

**Table 2. Summary of Bird Species by Habitat Type Associated with the Christmas Bird Counts at the STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

Habitat Type	Species
<b>Waterfowl</b>	Black-bellied Whistling-Duck Greater White-fronted Goose Snow Goose Ross' Goose Cackling Goose Canada Goose Wood Duck Gadwall Am. Wigeon Mallard Mottled Duck Blue-winged Teal Cinnamon Teal N. Shoveler N. Pintail Green-winged Teal Canvasback Redhead Ring-necked Duck Greater Scaup Lesser Scaup Surf Scoter Bufflehead Common Goldeneye Hooded Merganser Com. Merganser Red-breaster Merganser Ruddy Duck Common Loon Least Grebe Pied-billed Grebe Horned Grebe Eared Grebe Am. White Pelican Brown Pelican Neotropic Cormorant Double-crested Cormorant Anhinga Com. Moorhen Am. Coot

**Table 2. Continued.**

<u>Habitat Type</u>	<u>Species</u>
<b>Woodland</b>	Golden-fronted Woodpecker
	Red-bellied Woodpecker
	Yellow-bellied Sapsucker
	Ladder-backed Woodpecker
	Downy Woodpecker
	Hairy Woodpecker
	N. (Yel.-sh.) Flicker
	Pileated Woodpecker
	Am. Woodcock
	Least Flycatcher
	Traill's Flycatcher
	Empidonax, sp.
	E. Phoebe
	Vermilion Flycatcher
	Ash-throated Flycatcher
	Brown-crested Flycatcher
	Couch's Kingbird
	Thick-billed Kingbird
	W. Kingbird
	Loggerhead Shrike
	White-eyed Vireo
	Blue-headed Vireo
	Red-eyed Vireo
	Blue Jay
	Am. Crow
	Horned Lark
	Tree Swallow
	N. Rough-winged Swallow
	Cave Swallow
	Barn Swallow
	Carolina Chickadee
	Tufted Titmouse
	Red-breasted Nuthatch
	Brown Creeper
	Carolina Wren
	House Wren
	Winter Wren
	Sedge Wren
	Marsh Wren
	Golden-crowned Kinglet
	Ruby-crowned Kinglet
	Blue-gray Gnatcatcher
	E. Bluebird
	Hermit Thrush

**Table 2. Continued.**

Habitat Type	Species
<b>Woodland</b>	Wood Thrush
	Am. Robin
	N. Mockingbird
	Brown Thrasher
	Eur. Starling
	Am. Pipit
	Sprague's Pipit
	Cedar Waxwing
	Tennessee Warbler
	Orange-crowned Warbler
	N. parula
	Nashville Warbler
	Yellow-r. (Myrtle) Warbler
	Yellow-throated Warbler
	Pine Warbler
	Palm Warbler
	Black-and-White Warbler
	Ovenbird
	Com. Yellowthroat
	Wilson's Warbler
	Yellow-breasted Chat
	Summer Tanager
	Western Tanager
	Spotted Towhee
	Eastern Towhee
	Chipping Sparrow
	Field Sparrow
	Vesper Sparrow
	Lark Sparrow
	Savannah Sparrow
	Grasshopper Sparrow
	Le Conte's Sparrow
	Fox Sparrow
	Song Sparrow
	Lincoln's Sparrow
	Swamp Sparrow
	White-throated Sparrow
	White-crowned Sparrow
	Harris' Sparrow
	Dark-eyed Junco
	N. Cardinal
Pyrrhuloxia	
Indigo Bunting	
Painted Bunting	
Red-winged Blackbird	

**Table 2. Continued.**

<b>Habitat Type</b>	<b>Species</b>
<b>Woodland</b>	E. Meadowlark
	Yellow-headed Blackbird
	Brewer's Blackbird
	Com. Grackle
	Boat-tailed Grackle
	Great-tailed Grackle
	Bronzed Cowbird
	Brown-headed Cowbird
	Bullock's Oriole
	Baltimore Oriole
	Am. Goldfinch
	House Sparrow
<b>Grassland</b>	N. Bobwhite
	Rock Dove
	Eur. Collared Dove
	White-winged Dove
	Mourning Dove
	Inca Dove
	Com. Ground Dove
	Black Vulture
	Turkey Vulture
	Osprey
	White-tailed Kite
	Bald Eagle
	N. Harrier
	Sharp-shinned Hawk
	Cooper's Hawk
	Harris's Hawk
	Red-shouldered Hawk
	White-tailed Hawk
	Red-tailed Hawk
	Ferruginous Hawk
	Crested Caracara
	Am. Kestrel
Merlin	
Peregrine Falcon	

