Department of the Army
Permit Number SAJ-1993-01395 (SP-JPF)

Attachment B

22. Upon reasonable notice to the permittee, Department authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with Department rules, regulations and conditions of the permits.

23. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the Department and the Florida Department of State, Division of Historical Resources.

24. The permittee shall immediately notify the Department in writing of any previously submitted information that is later discovered to be inaccurate.

SPECIFIC CONDITIONS:

1. SOVEREIGN SUBMERGED LANDS: The permittee is hereby advised that Florida law states: "No person shall commence any excavation, construction, or other activity involving the use of sovereign or other lands of the state, title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund or the Department of Environmental Protection under Chapter 253, F.S., until such person has received from the Board of Trustees of the Internal Improvement Trust Fund the required lease, license, easement, or other form of consent authorizing the proposed use." Pursuant to Chapter 18-4, F.A.C., if such work is done without consent, or if a person otherwise damages state land or products of state land, the Board of Trustees may levy administrative fines of up to $10,000 per offense. No sovereign submerged lands have been identified on the property.

2. HISTORICAL AND ARCHAEOLOGICAL ARTIFACTS: Pursuant to General Condition 23, if historical or archaeological artifacts are discovered within the project site the permittee shall immediately notify the Bureau of Historic Preservation, Division of Historical Resources, R. A. Gray Building, 500 S. Bronough St., Tallahassee, Florida 32399-0250; the permittee shall also notify the Bureau of Mining and Minerals Regulation, 2051 East Dirac Dr., Tallahassee, FL 32310.

3. FINANCIAL RESPONSIBILITY: Financial responsibility shall be provided by the applicant as follows:

    a. Prior to the initiation of mining operations, the final version of the financial responsibility mechanism for the mitigation costs shall be provided to and approved by the Department as required by rule 40D-4.301(1)(j), F.A.C., and

rule 62-330.200(3), F.A.C. **No work shall be initiated on any area authorized by this permit until the Department has approved, in writing, the executed final version of the financial responsibility mechanism.** The financial responsibility mechanism shall be equal to 110 percent (%) of the estimated mitigation costs for wetlands and other surface waters affected in the first three years of operation under the permit; and, for each year thereafter, the financial responsibility demonstration shall be updated, including to provide an amount equal to the 110 percent of the estimated mitigation costs for the next year of operations under the permit for which financial responsibility has not already been demonstrated. The amount shall be adjusted to reduce the financial responsibility for areas complete through revegetation to the amount covering the remaining monitoring and maintenance costs for that area. Financial responsibility amounts shall no longer be required for individual wetlands and other surface waters that have been released by the Department, as described in Specific Condition 26. Adjustments to the financial responsibility mechanism shall be submitted with the annual status report required in Specific Condition 8.

b. The mitigation cost per acre for the wetland types shall be adjusted annually for inflation by five (5) percent (%). Alternatively, the permittee may submit updated cost estimates, with supporting data. Adjustments shall be submitted with the annual status report required in Specific Condition 8.

c. In accordance with SWFWMD Basis of Review as adopted by the Department on August 2, 2006:

    a. The permittee must notify the Department by certified mail of the commencement of a voluntary or involuntary proceeding under Title XI (Bankruptcy), U.S. Code naming the permittee as debtor within 10 business days after the commencement of the proceeding.

    b. The permittee who fulfills the requirements of subsections 3.3.7 through 3.3.7.9 of the Basis of Review for SWFWMD as adopted by the Department in 2006, by obtaining a letter of credit or performance bond will be deemed to be without the required financial assurance in the event of bankruptcy, insolvency or suspension or revocation of the license or charter of the issuing institution. The permittee must reestablish in accordance with subsections 3.3.7 through 3.3.7.9 a financial responsibility mechanism within 60 days after such event.

    c. When transferring a permit in accordance with section 40D-4.351, F.A.C., the new owner or person with legal control shall submit documentation to

satisfy the financial responsibility requirements of subsections 3.3.7 through 3.3.7.9 of the Basis of Review for SWFWMD as adopted by the Department in 2006. The prior owner or person with legal control of the project shall continue the financial responsibility mechanism until the Department has approved the permit transfer and substitute financial responsibility mechanism.

4. CONSERVATION EASEMENT: The permittee shall provide a phased perpetual conservation easement to the Department on 3,799.6 acres, including approximately 2,884.0 acres within the South Pasture Extension Mine and approximately 915.6 acres within the South Pasture Mine (Figure EN-13). This 3,799.6 acres includes approximately 2010.2 acres of unmined lands (1,094.6 acres within the South Pasture Extension and 915.6 acres within the South Pasture Mine) within and adjacent to the 100 year floodplains of the Brushy Creek, Lettis Creek, Horse Creek, Payne Creek, Doe Branch, Hickey Branch, and several wetland and unnamed tributaries ("Immediate Protection Level 1" lands). Additionally, the conservation easement shall include 1789.4 acres of reclaimed lands within the South Pasture Extension ["1336.8 acres of Post-Reclamation Protection Level 1" lands and "452.6 acres of Post-Reclamation Protection Level 2" lands, as shown on Figure WHMP-9 and described on Table WHMP-3 in the attached "CF Industries South Pasture Extension Wildlife Habitat Management Plan" (Appendix 12)]. An Easement Documentation Report (baseline environmental inventory) shall be completed and executed in accordance with Section 7 of Appendix 12, for each Category of lands of the conservation easement concurrent with the execution and recording of each segment of the easement. An Easement Management Plan for all Immediate Protection Level 1, Post-Reclamation Protection Level 1, and Post-Reclamation Protection Level 2 lands shall be submitted by the permittee and approved by the Bureau of Mining and Minerals Regulation. For Immediate Protection Level 1 lands, the Instrument of Perpetual Conservation Easement and an accurate legal description as granted by the landowner shall be executed by the permittee in a format acceptable to the Bureau and submitted to the Department prior to the initiation of any disturbance or site preparation within the South Pasture Extension Mine. Within 90 days of execution by the Department, the permittee shall have the document recorded in the public records of Hardee County. For Post-Reclamation Protection Level 1 and 2 lands, an accurate legal description and amendment to the Perpetual Conservation Easement shall be executed by the permittee in a format approved by the Bureau and provided to the Department within one year from the date that the Department has released all lands within the South Pasture Extension Mine from all reclamation and mitigation requirements. Within 90 days of execution by the Department, the permittee shall have the document recorded in the public records of Hardee

County. The Perpetual Conservation Easement/Exhibits/Amendments, Easement Documentation Report shall be, and the Easement Management Plan is incorporated and made part of this permit document, notwithstanding their survival in record beyond the duration of permit life.

5. CONSERVATION EASEMENT SIGNAGE: All areas within the Immediate Protection Level 1 conservation easement shall be clearly identified in the field with appropriate signage prior to initiation of mining operations and shall remain so for the duration of mining operations in the permitted area. All areas within the Post-Reclamation Protection Level 1 and 2 lands shall be clearly identified in the field within 90 days of the Department's execution of the conservation easement document.

6. ENHANCEMENT: Prior to the commencement of mining operations at the South Pasture Extension Mine, the following enhancement activities shall be completed (deemed complete by the Department):

   a. The permittee shall provide ecological enhancement of the upland enhancement areas shown on Figure RP-4 in the attached "Reclamation Plan for the CF Industries, Inc. South Pasture Extension" (Appendix 7) by planting vegetation of the target post-reclamation land uses shown on Figure EN-15a, in accordance with the planting list for the target community type as indicated on Appendix 7 - Table RP-2. Enhancement activities in the upland areas shall also include control of nuisance and/or exotic species where necessary.

   b. The permittee shall provide ecological enhancement of the wetland enhancement areas shown on Appendix 7 - Figure RP-4 by installing a temporary ditch block at the southern boundary of Wetland 06W-20P, as shown on attached Figure EN-19. The ditch block crest shall be set at 100' NGVD and the block shall be designed consistent with the specifications described on Figure EN-20. The cattle pond in the southeastern portion of the wetland shall be backfilled to the extent allowed by the available adjacent spoil. The temporary ditch block shall remain in place until the final connection of reclaimed wetland R-07W-06-617 shown on Figure EN-16. The final connection of reclaimed wetland R-07W-06-617 shall include regrading of the ditch block to conform to the reclamation plan.

   c. In addition, the permittee shall perform ecological enhancement of Wetland 12W-40 by removing the impoundment along the western side of the wetland and using the material to backfill the cattle pond located immediately downstream to the greatest extent practical. The existing culvert shall also be

replaced with a culvert that does not impede the movement of fishes and other wildlife species from downstream areas to upstream areas. Upon completion, all disturbed areas in the enhancement area shall be stabilized and planted with native vegetation in accordance with the post-reclamation land use shown on Figure EN-15a.

d. Detailed plans including methods of ditch removal or fill placement, water quality protection, BMPs and planting plans shall be provided to the Bureau of Mining and Minerals Regulation for review and approval at least 60 days prior to the beginning of construction. Enhancement activities in the disturbed area shall also include control of nuisance and/or exotic species where necessary.

e. Enhancement activities shall be deemed complete by the Department once the work has been finished as described above, and all areas have been initially revegetated in accordance with the post-appropriate reclamation land use as shown on Figure EN-15a. Following a one-year establishment period after the completion of the enhancement activities the enhancement areas will be eligible for release in accordance with Specific Condition 26.

7. SAND TAILINGS: The permittee has provided a sand tailings production and utilization summary and a sand tailings backfill schedule on Tables BP-5, BP-6, and BP-10 in the attached "South Pasture Extension Life-Of-Mine Backfill Plan" (Appendix 5) for reserves mined and sand tailings backfill within the South Pasture and South Pasture Extension Mines. The sand tailings balance shall be assessed annually with regard to planned versus actual production quantities, and an updated sand tailings production and utilization summary and backfill schedule shall be submitted by the permittee on or before March 1 of each year following permit issuance. The mining, backfill, and reclamation schedules shown on Appendix 5 - Table BP-5 and Table CRP-3 shall also be updated annually and submitted with the annual status report required in Specific Condition 8. In the event that a sand tailings balance assessment identifies a potential sand tailings deficit that could affect an area exceeding 5% of the remaining sand tailings disposal acreage shown on Appendix 5 - Figure BP-9 (1-5), then the assessment shall also identify the specific sand tailings areas where the approved land surface elevations shown on Appendix 5 - Figure BP-10 (1-5) may not be able to be established, and describe all wetlands, streams, or other surface waters described on Table ERP-2, that could potentially be affected by a deficit in material. In the event such areas are identified, the permittee shall, within 90 days, submit a plan to the Department detailing actions that will be taken by the permittee to ensure that all required mitigation will be completed in a timely manner.

8. ANNUAL STATUS REPORTS: Annual narrative reports shall be submitted to the Bureau of Mining and Minerals Regulation in Tallahassee indicating the status of the project. These reports shall include the following information:

    a. Date permitted activity was begun or projected commencement date if work has not begun on-site;

    b. Brief description and extent of work (site preparation, mining operations, and restoration) completed since the previous report or since the permit was issued. Indicate on copies of the permit drawings those areas where work has been completed. This description shall include details on construction of isolation berms and recharge ditches adjacent to unmined wetlands, clearing, wetland severance, muck removal, storage and placement, and completed earthwork, and planting;

    c. Brief description and extent of work (site preparation, mining operations, and restoration) anticipated in the next year. Indicate on copies of the permit drawings those areas where it is anticipated that work will be done;

    d. The results of any pre-mining wildlife and endangered/threatened species surveys conducted during the year. Copies of any permits obtained and a description of activities taken to avoid or relocate these species shall also be provided; and

    e. The information required in Specific Conditions 3, 7, 10c, 14h, 16b, 25, 27a, and 27c.

The status reports shall be incorporated into the annual reclamation report required by Chapter 62C-16, F.A.C. The reports should include: a description of problems encountered and solutions undertaken and anticipated work for the following year. The annual report for the previous calendar year is due on or before March 1 of each year following permit issuance.

9. ANNUAL HYDROLOGY/WATER QUALITY/VEGETATIVE MONITORING REPORTS: Annual hydrology and water quality reports that include the information required in Specific Conditions 11, 14b, 14f, 14i, 22c, and in the Monitoring Required section of this permit shall be submitted to the Bureau of Mining and Minerals Regulation in Tallahassee. Vegetation statistical reports shall also be submitted to the Bureau of Mining and Minerals Regulation beginning one year after initial planting and in years two, three, five, and biennially thereafter until release. Reports are due upon completion or no later

than March 1 of the year following monitoring. Specific monitoring and reporting requirements are described in the Monitoring Required section of this permit. Each report shall include on the cover page, just below the title, the certification of the following statement by the individual who supervised preparation of the report: "This report represents a true, accurate, and representative description of the site conditions present at the time of monitoring."