**Table 2. Continued.**

<b>Habitat Type</b>	<b>Species</b>
<b>Shoreline</b>	Black-bellied Plover
	Semipalmated Plover
	Piping Plover
	Killdeer
	Black-necked Stilt
	Greater Yellowlegs
	Lesser Yellowlegs
	Willet
	Spotted Sandpiper
	Ruddy Turnstone
	Sanderling
	W. Sandpiper
	Least Sandpiper
	Dunlin
	Stilt Sandpiper
	Short-billed Dowitcher
	Long-billed Dowitcher
	Laughing Gull
	Franklin's Gull
	Bonaparte's Gull
	Ring-billed Gull
	Herring Gull
	Gull-billed Tern
	Caspian Tern
	Royal Tern
	Com. Tern
	Forster's Tern
	Am. Bittern
	Least Bittern
	Great Blue Heron
	Great Egret
	Snowy Egret
	Little Blue Heron
	Tricolored Heron
	Reddish Egret
	Cattle Egret
	Green Heron
	Black-crowned Night-Heron
	Yellow-crowned Night-Heron
	White Ibis
	White-faced Ibis
Roseate Spoonbill	

**Table 2. Continued.**

<b>Habitat Type</b>	<b>Species</b>
<b>Shoreline</b>	Long-billed Curlew Wilson's Snipe King Rail Virginia Rail Sora Sandhill Crane
<b>Scrub Shrub*</b>	Groove-billed Ani Pyrrhuloxia

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\*Most species associated with the grasslands and many of the woodland species will be common to the scrub shrub habitat. Areas are determined based on known habitat use and observation during bird counts.

**Table 3. Summary of Relative Important Species and their associated habitats at STP Nuclear Operating Company's South Texas Project Electric Generating Station.**

<b>Wildlife Species</b>	<b>Habitat</b>	<b>Observed</b>
Whitetail deer	Mostly associated with the scrub shrub and woodland habitats. Common in the open grassland areas.	Observed on many occasions. Species is common throughout the property.
Bald eagle	Mostly associated with woodland habitats.	Observed infrequently over facility property and over the MCR. Two active nests were documented on the lower Colorado River more than 1 mile from the site.
American alligator	Mostly associated with large wetlands, drainages, ponds, rivers, and lakes.	Observed frequently in on-site wetlands (Kelly Lake) and drainages. Few numbers observed in the MCR.
Bobwhite quail	Mostly grassland habitats but common in scrub shrub habitat.	Observed infrequently.
Morning Dove	Mostly grassland habitats but common in scrub shrub habitat.	Observed on many occasions. Species is common throughout the property.
Waterfowl	Mostly associated with open water habitats such as the MCR, ECP, and lower Colorado River.	Observed frequently on the MCR and ECP. Common to the area as part of migratory flyway.
Rabbits (swamp rabbit, Eastern cottontail)	Mostly associated with grassland and scrub shrub habitat.	Observed infrequently during current field activities.
Squirrels (Eastern gray squirrel, Eastern fox squirrel)	Mostly associated with woodland habitats.	None observed during any of the current field activities.

## Figures



**Project Location Map  
South Texas Project Electric Generating Station  
Unit 3 and 4 Licensing Project**

**Matagorda County, Texas**

Image Source: Delorme

Scale: 1:500,000 (1" = 7.9 miles)

**STPNOC**

**ENSR | AECOM**

Figure 1

Project #: 10720-008



Site Layout Features
1) Units 3 and 4
2) East and West Laydown Areas
3) Switch Yard
4) Contractor and Craft Parking areas
5) Material Spoil Area
6) Heavy Haul Road
7) Radioactive Waste Storage Building
8) Concrete Batch Plant
9) Relocated Main Drainage Ditch



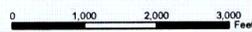
Legend
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<span style="border: 1px solid green; display: inline-block; width: 15px; height: 10px;"></span> Site Layout
<span style="border: 2px dashed yellow; display: inline-block; width: 15px; height: 10px;"></span> Site Property Boundary (12,220 ac)