10. SURFACE WATER QUALITY PROTECTION: Water quality in wetlands or other surface waters adjacent to and/or downstream from site preparation, mining operations, and reclamation activities shall be protected as follows:

    a. Prior to any clearing or mining operations, the areas to be disturbed shall be severed from adjacent wetlands and other surface waters. This severance includes the construction of an isolation berm and ditch adjacent to, but not within, the undisturbed wetlands and other surface waters. The areas to remain undisturbed, shown as "No Mine" on Figure EN-7, shall not be disturbed by mining operations except for activities authorized under this permit.

    b. Ditch, berm, and retention systems shall be designed and constructed prior to initiation of mining operations to manage or prevent discharge from a 25-year, 24-hour storm event. The SWFWMD Basis of Review (as adopted by the Department on August 2, 2006) shall be used to determine the design storm characteristics. Operation, maintenance and inspection of the berm, ditch and retention system shall be in accordance with the permittee's "South Pasture Extension Stormwater Pollution Prevention Plan" (Appendix 2) and the Department's "BMP's for Non-clay, Phosphate Mining and Reclamation Berms and Impoundments" (attached as Appendix 13).

    c. Prior to the use of any ditch and berm systems, the permittee shall have in its possession engineering design as-built drawings, signed and sealed by a Professional Engineer registered in the state of Florida, confirming that they have been constructed in accordance with the stormwater pollution prevention plans attached to this permit and in accordance with the design drawings. As-built drawings shall be submitted to the Bureau of Mining and Minerals Regulation, as they become available, or with the annual status reports required in Specific Condition 8.

    d. The top of the outside berm (including temporary roads) on all recharge ditches adjacent to areas not designated for mining operations (including preservation areas) shall be sloped such that they drain towards the recharge

ditch. The top of the outside berm shall be at an elevation that is sufficiently higher than the designed height of the interior berm between the recharge ditch and the mine-cut, as determined by a registered professional engineer, to ensure that overflow of the recharge ditch, if any, will be directed to the mine cut and not undisturbed areas.

e. The ditch and berm shall remain in place until mining operations and reclamation have been completed, all applicable monitoring indicates that no violations of State Water Quality Standards are expected to occur, and the Department has determined that the reclaimed wetlands are adequately stabilized and sufficiently acclimated to ambient hydrological conditions. The determination of when the ditch and berm may be removed shall be made by the Department, in writing, upon the written request of the permittee. This determination shall be based on a site inspection and water quality monitoring data (outlined in the Monitoring Requirements Section of this permit). At that time, the ditch and berm shall be restored to grade and revegetated to meet the land use(s) identified on Map EN-15a.

f. Best management practices or any other Department approved practices for turbidity and erosion control shall be implemented and maintained at all times to prevent siltation and turbid discharges. Methods shall include, but are not limited to, the use of staked filter cloth, silt-control polymers, sodding, seeding, mulching, and the deployment of turbidity screens around the immediate project site, as appropriate for each area. Except as otherwise specifically provided in this permit, in no case shall discharges result in an exceedance of State water quality standards pursuant to Chapter 62-302, F.A.C.

g. During all phases of ditch and berm construction and removal authorized by this permit, the permittee shall be responsible for ensuring that erosion control procedures are followed and that erosion and turbidity control devices are inspected and maintained daily and after each rainfall event >1/2 inch. Erosion and turbidity control devices shall also be inspected and maintained on a regular basis during all phases of mining operations and reclamation. Inspectors shall have completed stormwater erosion control training, shall receive annual training updates, and be familiar with all BMP plans. Records of inspections shall be maintained on site for a period of three (3) years and shall be available to Department staff upon request. Erosion control devices shall remain in place until all areas are sufficiently stabilized to prevent erosion, siltation, and turbid discharges. If the berm impounds water above the downstream toe of the outside berm, then the berm shall also be visually inspected daily to ensure its integrity and stability during the

period(s) that water is impounded by the berm. The ditch and berm shall be maintained so as to prevent breach of the berm or erosion sufficient to cause violations of state water quality standards for turbidity.

h. Notwithstanding General Condition 7, there shall be no discharges unless specifically authorized by this permit or the permittee's Industrial Wastewater Facility Permit.

11. SURFACE WATER AND GROUNDWATER QUALITY MONITORING: Water quality data shall be submitted to the Bureau of Mining and Minerals Regulation with the annual water quality reports required under Specific Condition 9. Data shall be collected as specified in Table MR-A, and as follows:

a. The following parameters shall be monitored monthly throughout mine life at surface water stations BCM-1, BCM-2, BCT-1, BCT-2, LCM-2, and LCT-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, (shown on Figure EN-11): Temperature, pH, Dissolved Oxygen (DO), Conductivity, Turbidity, Total Alkalinity, Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Phosphorus (TP), Ammonia, Ortho Phosphate, Total Nitrogen (TN), Total Kjeldahl Nitrogen (TKN), Nitrate/Nitrite, Fluoride, Sulfate, Total Organic Carbon (TOC), Biochemical Oxygen Demand (BOD), Chloride, and Chlorophyll-a.

b. The following parameters shall be monitored bimonthly throughout mine life at surface water stations BCM-1, BCM-2, BCT-1, BCT-2, LCM-2, and LCT-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, as shown on Figure EN-11: Color, Oil and Grease, Hardness, Aluminum, Selenium, Calcium, Magnesium, Arsenic, Cadmium, Chromium, Iron, Lead, Mercury, Nickel, Zinc, Gross Alpha, and Radium 226/228.

c. The following parameters shall be monitored quarterly throughout mine life in both the surficial and the intermediate aquifers at the property boundaries: pH, Temperature, DO, Conductivity, Turbidity, TDS, Total Alkalinity, Hardness, TP, Ortho Phosphate, Total Nitrogen, TKN, Nitrate/Nitrite, TSS, Fluoride, Sulfate, Chloride, Color, Oil and Grease, Aluminum, Selenium, Calcium, Magnesium, Arsenic, Cadmium, Chromium, Iron, Lead, Mercury, Nickel, Zinc, Gross Alpha, and Radium 226/228. At least one set of monitoring wells shall be monitored within each section of land along the property boundary within the South Pasture Extension Mine. The permittee shall submit proposed well locations and well screening depths to the Department for review and approval prior to the commencement of monitoring.

d. The following parameter shall be monitored daily during construction and removal of the Brushy Creek dragline/utility corridor at locations 50m upstream and 50m downstream of the construction area: Turbidity.

e. The following parameter shall be monitored daily during severance from or reconnection to any preserved or offsite wetland or other surface water at locations 50m upstream and 50m downstream of the construction area: Turbidity.

f. In all stream and mitigation wetlands designed to reconnect to preserved or off-site wetlands or other surface waters, the following parameters shall be monitored monthly from May to October for at least one year prior to reconnection: Turbidity, Temperature, DO, pH, Conductivity.

g. In all streams and mitigation wetlands, the following parameters shall be monitored monthly from May to October for at least one year prior to release request: Turbidity, Temperature, DO, pH, Conductivity.

12. EXCEEDANCES OF WATER QUALITY STANDARDS: The following measures shall be taken immediately by the permittee if turbidity levels within waters of the State on or adjacent to the project site exceed State Water Quality Standards established pursuant to Chapter 62-302, F.A.C.:

    a. Immediately cease all work contributing to the water quality violation;

    b. Stabilize all exposed soils contributing to the violation. Modify the work procedures that were responsible for the violation, and install more turbidity containment devices and repair any non-functioning turbidity containment devices;

    c. Notify the Bureau of Mining and Minerals Regulation in Tallahassee (phone (850) 488-8217; fax (850) 488-1254) and the Department's Homeland office (phone (863) 534-7077; fax (863) 534-7143 within 24 hours of the time the violation is first detected.

13. SPILL REPORTING: The permittee shall report all unauthorized releases or spills of untreated or treated wastewater or stormwater in excess of 1,000 gallons per incident, or where public health or the environment may be endangered, to the **State Warning Office Toll Free Number (800) 320-0519 and the Department's Bureau of Mining and Minerals Regulation** at each phone number listed below, as soon as practical, but no later than 24 hours from the time the permittee

becomes aware of the discharge. The permittee, to the extent known, shall provide the following information:

a. Name, address, and telephone number of person reporting.
b. Name, address, and telephone number of permittee or responsible person for the discharge.
c. Date and time of the discharge and status of discharge (ongoing or ceased).
d. Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater or stormwater).
e. Estimated amount of the discharge.
f. Location or address of the discharge.
g. Source and cause of the discharge.
h. Whether the discharge was contained on site and cleanup actions taken to date.
i. Description of area affected by the discharge, including name of water body affected, if any.
j. Other persons or agencies contacted.

For unauthorized releases or spills of 1,000 gallons or less, per incident, oral reports, or facsimiles when used in lieu thereof, shall be provided to the **Department's Bureau of Mining and Minerals Regulation** at all addresses listed below, within 24 hours from the time the permittee becomes aware of the discharge.

Phosphate Management
13051 N. Telecom Parkway
Temple Terrace, FL 33637-0926
Ph: 813/632-7600
Fax: 813/744-6457

Mandatory Phosphate Section
2051 E. Dirac Drive
Tallahassee, FL 32310-3760
Phone: (850) 488-8217
Fax: (850) 488-1254

Homeland Field Office
2001 Homeland Garfield Road
Bartow, FL 33830
Phone: (863) 534-7077
Fax: (863)534-7143

A written submission shall also be provided to the **Department's Bureau of Mining and Minerals Regulation** at all addresses listed above, within five (5) days of the time the permittee becomes aware of the unauthorized release or spill. The written submission shall contain: all of the information listed above, a description of the unauthorized discharge and its cause; the period of the unauthorized discharge including exact dates and time, and if the unauthorized discharge has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the unauthorized discharge.

14. WATER QUANTITY PROTECTION: Water levels and flows in wetlands and other surface waters adjacent to and downstream from site preparation, mining operations, and reclamation activities shall be protected as follows:

    a. **Environmental Management Plan:** At least four years prior to the initiation of mining operations within the South Pasture Extension Mine, the permittee shall develop and implement an Environmental Management Plan (EMP) for the South Pasture Extension Mine. This EMP shall be based on the currently approved EMP (attached as Appendix 14) that was submitted in accordance with the requirements of Special Condition 22 of Water Use Permit (WUP) No. 200003669.010 for the South Pasture Mine. Upon incorporation of the South Pasture Extension Mine into a WUP approved by the Southwest Florida Water Management District (SWFWMD), the permittee may satisfy the reporting requirements described in parts 14b and 14f (below) by providing the Department copies of hydrologic reports submitted to the SWFWMD in accordance with the WUP, provided the frequency and precision of monitoring and the quality of information in the monitoring reports are not decreased from the requirements specified below.

    b. **Long-Term Monitoring:** The permittee shall install a piezometer network along the property boundary and along the boundaries of wetlands within preserved areas. At least one piezometer shall be installed every 1,000 feet. In some cases, piezometers and/or staff gauges may be installed in the interior of wetlands. Data-logging transducers may be installed in piezometers at the option of the permittee. A minimum of four years of background data for each piezometer in the network shall be collected prior to the initiation of mining operations within the South Pasture Extension Mine. The location and piezometer construction details (height, depth, diameter, and screened interval) shall be submitted to the Department upon completion of installation. Piezometer and staff gauge data shall be obtained and recorded to the nearest hundredth of a foot. All water level data shall be reported in the National Geodetic Vertical Datum (NGVD). The minimum recording frequency for all piezometers and staff gauges across the mine shall be monthly. Rainfall recording gauges shall be installed in at least two representative locations across the mine site. Rainfall data shall be reported along with the groundwater elevations to facilitate comparisons of water levels to trends in rainfall. Water level data shall be submitted with the Annual Hydrology Report required in Specific Condition 9.

    Once surficial aquifer dewatering activities encroach to within a 1,800-foot Hydrologic Impact Distance (HID) of any piezometer or staff gauge,

monitoring shall be conducted weekly, at minimum. If the permittee opts to use continuous recording devices, the data shall be reported as weekly averages. More detailed data may be used in analyses, if necessary. Water level monitoring shall continue until all mined and/or dewatered areas within the HID have been backfilled and contoured and post-contouring hydrology assessment indicates the reestablishment of a normal surficial groundwater regime for the area, as documented by comparison with the background data that was collected prior to the initiation of mining operations.

The background data for each specific piezometer shall be used to conduct a Period of Record (POR) percentile analysis to establish exceedance values for each piezometer to be monitored. A P95 exceedance value (the elevation that the ground water level equals or exceeds for 95% of the season) shall be established for the wet season (June through September) and the dry season (October through May) specific to each piezometer.