**STP Nuclear Operating Company  
Habitat Assessment**

Matagorda County, Texas

Scale 1: 20,000



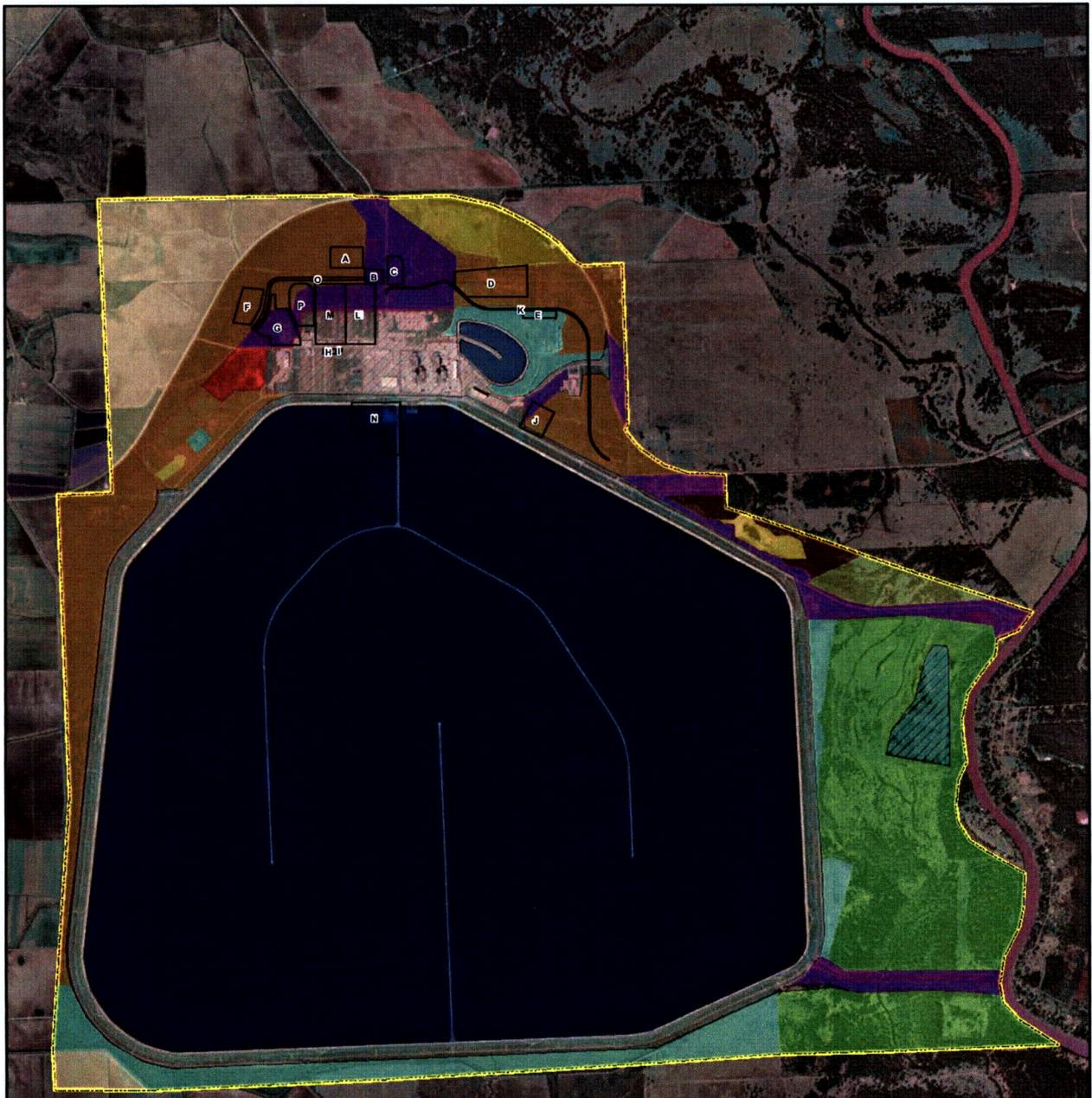
**STPNOC**

ENSR | AECOM

Figure 2

June 2008

Y:\Projects\Miscellaneous\10720-008\MXD\Figures\_1-4\_Site\_Plan\_Habibat\_11n\_x\_17m\Figure\_5\_Site\_Layout\_Features\_11n\_x\_17m.mxd