An internal trigger (requiring the permittee to notify appropriate staff) shall occur any time a piezometer drops below the P95 elevation for the appropriate season. An internal trigger shall prompt the permittee to closely monitor the piezometer's water level during subsequent data collection and begin preliminary evaluation to determine if mining activities are responsible for the water level drop. It is understood that water levels will drop below the P95 for approximately 5% of each season under normal conditions; however this conservative approach to water level analysis will provide assurance that the permittee will identify potential water table issues as soon as is feasible. An internal trigger will also occur if a piezometer's water level decreases 12 inches or greater between consecutive weekly monitoring events. This internal trigger will occur even if the 12-inch decrease does not cause water levels to fall below the P95 value and will prompt the same preliminary evaluation steps as described above. This additional internal trigger will provide assurance that piezometers with rapidly declining water levels will be identified and evaluated as soon as feasible.

An external trigger (requiring notification to the Department) will occur at any time a piezometer's water level falls below the P95 elevation for more than 5% of the appropriate season. For the wet season, an external trigger will occur at the second consecutive weekly monitoring event that the water levels are below the P95 wet season value. For the dry season, an external trigger will occur at the third consecutive weekly monitoring event that the water levels are below the P95 dry season value. When the criteria for an

external trigger are met, the permittee shall implement additional data analysis to determine if mining activities are the cause of the drop in groundwater elevations. Water level data from piezometers outside of the 1,800-foot HID shall be evaluated to determine if a similar data pattern is occurring. In addition, period of record rainfall data for representative locations within the mine site shall be evaluated to determine if rainfall patterns preceding the external trigger event are representative of the rainfall period of record for which the P95 exceedance values were established. The Department shall be notified of all external triggers and associated data analyses. A summary of water level data and POR analyses for all areas where active dewatering has commenced shall be submitted with the Annual Hydrology Report required in Specific Condition 9.

c. **Response:** In the event that an unnatural hydrologic change caused by mining activities is identified, the Department shall be notified and the permittee shall implement Hydrologic Mitigative Measures (HMMs) to correct the unnatural, mining-related hydrologic changes. HMMs are divided into two Tiers based on their order of potential implementation. Tier 1 HMMs shall include making a determination of the extent of dewatering by evaluating mine-wide reference water level data, developing an immediate plan for reestablishing the target water table, adding piezometers if necessary, raising the water level in the adjacent recharge system, performing maintenance on recharge systems (e.g., cleaning out silted clays, deepen/widen recharge ditches) near the affected area to ensure that sufficient water infiltrates through the system to support the water table in the area of concern, evaluate the acceleration of reclamation of open mine cuts immediately adjacent to the recharge system, establish additional hydraulic barriers (e.g., flood the mine cuts adjacent to the affected area), and inspect the overburden material used to seal off the open mine cut faces and compact additional overburden material if seepage into the mine cuts from adjacent preserved of offsite areas is evident. If the Tier 1 HMMs are not practical or are not effective, Tier 2 HMMs will be evaluated and the appropriate measure(s) implemented. Tier 2 HMMs include evaluating the feasibility and/or potential effectiveness of adjusting the mine plan and/or mine-cut orientation, direct hydration of the affected areas using an NPDES permit where available clean water is pumped into the affected area, or installation of recharge wells to inject water from the intermediate or Floridan aquifer into the bottom of the recharge ditch in quantities that would provide sufficient water to the wetlands. The final selection of a Tier 2 HMM for a specific location would be determined on a case-by-case basis, since the type of treatment would depend on several factors including the

specific soil stratigraphy, mine pit geometry, timing and type of reclamation, and constructability issues.

d. **Hydrologic Impact Prevention:** Recharge systems to maintain water table elevations in the surficial aquifer in preserved and off-site areas shall be installed and operating along all property boundaries and along all areas containing preserved wetlands and other surface waters at all times when such areas are within a 1,800-foot HID of any unreclaimed mine pit. Recharge systems shall be designed, monitored, and maintained based on analyses of site-specific hydrogeological information, such as data generated from analyses of materials collected during installation of piezometers, prospect boring logs, Standard Penetration Test (SPT) borings, aquifer performance test data, selected interval grain size laboratory data, and other hydrogeologic data and analysis, as needed, and as specified in the attached "South Pasture Extension Recharge Ditch Modeling Report" (Appendix 4).

In advance of mining and recharge system construction, SPT borings shall be completed on 1,000-foot centers (maximum spacing distance) along the projected alignment of the recharge systems to detect the presence of hardpans, highly permeable layers within the pit highwall or near the pit bottom, or other subsurface features that could impact recharge system functioning.

Site-specific seepage analyses shall be conducted by the permittee to determine whether recharge ditches alone would be expected to prevent mining-related impacts to groundwater levels within the preserved and offsite wetlands and other surface waters. If the results of these seepage analyses predict a drop in groundwater levels below the seasonal low water level (SLWL) using a recharge ditch only, then the permittee shall include in its recharge system design appropriate Tier 2 HMMs that would be implemented in the area upon detection of any abnormal drop in water levels, and obtain all necessary regulatory approvals for implementation of such Tier 2 HMMs prior to commencement of dewatering within the 1,800-foot HID of any preserved and/or offsite wetland or other surface water that could be affected by dewatering activities. The results of the seepage analyses and the resulting recharge system designs shall be submitted to the Department for review and comment at least 90 days prior to initiation of pit dewatering within a 1,800-foot HID of any preserved or offsite wetland or other surface water. As-built surveys of the completed recharge systems shall be submitted to the Department prior to commencement of dewatering within a 1,800-foot HID of any wetland or other surface water.

Recharge systems shall remain operational in all areas where dewatering has commenced until all mined and/or dewatered areas within 1,800-feet have been backfilled and contoured and post-contouring hydrology assessment indicates the reestablishment of a normal surficial groundwater regime for the area, as documented by comparison with the background data that was collected prior to the initiation of mining operations.

e. **Recharge System Operation:** During mining operations, water levels in the recharge systems adjacent to off-site wetlands and other surface waters shall be maintained at levels sufficient to support the normal seasonal water level fluctuations of those preserved and/or off-site wetlands and other surface waters as determined from the baseline monitoring described in Item 14b (above). Recharge systems adjacent to preserved on-site wetlands and other surface waters shall be charged with water at levels sufficient to maintain base flows and/or minimize stress to the vegetation and prevent abnormal oxidation of soil organic matter in the preserved areas. Staff gauges shall be installed in the recharge ditches to monitor water levels.

f. **Recharge System Monitoring:** To monitor the performance of the recharge system, all staff gauges and piezometers within a 1,800-foot HID of active dewatering shall be monitored weekly by the permittee, as specified in the Monitoring Required section and Table MR-B of this permit. Water level data shall be submitted with the Annual Hydrology Report required in Specific Condition 9. Water level records shall be retained on site for a period of at least three (3) years. Adjacent preserved and off-site wetland conditions shall also be verified by monthly visual inspections by the permittee and in conjunction with the quarterly mine inspections with Department staff. If preserved and/or off-site wetlands or other surface waters show signs of stress, or if the monitoring data or inspections indicate that the recharge system and associated HMMs are not maintaining the normal seasonal water level fluctuations in the adjacent wetlands or surface waters, the permittee shall notify the Department in writing. Upon approval, the permittee shall take additional remedial actions, which may include performing additional maintenance, modifying the design of the recharge system, altering mining operations, altering reclamation timing or procedures, providing additional sources of water, and conducting additional monitoring, as necessary. To further verify that the proposed recharge system redesign will maintain adequate ground water levels, the Department may require additional modeling. Modifications to recharge system designs in accordance with this condition are not considered a substantial deviation as defined in General Condition 14.

g. **Recharge System Performance:** Appropriate water levels, considering normal seasonal fluctuations and other climatic conditions that may affect the natural system, shall be maintained in adjacent unmined wetlands and other surface waters throughout site preparation and during mining operations and reclamation to ensure that unmined wetlands and other surface waters are not adversely impacted by mining operations. The permittee shall follow Water Use Permit (WUP) Number 20003669.010, or subsequent permits issued by the SWFWMD, for protection of all preserved and/or off-site wetlands and other surface waters in the vicinity of the South Pasture Extension Mine. All reports required by SWFWMD shall be copied to the Bureau of Mining and Minerals Regulation. If SWFWMD determines that monitoring may be discontinued for any unmined wetland within this project area prior to the completion of contouring within 1,800 feet of the preserved and or/off-site wetlands and other surface waters, the Department reserves the right to require weekly monitoring to continue and all reports to be submitted until the contouring is completed within 1,800 feet of the preserved and/or off-site wetlands and other surface waters, and the piezometers in the vicinity indicate that natural water levels in the preserved area have recovered to pre-mining levels. The permittee shall copy the Bureau of Mining and Minerals Regulation on any correspondence with SWFWMD regarding monitoring of preserved and/or off-site wetlands and or other surface waters within 1 mile of the project area.

h. **Documentation of Surficial Aquifer Restoration:** Following reclamation, in order to ensure that groundwater seepage to preserved wetlands and other surface waters will be appropriate, reclaimed subsurface hydraulic conductivities and hydraulic gradients adjacent to the major streams and preserved wetlands and unnamed streams shall be functionally equivalent to those assumed in the attached "Integrated Simulations for the South Pasture Extension Mine for Pre-Mining and Post-Reclamation Conditions" (Appendix 9). The permittee shall provide the Department mining, waste disposal and reclamation plans that ensure reclaimed subsurface flows will achieve conditions hydrologically equivalent to those described in the Integrated Modeling Report. Such plans should include an analysis of post-reclamation topography, mine cut directions, sand tailings and overburden depths and locations and overburden composition. Final soil lithology maps for each area reclaimed during the previous year shall be provided with the Annual Narrative Reports required under Specific Condition 8. Lithology maps shall be certified by a Professional Engineer or Professional Geologist and shall include mine cut directions, overburden composition, and sand tailings and overburden depths and locations at cross section locations acceptable to the Department.

i. **Protection of Stream Flow:** At all times during the life of the South Pasture Extension Mine, the permittee shall maintain a minimum 1000-foot-wide buffer of either natural ground or backfilled lands that have been contoured to the post-reclamation elevations shown on Figure EN-17 (1-4) along at least one bank of each linear foot of the preserved stream systems shown within the no-mine boundary on Appendix 10 - Figures SRO-2A, SRO-2B, and SRO-2C.

Downstream flows from the project area shall not be reduced by mining or mining operations to the point where an abnormal decrease in flow exiting the mine property results in degradation of natural systems or causes water quality violations in Brushy Creek, Lettis Creek, or Troublesome Creek. Beginning at least four years prior to the initiation of mining operations within the South Pasture Extension Mine, surface water flows shall be monitored continuously near monitoring stations BCM-1, BCM-2, BCT-1, BCT-2, BCT-3, LCT-1, LCT-2, and LCM-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, as shown on Figure EN-11. Ground water levels shall be monitored continuously along the property boundaries and along preserved areas as specified on Table MR-B. Rainfall amounts shall be monitored daily from a minimum of two representative stations in accordance with Table MR-B. Surface water flows, groundwater levels, and rainfall monitoring at these stations shall continue until all mitigation activities required under this permit are completed and have been released by the Department. Monitoring results shall be submitted with the Annual Hydrology Reports required under Specific Condition 9 and reported as described in the Monitoring Required Section of this permit.

j. **Troublesome Creek Reroute Ditch:** Prior to severance or restriction of water flows onto the South Pasture Extension Mine from adjacent properties along the mine boundary in Sections 9 and 10, Township 34 South, Range 24 East, the permittee shall construct a re-route ditch in accordance with the "South Pasture Extension Troublesome Creek Reroute Ditch Modeling and Conceptual Design" (Appendix 15). The re-route ditch shall remain in place and operational at all times when flows from adjacent properties could be severed or restricted by activities within the South Pasture Extension Mine. The ditch shall be removed and reclaimed prior to the request for release of mitigation Wetland R-10E-02-617, shown on Figure EN-16.

15. WILDLIFE MANAGEMENT: The permittee shall follow the Wildlife Habitat Management Plan for the South Pasture Extension Mine (Appendix 12) for all pre-clearing wildlife surveys, timing of habitat disturbance and relocation

activities or as required by Florida Fish and Wildlife Conservation Commission and/or US Fish and Wildlife Service (FFWCC/USFWS) permits or management plans. The appropriate FFWCC/ USFWS authorizations shall be obtained prior to the disturbance of habitat or relocation of any listed wildlife species pursuant to the SWFWMD Basis of Review (August 2, 2006) as adopted by Chapter 62-330, F.A.C. If required by FFWCC or USFWS, a Bald Eagle (*Haliaeetus leucocephalus*) and Crested Caracara (*Caracara cheriway*) nest monitoring plan shall be implemented in accordance with FFWCC/USFWS requirements. Copies of all correspondence, permits, authorizations and reports to or from these agencies shall be provided to the Bureau of Mining and Minerals Regulation.