Habitat Impacts Table (Acreage Impacts)

Site	Existing Facilities	Main Cooling Reservoir	Maintained and Disturbed Areas	Mixed Grass Communities	Other	Scrub Shrub Communities	Wetland	Grand Total
A - Switch Yard						12.04		12.04
B - Craft Parking			4.41					4.41
C - Contractor Parking			7.99					7.99
D - Spoils Area			0.01			36.36		36.37
E - Concrete Batch Plant				4.26				4.26
F - West Laydown Area						13.6		13.6
G - East Laydown Area	1.01		18.6			1.44		21.05
H - Fab Shops	1.06							1.06
I - Comp Bldg	0.15							0.15
J - Radioactive Waste Storage Building	0.2		2.47		1.44	8.46		12.57
K - Haul Road			1.69	2.45	0.32	4.37		8.83
L - Unit 3	18.37		13.88			0.72		32.97
M - Unit 4	17.84		14.14			0.28		32.26
N - CWMS 2		29.23			3.23			32.46
O - Relocated Drainage Ditch			0.54			7.02		7.56
P - Additional Area	3.49		10.04			3.25	0.17	16.95
<b>Grand Total</b>	<b>42.12</b>	<b>29.23</b>	<b>73.77</b>	<b>6.71</b>	<b>4.99</b>	<b>87.54</b>	<b>0.17</b>	<b>244.53</b>



**Legend**

Impact Areas	Leased Agricultural Land (536 ac)
Bottomland Habitat (1178 ac)	Main Cooling Reservoir (7000 ac)
Units 1 & 2 Construction Spoil Area (41 ac)	Maintained and Disturbed Areas (468 ac)
Dredged Material Disposal Area (133 ac)	Mixed Grass Communities (486 ac)
Essential Cooling Pond (46 ac)	Other (762 ac)
Existing Facilities (300 ac)	Scrub Shrub Communities (976 ac)
Forested Communities (53 ac)	Wetlands (150 ac)
Forested/Mixed Pastureland/leased lands (91 ac)	Site Property Boundary (12,220 ac)

**STP Nuclear Operating Company  
Habitat Assessment**

Matagorda County, Texas

Scale 1: 20,000

0 2,000 4,000 6,000 Feet

**STPNOC**

ENSR | AECOM

Figure 3

June 2008

Y:\Projects\Miscellaneous\10\20-008\MKD\Figures\_1-4\_Site\_Plan\_Habitat\11n\_x\_17m\Figure\_3\_Habitat\_Impacts\_11n\_x\_17m.mxd