16. TIMETABLES AND MINING OPERATIONS: The mining operations and reclamation activities authorized by this permit shall be completed according to the following generalized timetable except as otherwise noted:

a. Generalized Timetable for Work in Wetlands and Other Surface Waters:

Activity	Relative Time Frame
Commencement of Severance/Site preparation	No more than six (6) months prior to mining operations (unless approved by the Department for the purposes of directly transferring topsoil/muck to a contoured mitigation site), except as otherwise authorized herein.
Final grading, including muck placement	No later than 18 months after completion of mining operations, including backfilling with sand tailings
Phase A planting (species that tolerate a wider range of water levels)	No later than six (6) months after final grading or 1 year after muck placement
Hydrological Assessment	For two (2) years after contouring in accordance with Specific Condition 22c and the Monitoring Required section of this permit
Phase B planting (species that tolerate a more narrow range of water levels)	Up to 12 months after the completion of the hydrological assessment
Phase C planting (shade-adapted ground cover and shrub species, additional trees and shrubs to meet density and diversity requirements in	At least two (2) years prior to release in forested wetlands

Specific Condition 25C)

b. Disturbance, mining, and reclamation of wetlands, streams and other surface waters shall proceed as shown on Figures ERP-C-4 and Appendix 5 – Figure BP-6, and as described on Tables CRP-3 and CRP-5. The permittee shall submit updates to the approved schedule with the Annual Status Reports required in Specific Condition 8. Anticipated deviations from these schedules shall be submitted prior to initiating impacts to wetlands out of sequence and significant changes may require a modification to this permit. Changes in sequence of wetland disturbance shall be acceptable provided a) there are no additional adverse impacts or b) an acceptable mitigation plan to offset these impacts is provided.

17. DRAGLINE/UTILITY CORRIDOR CROSSING: Removal of the existing vehicular crossing and hanging culvert, construction of the temporary dragline/utility crossing shown on Figure EN-7, and reconstruction of the vehicular crossing of Brushy Creek shall be completed as outlined in the attached "Brushy Creek Utility Crossing Plan Set" (Appendix 3), and as follows:

a. Best management practices for turbidity and erosion control, as outlined in Specific Condition 10, shall be used and maintained at all times beginning prior to construction, during use of the temporary dragline/utility crossing, and through the reconstruction and stabilization of the vehicular crossing of Brushy Creek.

b. Clean sand shall be compacted over the crossing area and the ground and side slopes shall be sodded within 48-hours to stabilize the crossing area and prevent turbid runoff. Protective riprap shall be installed on the upstream face of the transition slope and at the culvert discharge areas to prevent erosion.

c. Pipelines for transport of any substance other than clear water shall be double walled, i.e., each pipe shall be fully encased in continuous welded smooth steel or HDPE pipe. The encasement conduits will extend to spill protection basins lying entirely within the BMP's of the mining operations area. Each basin shall be equipped with a spill detection device and shall be designed to contain a pipeline leak of at least 800 gallons per minute (gpm) for a period of at least eight hours. The final details of the containment system shall consider the expected pumping volumes and shall be submitted to the Department for approval prior to construction.

d. All construction activities associated with the crossing shall be timed to coincide with periods of low flow and shall not be initiated at any time when such work will be ongoing during the months of July, August, or September.

e. Certified as-built engineering drawings for the dragline/utility crossing shall be submitted to the Department within 30 days of completion of construction of the temporary dragline/utility crossing.

f. Upon the completion of mining operations within the temporary dragline crossing/utility corridor, all equipment shall be removed from the crossing area and the final vehicular crossing of Brushy Creek shall be contoured and constructed as shown in the Post Grading Plan Sheet 7 of Appendix 3. All exposed soil shall be seeded and mulched or sodded within 72 hours after final contouring.

g. The final contours of the restored dragline/utility crossing area and reconstructed vehicular crossing of Brushy Creek shall be surveyed in accordance with general survey procedures utilizing a 50-foot grid and showing elevations to 0.1 foot. Within 60 days of final grading, both a cross section and a topographic map of the crossing site extending the width of the 25-year floodplain, showing sampled points and 0.5-foot contours referenced to NGVD, and certified by a land surveyor or professional engineer registered in the state of Florida, shall be submitted to the Bureau of Mining and Minerals Regulation for approval. All topographic maps shall meet the minimum technical standards as set forth in Chapter 472, F.S.

h. Revegetation shall be performed in accordance with Table EN-8 and Specific Condition 22.

18. TOPSOIL UTILIZATION: Prior to mining operations permitted in wetlands, wetland muck, topsoil, or sod shall be removed from the site for use in wetland restoration. Neither muck, nor topsoil nor sod shall be collected from wetlands that are vegetatively highly degraded (minimal cover of desirable species). If the permittee believes a donor wetland is highly degraded and unsuitable, the permittee shall notify the Department, which shall determine if the wetland is degraded to an extent that it meets this condition. Timing between the clearing of donor sites and the completion of wetland restoration shall be optimized to provide greater opportunities for direct transfer of wetland topsoil. In some instances, wetland topsoil may be removed from donor sites more than six (6) months in advance of mining operations. If no contoured mitigation site is available to receive the wetland topsoil, it shall be stored in a manner that minimizes oxidation and colonization by nuisance

species. The permittee is encouraged to relocate any threatened or endangered plant species encountered to appropriate mitigation sites.

19. SOIL ESTABLISHMENT: Surface soils in all reclaimed areas shall be established for each post-reclamation land use/vegetation community as described in Sections 2.0 and 4.0 of Appendix 7, and as follows: In all sand tailings reclamation areas on the South Pasture Extension (as shown on Appendix 5 - Figure BP-2,) an average upper layer of at least 3 feet of sandy material shall be placed over the overburden spoil to establish the parent materials for the surface soils and promote water infiltration. Additional overburden may be added to the surface soils, as needed, to enhance water holding capacity, cation exchange capacity, and nutrient retention, provided that the infiltration zone remains composed of predominantly sandy material and could be classified as sand, loamy sand, or sandy loam pursuant to the USDA-NRCS soil texture classification.

    Whenever practicable, topsoil shall be harvested from upland areas prior to mining and shall be used to establish the final design contours in reclaimed upland areas. Incorporation of additional organic materials into the upland soils through green manuring or amendment with composts or other organic materials is encouraged.

    All wetland muck that is reasonably free of nuisance and exotic species shall be harvested from the wetland sites prior to mining and shall be used to establish the final design contours in reclaimed wetland areas.

20. POST-MINING LANDSCAPE ELEVATIONS: Within 90 days of the completion of contouring and soil establishment in each reclamation parcel, the permittee shall submit as-built topographic surveys to demonstrate that the modeled land surface elevations have been established as shown on Figure EN-17 (1-4). Substantial deviations from the approved reclaimed land surface elevations that have potential to adversely affect the functions of preserved, off-site, and/or reclaimed wetlands or other surface waters shall be corrected within 90 days of detection.

21. LAKE AND LAKE LITTORAL SHELF CONSTRUCTION:
    LAKE The 64-acre lake and associated littoral shelf wetlands shall be constructed in accordance with rule 62C-16.0051(6), F.A.C. The lake shall be graded to no more than 10 feet in depth and shall not be contained within a closed basin. The littoral zone shall represent no less than 20% of the open water surface and shall be planted with appropriate species for a freshwater marsh, as indicated in Table RP-2.

22. MITIGATION CONSTRUCTION STANDARDS: The permittee shall create as mitigation 1,476.3 acres of wetlands and 234.5 acres of other surface waters, including 43,838 linear feet of natural stream channels, as shown on Figures EN-15a, EN-16, EN-17. The mitigation wetlands to be constructed include 7.6 acres of vegetated non-forested wetlands, 894.1 acres of freshwater marsh, 86.0 acres of wet prairie, 3.5 acres of bay swamp, 4.0 acres of gum swamp, 15.5 acres of inland ponds and sloughs, 284.5 acres of mixed wetland hardwood forest, 17.5 acres of hydric pine flatwoods, 47.1 acres of hydric pine savanna, 11.0 acres of slash pine swamp forest, and 105.5 acres of hardwood-conifer mixed wetland forest. The 43,838 linear feet of stream channel mitigation are to be constructed as detailed in the attached "South Pasture Extension Stream Restoration Plan" (Appendix 10). The permittee shall also restore approximately 0.8 acres of forested and herbaceous wetlands and approximately 0.3 acres of other surface waters in the temporary dragline/utility crossing area, as shown on Figures EN-15a, EN-16, and EN-17. The wetland and other surface water mitigation and restoration shall be accomplished in accordance with Specific Condition 16, Tables CRP-3, CRP-4, and CRP-5, Appendix 10, Appendix 7, the permittee's "Representative Reclaimed Wetland Transect Drawings" (Appendix 8), and in the following manner:

For All Mitigation Areas:

a. Following mining, the permittee shall prepare soil lithology maps illustrating the "as mined" post-mining subsurface locations where overburden has been placed by the mining activities. The overburden lithology maps shall be prepared based upon aerial photogrammetry, and shall be used as input data for the following modeling efforts:

    i. **Cut and Fill Topographic Modeling-** Cut and fill topographic modeling shall be conducted by the permittee to calculate the volume of sand needed to result in the design elevations and topographic gradients for each mitigation area and its contributing watershed. The results of the cut and fill model shall include a sub-surface lithologic map showing tailings and overburden locations and thicknesses.

    ii. **Fine-Scale Wetland Hydroperiod/Stream Performance Modeling.** The cut and fill modeling results shall be one input parameter to an integrated surface/ groundwater model that shall be performed by the permittee and applied to each mitigation area. The scale of the model shall be subject to Department approval and must be

appropriate for the scale of the waterbodies to be evaluated. The hydroperiod modeling shall be used to finalize the design of the sub-surface lithology and land surface elevations and topographic gradients in each mitigation area and contributing upland watershed. The hydroperiod modeling results shall confirm that the wetland bottom and output elevations, the side slopes, and the subsurface lithology will result in hydroperiod depths and durations appropriate for the community types planned for each mitigation area. The key sub-surface design parameters for the modeling should, at minimum, include the thickness and texture of the upper soil layers, the thickness and upper-elevation of any mine-face seal to remain, the orientation of preferential conduits for groundwater flow along tailings rows (and the effective saturated hydraulic conductivity of the overburden and sand tailings distribution in general), and the local thickness and hydraulic conductivity of the intermediate confining unit. The key surface design parameters for the modeling should, at minimum, include the topographic surface of the sub-basin, including isolated wetlands, a 1-D representation of the lotic system (stream channels, wetland depressions), and the land use and cover.

iii. **Surficial Aquifer Baseflow Modeling-** Preserved wetlands 11W-02A and 03W-24 and created wetland R-03W-48-611 are "seepage" wetlands where seepage from reclaimed uplands will supply the water needed to support wetland functions and the appropriate vegetation community type (e.g., bay swamps). In these areas, the permittee shall conduct wetland hydroperiod modeling that is supported by groundwater modeling using MODFLOW (USGS) or an equivalent model with the purpose of ensuring that the subsurface flow of water through the reclaimed lithology will provide an ample supply of water to sustain the preserved and/or reclaimed wetlands.

The results of these modeling efforts shall be submitted to the Department for review and comment at least 90 days prior to commencement of contouring.

b. **Documentation of As-Built Conditions:** Within 60 days of final grading, the final contours of each restored mitigation area (including wetlands, streams, and non-wetland floodplains), shall be surveyed in accordance with general survey procedures utilizing a 50-foot grid and spot elevations to 0.1 of a foot. An as-built contour map will be generated to show one (1) foot contours for

uplands, 0.5 of a foot contours in wetlands/surface waters and the 0.1 of a foot spot elevations, extending at least 200 feet into the adjacent uplands. The contour map(s) will reference NGVD and be certified by a land surveyor or professional engineer registered in the state of Florida. All topographic maps shall meet the minimum technical standards as set forth in Chapter 472, F.S.

c. **Post-Construction Hydrology Monitoring and Second-Year Hydrology Assessment:** Post construction monitoring, as described in the Monitoring Required section of this permit (outlined in Tables MR-B and MR-C), shall be performed for all mitigation areas. All piezometers, staff gauges, and flow meters shall be installed at mutually agreed-upon locations within 30 days of the completion of grading/contouring activities in the mitigation areas to be monitored. Hydrologic data collected for each mitigation monitoring site is to be compiled, analyzed and submitted in both tabular and graphical formats with the Annual Hydrology Reports required in Specific Condition 9.

Initial assessment of the site hydrology shall be conducted for at least two (2) years after final contouring of each mitigation area. The results shall be submitted to the Bureau of Mining and Minerals Regulation for review and approval within 30 days of completion of the analysis. Within 30 days of receipt of the data, the Bureau of Mining and Minerals Regulation will review the results and approve the design hydrology, or require additional information or changes to the design. If the hydrology of the site does not meet the design objectives, the permittee shall have 60 days to submit a remedial action plan to ensure that design objectives will be met. Following the initial hydrological assessment, monitoring of each mitigation area shall continue until the requirements of Specific Condition 25 have been met.

For Forested Wetlands:

d. **Soil Establishment:** After mining operations and backfilling with sand tailings, forested wetland mitigation areas (FLUCFCS 611, 613, 616, 617, 625, 626, 627, and 630) shall be graded and capped with several inches of wetland muck or topsoil, as described in Appendix 7 (Reclamation Plan), to achieve the final elevations indicated in the attached permit drawings. In the event that sufficient wetland muck or topsoil is not available, the permittee shall coordinate the use of other appropriate materials with the Department. However, the bay swamp reclamation project (Wetland R-03W-48-611) shall receive a minimum of one foot of muck or a combination of muck and mulch or other appropriate organic material such as mucky-sand or sandy-muck.

Direct transfer of topsoil and live material (stumps, shrubs, small trees) shall be used where feasible. Wetland topsoil should be reasonably free of nuisance and exotic plant species before application to wetland mitigation areas.

e. **Hydropattern and Habitat Heterogeneity:** In forested wetlands, the permittee shall leave some areas roughly graded and shall install stumps, logs, and shrubs several inches above the seasonal high water line to provide hummocks and increase habitat heterogeneity. Snags shall also be placed within the forested wetlands to encourage wildlife usage. Direct transfer of small shrubs and trees from future mining areas shall also be utilized in the reclamation.

f. **Restoration of the Vegetation Community:** Forested wetlands shall be planted with sufficient tree, shrub, and herbaceous species to establish the densities and species richness and dominance characteristics appropriate for each community type in accordance with Appendix 7 - Table RP-2 and Appendix 8 (Representative Reclaimed Wetland Transect Drawings) in order to meet the requirements of Specific Condition 25C. Appropriate species shall be planted based on the design elevations, the results of the hydrology monitoring, and the goals of the mitigation.

g. **Successional Plantings:** Additional plantings of shrubs and shade tolerant herbaceous vegetation shall occur after establishment of suitable canopy/subcanopy cover (by year 7) within the forested wetlands, as described in Appendix 7 (Reclamation Plan), and as listed on the planting scheme of the target community types in Appendix 8 (Representative Reclaimed Wetland Transect Drawings).

For Herbaceous Wetlands and Wet Prairies:

h. **Soil Establishment:** After mining operations and backfilling with sand tailings and/or overburden, herbaceous wetland mitigation areas (FLUCFCS 640, 641, and 643) shall be graded and capped with several inches of wetland topsoil, when available, to achieve the final elevations indicated in the attached permit drawings. Direct transfer of topsoil shall be used where feasible. Wetland topsoil should be reasonably free of nuisance and exotic plant species before application to wetland mitigation areas. If topsoil is unavailable, herbaceous wetland species shall be planted on 3-foot centers according to the species listed on Appendix 7 - Table RP-2 to establish vegetation density, species richness, dominance characteristics, and ecotone

zonation patterns that are typical of reference wetlands of the appropriate community type and to meet the requirements of Specific Condition 25C.

i. **Hydropattern and Habitat Heterogeneity:** Marshes and wet prairies shall be designed to maintain the diversity of community types that existed prior to mining operations in order to support a wide range of wildlife species including birds, reptiles, and amphibians. Marsh hydroperiods shall range from ephemeral through seasonally and permanently flooded. Marshes and wet prairies shall be constructed with variations in topography and slope in order to provide the greatest diversity of hydroperiods and available habitat. However, the slopes of the created wet prairie wetlands shall be no steeper than 10:1. Slopes in most marshes shall be gradual enough to support wide transition zones with a diversity of vegetation and shall exhibit the distinct zonation patterns typical of the least disturbed marshes occurring at the South Pasture Extension Mine.

j. **Ecotone Development:** Herbaceous marshes and wet prairies shall be rim-mulched with several inches of wet prairie, pine flatwoods, or palmetto prairie topsoil or sod unless suitable material is not available within a reasonable hauling distance. Direct transfer shall be used where feasible. Where top-soiling is not feasible, other methods that are likely to achieve the same diversity of wet prairie forbs and grasses such as direct seeding or planting in accordance with Appendix 7 - Table RP-2 shall be used as approved by the Department. Additionally, plantings of herbaceous vegetation and shrubs shall occur within the appropriate zone of the wetlands, as determined by the established or predicted water levels.

k. **Vegetation Establishment in Wet Prairies:** All wet prairie (FLUCFCS 643) areas shall receive several inches of wet prairie topsoil or sod unless suitable material is not available within a reasonable hauling distance. Direct transfer shall be used where feasible. In addition, wet prairie mitigation sites shall be planted with a mixture of appropriate species, in accordance with Appendix 7 - Table RP-2 and the wet prairie planting scheme in Appendix 8 (Representative Reclaimed Wetland Transect Drawings). The permittee shall plant and/or seed upland areas surrounding wet prairie areas with native grasses such as creeping bluestem (*Schizachyrium scoparium*), sand cordgrass (*Spartina bakeri*), blue maidencane (*Amphicarpum muhlenbergianum*), bushy broom grass (*Andropogon glomeratus*), lovegrass (*Eragrostis* spp.), and eastern gama grass (*Tripsacum dactyloides*) to help prevent invasion by non-native and/or range grasses.

For Streams:

l. Stream systems shall be constructed in accordance with the design criteria set forth in the attached South Pasture Extension Stream Restoration Plan (Appendix 10). An experienced stream restoration scientist shall be utilized by the permittee as staff or consultant for the period of stream mitigation construction through release to provide project guidance and conduct regular inspections during construction and planting activities.

m. Within 90 days of final grading of any restored stream segment listed on Table SRO-5A, the permittee shall utilize the as-built survey required by Specific Condition 22b to prepare an as-built construction report for that restored reach to document that the as-built conditions are consistent with the specifications outlined in the Stream Restoration Plan. Results of the as-built shall be used to demonstrate the successful establishment of all applicable construction parameters consistent with the specifications provided on Tables SRO-5A, SRO-5B, and SRO-5C and the Stream Restoration Plan.

n. During the fifth and tenth year following contouring, the condition and abundance of large woody debris within the restored stream channels and riparian corridors shall be assessed and, if necessary, the permittee shall install additional large woody debris to achieve the success criteria in Specific Condition 25D.

For Other Surface Waters:

o. Non-wetland floodplain areas shall be constructed in accordance with the methods prescribed for the appropriate upland community type as described in Appendix 7 (Reclamation Plan).

p. Palmetto prairie (FLUCFCS 321o), and mixed rangeland (FLUCFCS 330o) other surface waters shall receive at least 3-6 inches of palmetto prairie or pine flatwoods topsoil, unless suitable material is not available within a reasonable hauling distance. Direct transfer shall be used where feasible. Where top-soiling is not feasible, a green manure crop will be seeded, allowed to mature, and disked in before applying a native groundcover seed mix. Trees, shrubs and additional groundcover species listed in Appendix 7 - Table RP-2 shall be planted in order to meet the requirements for other surface waters in Specific Condition 25C.

q. Forested other surface waters shall be planted with native groundcover, shrub, and tree species, as appropriate for the specific community type (FLUCFCS 411o, 427o, 434o, and 438o) in order to meet the requirements of Specific Condition 25C.

23. TIME SCHEDULE FOR COMPLETION OF MITIGATION: Forested wetlands and other surface waters and created streams shall achieve, or shall be on a clear trajectory toward achieving, all applicable mitigation success criteria listed in Specific Condition 25 (excluding tree height requirements) within 12 years of final contouring of drainage areas reporting to these mitigation areas. Herbaceous wetlands and other surface waters shall achieve, or shall be on a clear trajectory toward achieving, all applicable mitigation success criteria listed in Specific Condition 25 within 7 years of contouring. The time period for attainment of the mitigation success criteria may be extended by the Department for specific wetlands when circumstances beyond the control of the operator, such as drought or flooding, occur.

    In the event that a mitigation site has not met the design objectives within the applicable time frame, and monitoring data do not demonstrate that the site is on a clear trajectory towards achieving all applicable mitigation success criteria listed in Specific Condition 25, the permittee shall prepare and submit a corrective action plan to the Department detailing additional construction, maintenance, and/or enhancement measures that would be implemented to achieve the design objectives within a two-year extended time period. Upon approval, the permittee shall be granted an additional two year period in which to perform the corrective actions and/or enhancement activities specified in the approved corrective action plan and to provide documentation that the site has achieved the applicable mitigation success criteria listed in Specific Condition 25.

24. VEGETATION AND HABITAT MAINTENANCE: A monitoring and maintenance program shall be implemented to promote the survivorship and growth of desirable species in all mitigation areas:

    a. This program shall include at least semi-annual inspections of wetlands and other surface waters for nuisance and exotic species. These inspections shall be coordinated with Department staff. Nuisance and exotic vegetation shall be controlled by herbicide, fire, hydrological or mechanical means in order to limit cover of nuisance species to less than ten (10) percent and to remove exotic species when present in each mitigation area. Manual or chemical treatment of nuisance and exotic species shall be implemented at least annually when cover of nuisance and or/exotic species in any area of one acre or more increases to more than ten (10) percent cover or if invasive exotic

species are present. Manual or chemical treatment shall also be implemented if cogon grass (*Imperata cylindrica*) coverage exceeds ten (10) percent on reclaimed sites or five (5) percent within 300 feet of any mitigation wetland or other surface water.

b. Water levels may be controlled through outflow control structures and/or pumping as necessary to enhance the survivorship and growth of hydrologically sensitive taxa. The location, designs, and need for such structures shall be mutually agreed upon by both the permittee and the Bureau of Mining and Minerals Regulation. All water management structures shall be removed at least two years prior to release request.

c. Supplemental tree and shrub plantings in accordance with Specific Condition 22 shall occur when tree/shrub densities fall below those required to meet Specific Condition 25C.

d. Supplemental herbaceous plantings in accordance with Specific Condition 22 shall occur if cover by a diversity of non-nuisance, non-exotic wetland and facultative species as listed in rule 62-340.450, F.A.C., falls below the level required to meet Specific Condition 25C.

25. RELEASE CRITERIA: The 488.6 acres of forested wetlands, 987.7 acres of non-forested wetlands, and 234.5 acres of other surface waters [including 7.1 acres (43,838 linear feet) of created stream channels] shall be released when the reclaimed mitigation wetlands and other surface waters have been constructed in accordance with the permit requirements, the following conditions have been met, and no intervention in the form of irrigation, dewatering, or replanting of desirable vegetation has occurred for a period of two consecutive years unless approved in writing by the Department. If the associated watershed has been reclaimed, individual wetlands or other surface waters may be released by the Department provided they have met the minimum establishment period for the wetland type and meet all applicable permit conditions. The permittee shall indicate in the Annual Status Report required by Specific Condition 8 the start date for the non-intervention period for each wetland/other surface water:

a. Water Quality.

Water quality shall meet Class III standards (Chapter 62-302, F.A.C.)

b. Water Quantity

1. Each created wetland shall have hydroperiods and depths of inundation sufficient to support wetland vegetation and that are within the range of conditions occurring in the reference wetlands of the applicable community type for the same time period as determined based on the monitoring data. Reference wetlands are discussed further in Paragraph B of the Monitoring Required section.

2. Hydrologic performance of the reclaimed streams shall be verified through the results of the monitoring conducted in accordance with Specific Condition 22c. The bankfull discharge volumes shall be comparable to the values provided on Table SRO-5A and shall occur at a frequency comparable to reference streams in the Middle Peace River Basin or comparable hydrophysiographic region. The velocity of water in the channels shall be adequate to preclude the establishment of excessive amounts of vegetation in the channel following canopy closure in the stream buffers. The bankfull depths, as evidenced by flow measurements and the development of bankfull indicators, shall be comparable to the depths provided on Table SRO-5A.

3. Wet prairies shall remain inundated for no more than eight (8) months of the year during a typical rainfall year, defined as being within the 20th and 80th percentile of historical record in terms of total rainfall and major event occurrences.