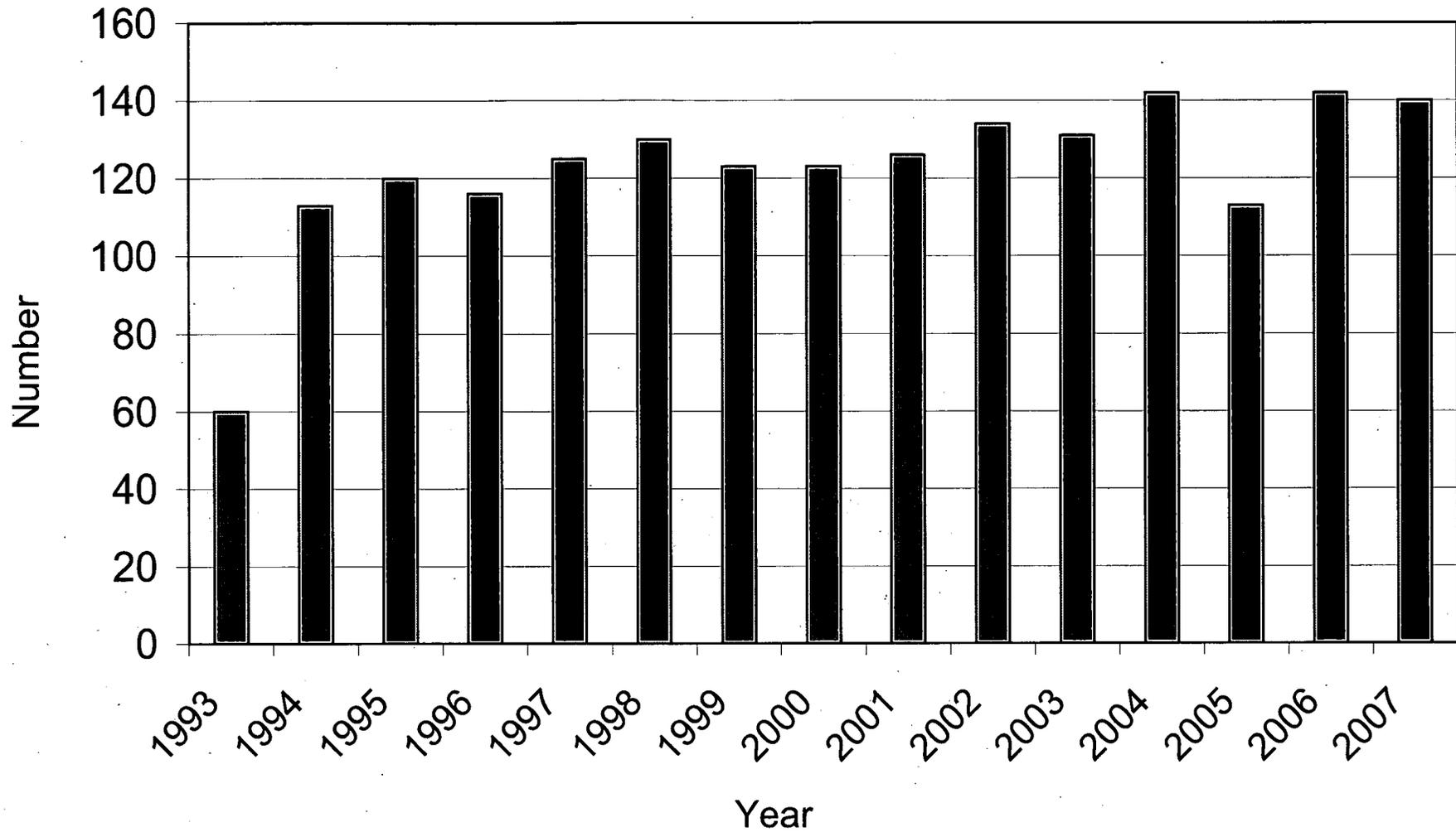


Figure 4. Total number of species documented annually in the STP Christmas Bird Count Surveys 1993 - 2007.