4. In no case shall as-built elevations for reclaimed areas within the extent of the post-reclamation mean annual floodplain, as identified on Figures FMR-20a and FMR-20b in the permittee's "Flood Modeling of the South Pasture Extension for Pre-Mining and Post-Reclamation Conditions" (Appendix 6), or areas identified as non-wetland other surface waters on Figure EN-16, be higher than the approved mean annual floodplain elevations shown on Appendix 6 - Figure FMR-3.

c. Vegetation

For All Non-Stream Mitigation Areas:

1. Total cover by non-nuisance, non-exotic FAC, FACW, and/or OBL species listed in rule 62-340.450, F.A.C., (desirable species) in the ground cover shall be at least 80%. Relative cover by non-nuisance, non-exotic FAC, FACW, or OBL species listed in rule 62-340.450, F.A.C., in the ground

cover shall also be at least 80%. Non-nuisance, non-exotic facultative species will be considered desirable only provided that their contributions to the vegetative community structure are within the range of values documented within the reference wetlands of the target community type, the target community type is established as described in the Appendix 7 (Reclamation Plan), and the mitigation site is jurisdictional in accordance with Rule 62-340, F.A.C. In no case shall temporary dominance by transient facultative species such as dogfennell (*Eupatorium capillifolium*), sesbania (*Sesbania* spp.), wax myrtle (*Myrica cerifera*), shyleaf (*Aeschynomene americana*), or similar species be used to demonstrate achievement of vegetation community performance standards. Desirable ground cover plant species shall be reproducing naturally, either by normal vegetative spread or through seedling establishment, growth and survival.

Native upland species shall be considered desirable vegetation when evaluating non-wetland, non-stream other surface waters (FLUCFCS 211o, 321o, 330o, 411o, 427o, 434o, and 438o).

For the purposes of evaluating other surface waters revegetated to cropland and pastureland (FLUCFCS 210o), pasture grasses such as Bahia (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*) shall also be considered desirable vegetation species.

2. Cover by nuisance vegetation species, including cattail (*Typha* spp.), climbing hemp vine (*Mikania* spp.), saltbush (*Baccharis* spp.), and willow (*Salix* spp.), shall be limited to less than 10% relative cover. However, any member of the species listed above shall not be considered a nuisance species in cases where it individually contributes less than 3% to the relative vegetation cover and does not dominate any patches greater than ¼-acre in size.

3. Invasive exotic vegetation including, but not limited to Cogon grass (*Imperata cylindrica*), melaleuca (*Melaleuca quinquenervia*), Chinese tallow (*Sapium sebiferum*), primrose willow (*Ludwigia peruviana*), and Brazilian pepper (*Schinus terebinthifolius*) shall not be considered an acceptable component of the vegetative community. Invasive exotic species shall mean those species listed on the Florida Exotic Pest Plant Council's 2009 list of invasive exotic plant species.

For All Forested Wetlands:

4. Species richness and dominance regimes in the canopy, sub canopy, and ground layer shall be within the range of values documented within the reference wetlands of the target community type. The relative age of the mitigation site when compared to mature systems shall be considered in the evaluation.

5. Canopy and shrub measurements shall be limited to those indigenous species that contribute to the shrub, sub canopy, and canopy strata of the mature forested wetlands in the Peace River basin. Desirable canopy and shrub species shall be reproducing naturally, as evidenced by the presence of saplings that are greater than one foot in height.

For Herbaceous Marshes (FLUCFCS 641):

6. Cover within herbaceous marshes shall be dominated by native species typical of reference marshes and shall be distributed in similar zonation patterns. Species richness and dominance regimes shall be within the range of values documented within the reference marshes. Non-vegetated open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

7. The outer transition zone of each herbaceous marsh, defined as the wetland area within 50 feet of the wetland edge, shall be supporting at least five shrubs per acre, as listed for the 641 community type on Appendix 7 - Table RP-2.

For Wet Prairies (FLUCFCS 643):

8. Cover within wet prairies shall be dominated by native species typical of reference wet prairies. Species richness and dominance regimes shall be within the range of values documented within the reference wet prairies. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Non-vegetated open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

For Bay Swamps (FLUCFCS 611):

9. The canopy layer shall contain at least five of the tree species listed for this community type on Appendix 7 - Table RP-2, shall be dominated by

(meaning that > 50% of all trees are) bay trees (*Magnolia virginiana, Persea palustris,* and *Gordonia lasianthus*), and shall have an average of at least 400 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). No area greater than one acre in size shall have less than 200 trees per acre.

10. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

For Gum Swamps (FLUCFCS 613):

11. The canopy layer shall contain at least five of the tree species listed for this community type on Appendix 7 - Table RP-2, shall be dominated by (meaning that > 50% of all trees are) swamp tupelo (*Nyssa sylvatica var. biflora*), and shall have an average of at least 400 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). No area greater than one acre in size shall have less than 200 trees per acre.

12. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

For Inland Ponds and Sloughs (FLUCFCS 616):

13. The canopy layer shall contain at least five of the tree species listed for this community type on Appendix 7 - Table RP-2, shall be dominated by (meaning that > 50% of all trees are) popash (*Fraxinus caroliniana*), and shall have an average of at least 400 live trees per acre that are at least 8 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). No area greater than one acre in size shall have less than 200 trees per acre.

14. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

For Mixed Wetland Hardwoods (FLUCFCS 617):

15. The canopy layer shall contain at least five of the tree species listed for this community type on Appendix 7 - Table RP-2 and shall have an average of at least 400 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). No area greater than one acre in size shall have less than 200 trees per acre. No one tree species shall constitute more than 50% of the total trees.

16. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

For Hydric Pine Flatwoods (FLUCFCS 625):

17. The canopy layer shall be dominated by (meaning that > 50% of all trees are) slash pine (*Pinus elliottii*) and shall have an average of at least 150 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). At least 5 of the tree species on Appendix 7 - Table RP-2 shall be present. No area greater than an acre in size shall have less than 50 trees per acre.

18. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 300 shrubs per acre.

19. Ground cover within hydric pine flatwoods shall be dominated by native species typical of reference hydric pine flatwoods. At least 10% of the relative cover shall be derived from wiregrass (*Aristida stricta var. beyrichiana*). Species richness and dominance regimes shall be within the range of values documented within the reference hydric pine flatwoods. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Non-vegetated open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

For Hydric Pine Savanna (FLUCFCS 626):

20. The canopy layer shall be dominated by (meaning that > 50% of all trees are) slash pine (*Pinus elliottii*) and shall have an average of at least 50 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). At least 5 of the tree species on Appendix 7 - Table RP-2 shall be present. No area greater than an acre in size shall have less than 50 trees per acre.

21. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

22. Ground cover within hydric pine savanna shall be dominated by native species typical of reference hydric pine savannas. At least 10% of the relative cover shall be derived from wiregrass (*Aristida stricta var. beyrichiana*). Species richness and dominance regimes shall be within the range of values documented within the reference hydric pine savannas. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Non-vegetated open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

For Slash Pine Swamp Forest (FLUCFCS 627):

23. The canopy layer shall be dominated by (meaning that > 50% of all trees are) slash pine (*Pinus elliottii*) and shall have an average of at least 400 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). At least 5 of the tree species on Appendix 7 - Table RP-2 shall be present. No area greater than one acre in size shall have less than 200 trees per acre.

24. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

25. Ground cover within slash pine swamp forest shall be dominated by native species typical of reference slash pine swamp forests. Species richness and dominance regimes shall be within the range of values documented within the reference slash pine swamp forests. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Non-vegetated

open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

For Wetland Mixed Hardwood-Coniferous Forest (FLUCFCS 630):

26. The canopy layer shall have an average of at least 400 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). Neither pines nor hardwoods shall account for more than 66% of the crown canopy composition. At least 5 of the tree species on Appendix 7 - Table RP-2 shall be present in sufficient numbers to individually contribute at least 10 percent to the canopy composition. No one tree species shall constitute more than 40% of the total trees. No area greater than one acre in size shall have less than 200 trees per acre.

27. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 100 shrubs per acre.

28. Ground cover within mixed hardwood-coniferous forests shall be dominated by native species typical of reference mixed hardwood-coniferous forests. Species richness and dominance regimes shall be within the range of values documented within the reference mixed hardwood-coniferous forests. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Non-vegetated open water and/or bare ground shall cumulatively be limited to less than 10% of the wetland area.

For Other Surface Waters:

29. Pine flatwoods other surface waters (FLUCFCS 411o) shall be dominated by (meaning that > 50% of all trees are) slash pine (*Pinus elliottii*) and/or longleaf pine (*Pinus palustris*), and shall have an average of at least 150 live trees per acre that are at least 12 feet tall (the height requirement does not apply to Cabbage Palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). At least 5 of the tree species on Appendix 7 - Table RP-2 shall be present. No area greater than an acre in size shall have less than 50 trees per acre. The shrub layer shall contain at least 5 of the species listed for the target community type on Appendix 7 - Table RP-2 and shall have an average of at least 300 shrubs per acre. Ground cover within pine flatwoods shall be dominated by native species

typical of reference pine flatwoods. At least 10% of the relative cover shall be derived from wiregrass (*Aristida stricta var. beyrichiana*). Species richness and dominance regimes shall be within the range of values documented within the reference pine flatwoods. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%. Bare ground shall cumulatively be limited to less than 10% of the community area.

30. Forested other surface waters areas other than pine flatwoods (FLUCFCS 427o, 434o, and 438o) shall have an average combined total of at least 400 live trees and shrubs per acre and shall consist of species typical of the specific FLUCFCS designation (427o, 434o, 438o) being created. Trees shall average at least 12 feet tall (the height requirement does not apply to Cabbage palm (*Sabal palmetto*), which shall have at least one leaf that is three (3) feet long including the stalk). At least 80 percent of the relative cover in the ground layer shall be native species typical of the native forested community type being created. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%.

31. Palmetto prairie other surface waters (FLUCFCS 321o) shall have an average of at least 25 trees per acre and 400 shrubs per acre. Greater than 50 percent of the shrubs shall be saw palmetto (*Serenoa repens*). At least 80 percent of the relative cover in the ground layer shall be native species typical of palmetto prairie or wet prairie communities. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%.

32. Mixed rangeland other surface waters (FLUCFCS 330o) shall have an average of at least 200 shrubs per acre. At least 80% of the relative cover in the ground layer shall be native species typical of mixed rangeland communities. Cumulative total cover by range grasses, such as Bahia grass (*Paspalum notatum*) and Bermuda grass (*Cynodon dactylon*), shall be less than 10%.

33. Cropland and pastureland other surface waters (FLUCFCS 210o) shall have sufficient vegetation cover to minimize soil erosion. No bare areas greater than 1/4th of an acre shall be present (see Rule 62C-16.0051(10)(b), F.A.C.).

d. Streams

1. Prior to release request for any restored stream segment, the as-built construction report required by Specific Condition 22m, shall be utilized to document that the as-built conditions in the restored stream segment are consistent with the specifications outlined in Appendix 10 (Stream Restoration Plan). Specifically, the as-built construction report shall demonstrate that drainage area, average bankfull cross-sectional area, average bankfull width, bankfull thalweg depth, hydraulic depth, width/depth ratio, pool depth, Rosgen class, sinuosity, stream length, bed slope, flood-prone width, valley slope, meander belt width, and functional process zone type are consistent with the specifications provided on Appendix 10 - Tables SRO-5A, SRO-5B, and pertinent exhibits in the Stream Restoration Plan. The report shall also demonstrate the successful establishment of all habitat amendments, as described on Appendix 10 - Table SRO-5C including number of bends/pools, number of large woody debris (LWD) snags, number of root wads, number of fine woody fascines, and percent palmetto lining the banks, as applicable for each restored stream reach.

2. For each restored stream segment, all stream banks shall be stable, though normal erosion and deposition zones shall be present as evidenced in part by stream morphology that falls within the approved Rosgen stream class (C or E).

3. Each reclaimed stream segment shall show the development of bankfull indicators resulting from the flow of water, as described in the USDA-NRCS's Stream Channel Reference Sites: An Illustrated Guide to Field Technique (Harrelson et al., 1994), in Chapter 3 of Blanton, Development of Bankfull Discharge and Channel Geometry Regressions for Peninsular Florida Streams (Blanton, 2008), or similar published studies.

4. Vegetation cover within the bankfull extent of the restored stream channels shall not exceed 50% of the channel bottom.

5. Tree roots, log jams, snags and other in-stream structure are present at intervals along the stream consistent with the specifications provided on Appendix 10 - Table SRO-5C.

6. Native riparian buffers shall be established as described in Section 2.5 of Appendix 10 (Stream Restoration Plan). The buffers for restored upland confined, wetland confined, and wetland underfit functional process

zones shall be at least 95, 60, and 25 feet wide, respectively, and shall be composed of native canopy, shrub, and groundcover species, as appropriate for the community type shown on Figure EN-15a. Relative cover by nuisance and exotic species within the riparian buffers shall be less than 10%.

7. Species richness of the macroinvertebrate community shall exceed or be within the range of values documented in the non-perennial reference streams or based on literature values for similar stream systems in peninsular Florida. The monitoring data shall also document a sustained presence (at least two consecutive sampling periods) of individuals from lotic and lentic macroinvertebrate species in proportion based on the range of values documented in non-perennial reference streams or based on literature values for similar stream systems in peninsular Florida, and a sustained presence of all functional feeding guilds of macroinvertebrates found in the reference streams. Reference streams are discussed further in Part B of the Monitoring Required Section. Determination of lotic versus lentic species and functional feeding guilds shall be assigned based on Merritt and Cummins, An Introduction to the Aquatic Insects of North America, or similar published literature. In instances when a genus or species is assigned as both lotic and lentic, each individual sampled of that genus/species shall be considered as one half of an individual for each designation.

8. Fish sampling shall show that a viable fishery resource has established in the restored stream segments. Species richness of the native fish community shall be within the range of values documented in the non-perennial reference streams of the applicable functional process zone being created, or other appropriate available data acceptable to the Department. Reference streams are discussed further in Part B of the Monitoring Required Section. If sampling efforts reveal that, although there is sufficient flow in the channel, fish are not reaching a particular restored reach because of habitat deficiency or the presence of other barriers to the passage of fish within the restored channel, then remedial measures shall be undertaken to enhance channel habitat and/or remove the barriers to fish passage.

e. Wetlands and Other Surface Waters Jurisdiction

1. Mine wide, not less than 488.6 acres of created forested wetlands, 987.7 acres of created herbaceous wetlands, 234.5 acres of created other surface waters, including 43,838 linear feet of created stream channels shall be

determined to be wetlands or other surface waters. The minimum acreage for each wetland or other surface water identified on Figure EN-16 shall be achieved as indicated on Table E-2. At least the average lengths of each stream segment identified on Appendix 10 - Figure SRO-4 (A-F) shall be achieved as indicated on Appendix 10 - Table SRO-5A. However, minor changes in the size, shape, or location of individual wetlands, streams and other surface waters may be acceptable subject to review and written approval from the Bureau of Mining and Minerals Regulation. The acreage of wetlands and other surface waters shall be determined pursuant to Chapter 62-340, F.A.C. Stream lengths shall be determined based on GPS mapping of the channel thalweg.

f. Long-Term Management Plan for All Fire-Dependent Communities:

Prior to release request, all mitigation sites which involve the creation of fire-dependent communities, including freshwater marshes, wet prairies, hydric pine flatwoods, and/or hydric pine savanna, shall have in place a long-term management plan that includes prescribed burning at ecologically appropriate intervals. For the purposes of this condition, ecologically appropriate fire return interval shall be determined through consultation of the Florida Natural Areas Inventory's Guide to the Natural Communities of Florida (2010 Edition), the Soil Conservation Service's 26 Ecological Communities of Florida (February, 1981), or other published literature documenting natural fire return intervals in the appropriate community type. Mitigation sites that are within the footprint of the post-reclamation Level 1 or Level 2 conservation easement required by Specific Condition 4 shall be considered to have satisfied this condition.

26. MITIGATION RELEASE PROCEDURES: The required mitigation shall be released when Specific Condition 25 has been met. Mitigation wetlands, streams and other surface waters shall be released as follows:

a. The permittee shall notify the Department whenever the permittee believes the mitigation is ready for release, but in no event earlier than two years after the mitigation is completed. This notice shall be sent to the Chief, Bureau of Mining and Minerals Regulation, at the Department of Environmental Protection, 2051 East Dirac Drive, Tallahassee, FL 32310;

b. Within one hundred twenty (120) days of receipt of this notice, the Department shall notify the permittee that either the Department has determined:

1. That the mitigation can be released; or

2. That the mitigation cannot be released, identifying those elements of the mitigation that do not meet the release criteria.

27. CLAY SETTLING AREAS: **The clay settling areas shown on Appendix 5 - Figure BP-2 (1-5), and described in Appendix 5 (Backfill Plan) are conceptually approved in accordance with the following:**

a. An updated Life of Mine Waste Disposal Plan shall be completed and submitted annually for clay settling areas planned or constructed within the South Pasture Extension Mine. The annual update shall be submitted to the Bureau of Mining and Minerals Regulation on or before March 1st of each year following permit issuance, and until the final reclamation release for settling areas within the South Pasture Extension Mine. The annual update shall include updated field monitoring and clay sampling data indicating, at a minimum, the average filled elevation and clay surface area, effective depth, volume, average solids content, and the corresponding calculated incremental and cumulative mass of dry clay disposed for each clay settling area. The annual update shall also include results from a corresponding phosphatic waste clay consolidation model, an updated clay settling area filling schedule, and the projected ultimate consolidated clay fill elevations, based on applicable yearly clay production quantities or estimates.

b. The permittee shall request, in writing, and receive approval from the Bureau of Mining and Minerals Regulation (Mandatory Phosphate Section) prior to commencing construction of any new clay settling area within the South Pasture Extension Mine under this permit. The requested approval shall include information demonstrating whether or not additional waste clay disposal capacity is needed when considering the most recently updated Life of Mine Waste Disposal Plan, and a comparison of updated clay production estimates with the remaining storage capacities for existing clay settling areas in the South Pasture and South Pasture Extension Mine.

c. The permittee shall provide detailed construction plans for any dam break diversion and containment systems to the Bureau of Mining and Minerals Regulation for review and approval at least three months prior to initiating construction. Any proposed delays in the completion of reclamation or mitigation due to construction and operation of the containment systems shall be noted in the Annual Status Reports required by Specific Condition 8.

d. The outfalls for all reclaimed clay settling areas shall be designed to manage the mean annual, 25-year, and 100-year peak storm events while minimizing the potential for downstream erosion and maintaining the volume, frequency and rate of long-term low flow runoff that existed prior to mining. Interim and final outfall installations must be approved prior to commencement of construction. Interim and final outfall configurations shall take into account the effects of additional incremental clay consolidation and the ultimate consolidated clay elevation, respectively, based on consolidation modeling and yearly data collected for the clay monitoring program. Reclaimed clay settling areas and associated final outfall structures shall be designed and maintained within the South Pasture Extension Mine to preclude non-modeled storage of rainfall runoff below the lowest outfall control elevation.

e. Reclamation of Clay Settling Area SPX4 shall include routing of surface water runoff from the settling area's reclaimed slopes and toe roads toward the preservation node for stream segment BC-NC-11 through construction of minor drainage swales to be generally oriented parallel to the centerline of the SPX4 embankment.

28. The surface water management system approved in this permit shall meet the following requirements:

a. All construction, operation and maintenance shall be as set forth in the plans, specifications, and performance criteria approved by this permit;

b. If revisions or modifications to the permitted project are required by other regulatory agencies, the Department shall be notified of the revisions so that a determination can be made whether a permit modification is required;

c. The operational phase applies to those lands disturbed by mining operations that no longer report to any surface water discharges permitted under Chapter 62-620, F.A.C., but have not been released in accordance with Specific Conditions 25 and 26 above and the reclamation requirements of Chapter 62C-16, F.A.C., as applicable. The operational phase shall not become effective until a Florida Registered Professional Engineer certifies that all facilities including mitigation and restoration have been constructed in accordance with the design approved by the Department. Within ninety days after removal of the ditch and berm and separation of the surface water management system of a reclamation parcel (as defined in Chapter 62C-16, F.A.C.) from lands that report to any surface water discharges permitted under Chapter 62-620, F.A.C., the permittee shall submit one set of certified record drawings of the surface water management system as actually

constructed and notify the Department that the facilities are ready for inspection and approval.

d. The permittee shall require the contractor to review and to maintain in good condition at the construction site a copy of this permit complete with all conditions, attachments, exhibits, and permit modifications issued for this permit. The complete permit copy must be available for review upon request by Department representatives;

e. Within thirty days after sale or conveyance of the permitted surface water management system, the land on which the system is located, or portions thereof, the owner in whose name the permit was granted shall notify the Department of such change of ownership. Transfer of this permit or portions thereof, shall be in accordance with the provisions of Chapter 373, F.S., and Chapters 40D-4 and 40D-1, F.A.C. All terms and conditions of this permit shall be binding upon transfer.

f. Once a reclamation parcel has met the requirements of Chapter 62C-16, F.A.C and all mitigation areas within the reclamation parcel have been released in accordance with Specific Conditions 25 and 26 above, the permittee shall request release from the operational phase. Upon review and approval by the Department that all reclamation and mitigation requirements have been met, the surface water management system shall be deemed abandoned.

29. 5-YEAR REVIEW: The Department shall review this permit at the end of the first five-year period and each subsequent five-year period thereafter, if applicable. The review shall begin 90 days before the end of the five-year period. The Department shall review the file and shall inspect the project site for compliance with the terms of the permit, including the General, Specific Conditions and Monitoring Requirements. This inspection will be in conjunction with the quarterly inspections conducted by Department staff.

a. If the Department determines that the permittee is not in compliance with the terms of the permit, revocation or suspension of the permit may be initiated pursuant to rule 62-4.100, F.A.C.

b. As an element of the five-year periodic review, the Department shall notify the permittee of any additional permit conditions to be added to the original permit based on rules adopted during the preceding five-year period.

30. MONITORING REQUIRED:

a. General Monitoring Requirements:

1. Annual status reports shall be submitted to the Bureau of Mining and Minerals Regulation detailing the progress of this restoration program as specified in Specific Condition 8. Annual hydrology and water quality monitoring reports shall be submitted to the Bureau of Mining and Minerals Regulation as specified in Specific Condition 9. Vegetation monitoring reports for each mitigation area shall be submitted to the Bureau of Mining and Minerals Regulation beginning one year after planting as specified in Specific Condition 9. Subsequent vegetation statistical reports shall be submitted in years two, three, five, and biennially thereafter until release. All monitoring data (other than data collected for compliance purposes) shall be submitted as available, but by no later than March 1st of the following year as specified in Specific Condition 9. Please clearly include in the reports the following statement: "**This information is being provided in partial fulfillment of the monitoring requirements in Permit No. 0294666-001.**"

2. The permittee shall submit vegetation and hydrology monitoring plans detailing specific sampling techniques and proposed sampling locations for approval at least 60 days prior to sampling. Methods used shall be consistent in reference sites and created sites throughout permit duration. The methods should provide an accurate representation of site conditions.

3. No additional permits are required under Part IV of Chapter 373, F.S., for the installation of piezometers, monitoring wells, staff gauges or any other devices associated with conducting the monitoring required by this permit.

4. Annual hydrology reports shall include the daily rainfall amounts for the South Pasture Extension Mine, with monthly totals.

5. Proposed minor changes to monitoring locations, parameters and frequencies shall be submitted to the Department in writing. If approved, such changes shall not be considered a formal modification of this permit and shall not require a fee.

6. If it is determined by Department staff, based on visual inspection and review of the monitoring reports, that the restoration efforts are not trending toward meeting the release conditions outlined in Specific Condition 25 within the applicable time period afforded by Specific Condition 23, the permittee shall have 30 days following notification by the Department to submit proposed

corrective actions for attainment of release criteria. Corrective actions shall be implemented within 90 days of written approval by the Department.

b. Selection of Reference Wetlands and Reference Streams

1. Several high-quality wetlands of each community type to be created shall be selected by the permittee and submitted the Bureau of Mining and Minerals Regulation for review and approval. For the purposes of this section, "high quality" shall mean wetlands that achieve a score of at least 0.7 through application of Chapter 62-345, F.A.C. Additional stage and hydroperiod data shall be collected from these representative wetlands. The permittee shall submit a proposed sampling plan including vegetation and hydrology sampling methods, locations and sampling frequencies to the Bureau of Mining and Minerals Regulation for approval within one year of permit issuance.

2. Several high-quality first order reference streams representing each type of functional process zone to be created under this permit shall be selected by the permittee and submitted to the Bureau of Mining and Minerals Regulation for review and approval. For the purposes of this section, "high quality" shall mean streams that achieve a score of at least one of the following: a 0.7 through application of Chapter 62-345, F.A.C.; suboptimal on the Department's Physical Stream Habitat Assessment (DEP-SOP-001/01: Form FD 9000-5); or comparable score using a comparable method applicable to streams proposed by the permittee and approved by the Department. All reference streams shall be located within the Middle Peace River Basin or comparable hydrophysiographic region. The permittee shall submit a proposed stream habitat, macroinvertebrate, and fish sampling plan including sampling methods, locations and sampling frequencies to the Bureau of Mining and Minerals Regulation for approval within one year of permit issuance.

c. Compliance Monitoring: Water Quality and Water Quantity

1. Water quality data collected during dragline/utility corridor construction and removal shall be submitted weekly. Water quality data collected in accordance with Specific Condition 11 shall be submitted with the Annual Monitoring Reports. All monitoring reports shall include the following information: (1) permit number; (2) dates of sampling and analysis; (3) a statement describing the methods used in collection, handling, storage and analysis of the samples; (4) a map indicating the sampling locations; and (5) a statement by the individual responsible for implementation of the sampling

program concerning the authenticity, precision, limits of detection and accuracy of the data. Monitoring reports shall also include the following information for each sample that is taken: (1) time of day samples taken; (2) water temperature (°C); (3) depth of water body; (4) depth of sample; (5) antecedent weather conditions; and (6) direction and velocity of flow. Water quality shall be monitored in accordance with Table MR-A.