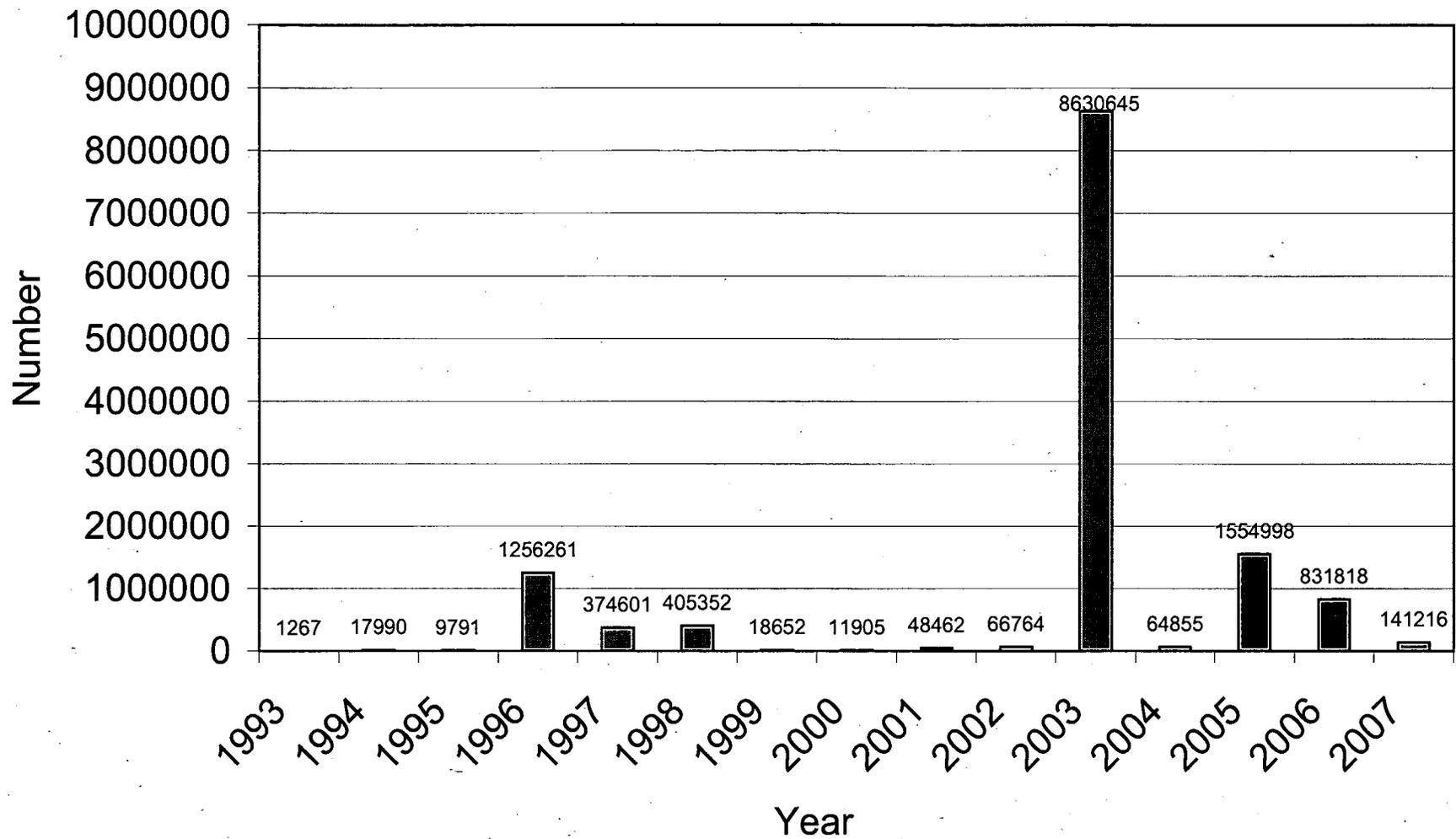


Figure 5. Total number of birds documented in the STP Christmas Bird Count Surveys 1993 - 2007.

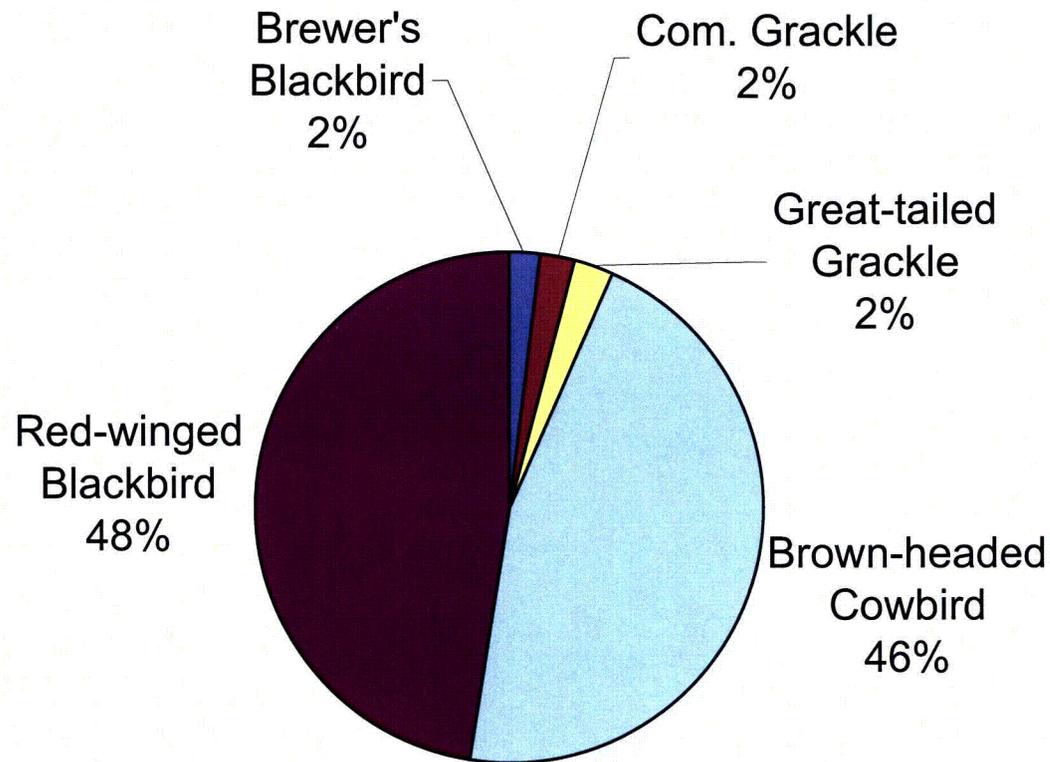


Figure 6. Percent composition of bird species comprising >1% in the STP Christmas Bird Count, 1993-2007.

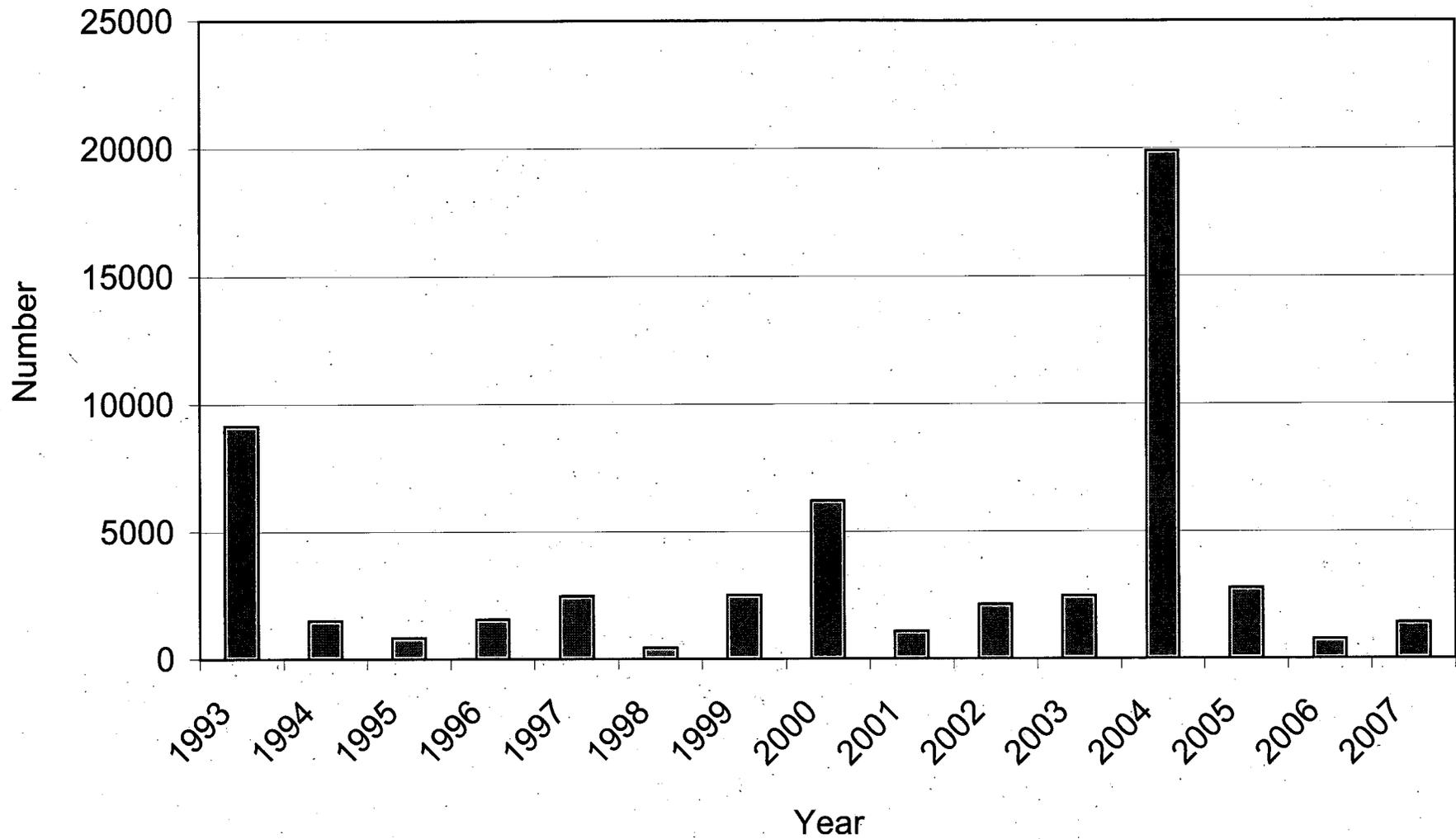


Figure 7. Total number of waterfowl documented in the STP Christmas Bird Count Surveys 1993 - 2007.

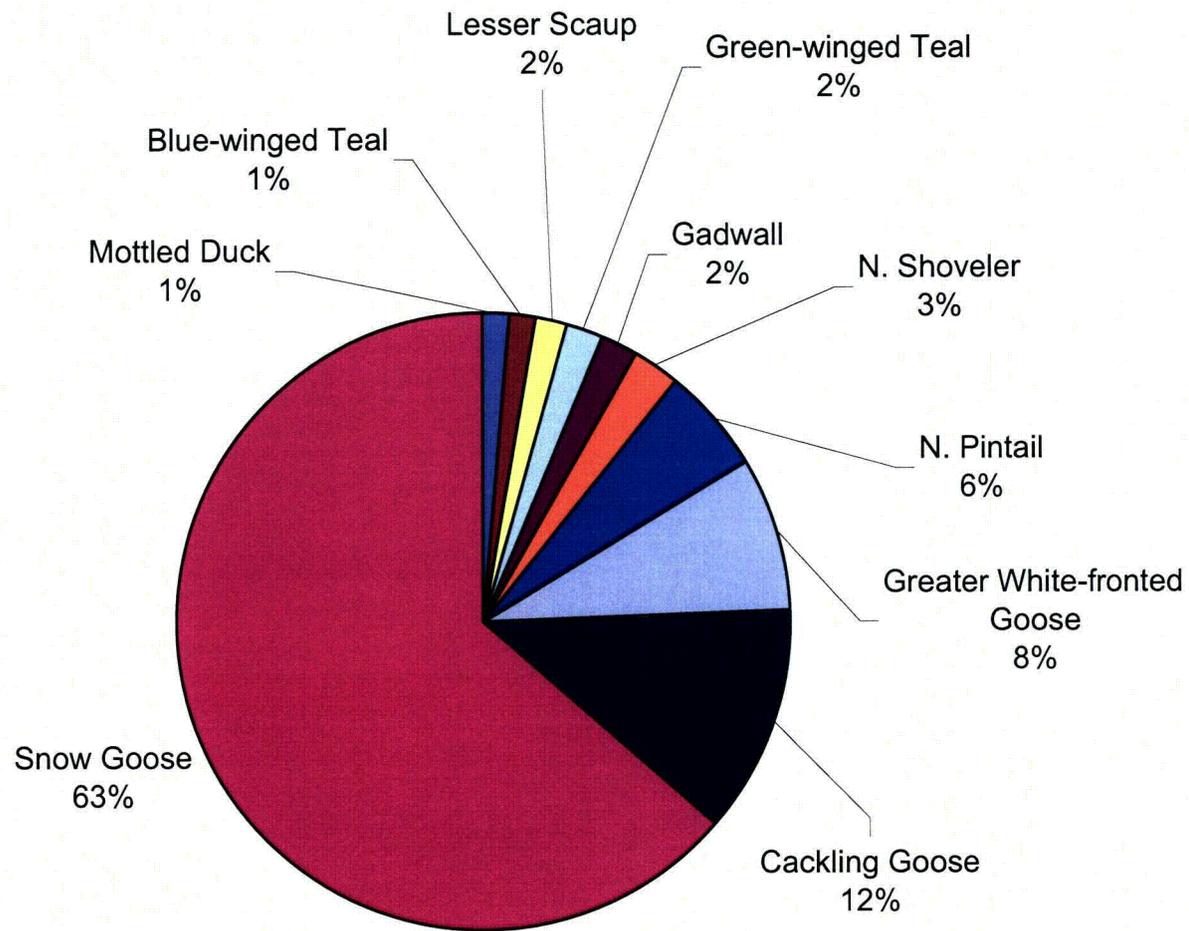


Figure 8. Percent composition of waterfowl species comprising > 1% in the STP Christmas Bird Count Surveys 1993 - 2007.