2. Hydrology data shall be submitted with the Annual Monitoring Reports, due in March of each year, as specified in Specific Condition 9. Hydrology data shall be compared and presented in both a tabular and graphical format, with the on-site daily rainfall data. Any hydrological and/or biological indicators of wetland impacts noted during the monitoring program should be fully discussed in the annual report in regard to: (1) the overall hydrologic setting, (2) whether the noted impacts are negative or positive, and (3) whether the said impacts are of any significance.

3. Water levels in preserved wetlands and other surface waters shall be monitored in accordance with Table MR-B.

4. A temporary mixing zone of 50 m shall be allowed adjacent to construction in waters of the State pursuant to rule 62-4.244, F.A.C. This 50-m zone applies only during construction, including removal and restoration of the dragline/utility crossing described in Specific Condition 17. This 50-m zone shall be considered the limits of the temporary mixing zone for turbidity during construction. If monitoring reveals levels at the compliance site more than 29 NTUs above the level at the corresponding background site upstream from the activity, construction activities shall cease immediately and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Any such occurrence shall also be immediately reported as described in Specific Condition 13.

d. Mitigation Monitoring

1. All herbaceous vegetation monitoring shall occur during or immediately after the summer growing season. The reports should include statistical summaries of all monitoring required under this section, a description of the methods used to collect the data (include citations and strata definitions (trees, shrubs, groundcover), photographs taken from the same permanent stations, and maps of sampling locations. Means and one standard error of the mean for each variable measured shall be reported in each report. Percent cover shall be reported as both total and relative. Information shall be reported

graphically against time in the final report submitted prior to the request for release. Reports shall be submitted in the following format:

a. Data shall be reported separately for individual wetlands. For wetlands that include both herbaceous and forested areas, provide separate groundcover data tables for each wetland type.

b. DEP mitigation data shall be reported separately from data collected from non-DEP mitigation areas.

c. Shrub data shall be reported separately.

d. Summary data tables including the following information shall be provided for each wetland and wetland type:
   Trees:
   - Density of each species (numbers per acre, not just numbers sampled)
   - Mean height of each species
   - Numbers recruited if they meet the specified tree definition

   Shrubs:
   - Density of each species (numbers per acre, not just numbers sampled)
   - Numbers recruited if they meet the specified shrub definition

   Ground cover (report both total and relative cover):
   - percent cover of each species
   - percent cover of desirable species (as defined in Specific Condition 25C1).
   - percent cover of nuisance species (as defined in Specific Condition 25C1).
   - percent cover of upland species
   - percent cover of open water (total cover only)
   - percent cover of bare ground (total cover only)
   - qualitative description of vegetation zonation along the wetland ecotone

e. If any supplemental planting was done, provide a table that lists species and numbers planted.

f. Provide species data by both scientific and common name.

2. Water quantity shall be monitored in accordance with Table MR-B. Water quantity data shall be compared and presented in both a tabular and graphical format, with the on-site daily rainfall data being collected at the South Pasture Extension Mine.

3. Soils, stream morphology, stream macroinvertebrates, and stream fish shall be monitored as described in Tables MR-B and MR-C.

Tables MR-A through MR-C are provided below for convenience only and the preceding conditions shall control over the tables to the extent there is a conflict.

MR-A: Water Quality Monitoring

Location	Parameters	Proposed Method	Frequency/Duration	Compliance Criteria
Surface Water Stations BCM-1, BCM-2, BCT-1, BCT-2, LCM-2, and LCT-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, as shown on Figure EN-11	Temperature, pH, DO, Conductivity, Turbidity, Total Alkalinity, Hardness, TDS, TSS, TP, Ammonia, Ortho Phosphate, Total Nitrogen, TKN, Nitrate/Nitrite, Fluoride, Sulfate, TOC, BOD, Chloride, and Chlorophyll-a.	DEP Standard Operating Procedures or according to an approved QAPP	**Monthly** throughout mine life	Class III Standards
Surface Water Stations BCM-1, BCM-2, BCT-1, BCT-2, LCM-2, and LCT-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, as shown on Figure EN-11	Color, Oil and Grease, Hardness, Aluminum, Selenium, Calcium, Magnesium, Arsenic, Cadmium, Chromium, Iron, Lead, Mercury, Nickel, Zinc, Gross Alpha and Radium 226/228	DEP Standard Operating Procedures or according to an approved QAPP	**Bimonthly** throughout mine life	Class III Standards

Table MR-A (Continued)

Location	Parameters	Proposed Method	Frequency/Duration	Compliance Criteria
In the surficial and intermediate aquifers at the property boundaries. At least one set of monitoring wells shall be monitored within each section of land within the South Pasture Extension Mine.	pH, Temperature, DO, Conductivity, Turbidity, TDS, Total Alkalinity, Hardness, TP, Ortho Phosphate, Total Nitrogen, TKN, Nitrate/Nitrite, TSS, Fluoride, Sulfate, Chloride, Color, Oil and Grease, Aluminum, Selenium, Calcium, Magnesium, Arsenic, Cadmium, Chromium, Iron, Lead, Mercury, Nickel, Zinc, Gross Alpha and Radium 226/228.	DEP Standard Operating Procedures or according to an approved QAPP	**Quarterly** throughout mine life	Class G-II Standards
50 m upstream and 50 m downstream of dragline/utility corridor	Turbidity	DEP Standard Operating Procedures or according to an approved QAPP	**Daily** during construction and removal of dragline/utility corridor	Class III Standards
50 m upstream and 50 m downstream of the point of severance and reconnection of each wetland	Turbidity	DEP Standard Operating Procedures or according to an approved QAPP	**Daily** during severance or reconnection to preserved wetlands	Class III Standards
In stream and mitigation wetlands at or near the connection to preserved wetlands/streams	Turbidity, Temperature, DO, pH, Conductivity	DEP Standard Operating Procedures or according to an approved QAPP	**Monthly** from May through October prior to reconnection to preserved wetlands	Class III Standards
In streams and mitigation wetlands at or near vegetation transects	Turbidity, Temperature, DO, pH, Conductivity	DEP Standard Operating Procedures or according to an approved QAPP	**Monthly** from May through October of the year prior to release request	Class III Standards

Table MR-B: Water Quantity Monitoring

Location	Parameters	Proposed Method	Frequency/Duration	Compliance Criteria
At least two rain gauges shall be installed at the South Pasture Extension Mine. Locations shall be approved in writing by the Department.	Rainfall	Rain gauge	**Daily**	N/A
Surface Water Stations BCM-1, BCM-2, BCT-1, BCT-2, BCT-3, LCT-1, LCT-2, and LCM-2, as well as at the property boundaries downstream of stations TCT-1 and TCM-2, as shown on Figure EN-11	Water levels and flow, hydrographs	Staff gauge/ calibrated flow rating curve/flow meter	**Continuously** through mine life. Flow measurements taken **monthly or as needed** to refine the existing flow rating curves.	Downstream flows shall not be reduced to the point where lack of flow exiting the mine property results in degradation of natural systems or causes water quality violations in major tributary systems
At least one piezometer shall be installed every 1,000 feet along the property boundary and along the boundaries of wetlands within preserved areas.	Water levels*	Piezometers/ wells	**At least four years prior to the initiation of mining operations and then continuously** through mine life, in accordance with Specific Condition 14.	Water levels shall not be reduced below the P95 level for the season in preserved areas or at property boundaries, in accordance with Specific Condition 14.

Table MR-B (Continued)

Location	Parameters	Proposed Method	Frequency/Duration	Compliance Criteria
In preserved wetlands and other surface waters adjacent to mining areas	Soil moisture, plant stress *	Visual inspection and soil moisture meter	**Weekly** for at least one wet season prior to mining adjacent to wetlands, during mining operations, and until the surrounding watershed is complete through contouring	Soils moist enough to support wetland vegetation and prevent oxidation and adverse impacts to preserved wetlands
In off-site wetlands and other surface waters adjacent to mining areas	Water levels	Visual inspection	**Weekly** for at least one wet season prior to mining adjacent to wetlands, during mining operations, and until the surrounding watershed is complete through contouring	Water levels shall not be significantly reduced from premining levels
In recharge ditches	Water levels	Staff gauges and visual inspection	**Daily** visual inspections and **Weekly** monitoring during mining operations, and until the surrounding watershed is complete through contouring	Maintained to simulate normal seasonal fluctuations of water in adjacent wetlands and other surface waters
In all mitigation wetlands	Water levels, average water depth, hydroperiod, hydrographs	Staff gauges, piezometers, and visual inspection	Piezometers **weekly** for at least 2 years after contouring is complete for initial hydrological assessment, then continuing until release	Within the range of values documented in reference wetlands of the appropriate community type
In most downstream portion of each created stream reach	Water levels, flow, hydrographs, occurrence of bankfull events	Staff gauge/ calibrated flow rating curve/flow meter	Stage - **continuously** until release Flow measurements - **monthly or as needed** to refine the existing flow rating curves.	Bankfull stage and discharge volumes shall be similar to the values predicted on Table SRO-5A (in the ranges typical of Exhibit SRO-5), and shall occur at a frequency consistent with reference streams of the appropriate Functional Process Zone

* The Department may reevaluate the locations, methods, timing and compliance criteria for this parameter following review of any modifications to the monitoring requirements of the SWFWMD Water Use Permit

Table MR-C: Vegetation, Soil, Stream Macroinvertebrate, and Stream Fish Monitoring

Monitoring Type	Location	Parameters	Proposed Method	Frequency/ Duration	Compliance Criteria
Vegetation	Randomly selected replicate sites along several transects across each mitigation wetland.	Species list and % cover, FLUCCS level III map, % bare ground and open water, nuisance spp. cover, upland spp. cover, tree density, shrub density, tree height, tree dbh (starting year 5), fruit and seedlings (starting year 7)	Modified line-intercept, belt-transects; point-frames, elongated quadrats	Years 1, 2, 3, 5, then every other year through the year prior to release request	Specific to community type being restored. See Specific Condition 25C
Soils	In mitigation wetlands at or near vegetation transects	Substrate description (hydric indicators/ depth to hydric indicators), litter accumulation, compaction, soil moisture	soil auger, shovel, penetro-meter, soil moisture meter	During vegetation sampling	Development of hydric soil characteristics, soil moisture
Stream Channel Integrity and Morphology	Entire channel profile and representative cross sections	Bank and channel stability, map of channel, sinuosity, stream length, stream slope, bankfull indicators present, bankfull area, depth and width, max depth, width/depth ratio, entrenchment ratio, radius of curvature, large woody debris abundance, vegetation cover in stream channel.	Visual inspection Survey equipment, and GPS	Visual inspection of the channel after significant rain events for at least the first two years after contouring. GPS entire channel, survey profile and representative cross sections years 1, 2, 3, 5, 7 and 10	Stable channel and banks, no significant erosion or bank undercutting, development of bankfull indicators, stream morphology and habitat parameters within the range of values appropriate for the designed stream type (Table SRO-5A - 5C of Stream Restoration Plan). No more than 50% vegetation cover in restored stream channels.

Table MR-C (Continued)

Monitoring Type	Location	Parameters	Proposed Method	Frequency/ Duration	Compliance Criteria
Macro-invertebrates	Representative reaches in each reclaimed stream reach	Number and identity of each taxa, diversity, richness, functional feeding guilds (Merritt & Cummins)	Dipnet sampling, Hester Dendys (DEP SOPs)	Annually for at least two years prior to release request. Sampling shall be conducted in late August or early September	Sustained presence of lotic taxa and lentic macroinvertebrate species in proportion based on the range of values documented in the non-perennial reference streams, and species diversity and richness within ranges found in reference streams of the appropriate Functional Process Zone. All functional feeding guilds present (see Condition 25.D.7).
Fish	At least one representative station in each reclaimed stream reach	Number and identity of each taxa, diversity, richness, trophic guilds present	Seine/ Electro-shocking	In year 5 and for two years prior to release request. Sampling shall be conducted in late August or early September	Native fish species diversity and richness within the ranges found in reference streams of the appropriate Functional Process Zone

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Mark Thomasson, P. E.
Director, Division of Water Resource Management
2600 Blair Stone Road, Mail Station 3500
Tallahassee, Florida 32399-2400
(850) 245-8035

Attached Tables:		**Received Date**
Table ERP-A-1:	Adjacent Property Owners	October 27, 2011
Table EN-8:	Existing and Proposed Land Uses on the CF SPE	October 27, 2011
Table CRP-3:	Estimated Time Schedule for Mining Operations and Reclamation	October 27, 2011
Table CRP-4:	Reclamation Parcel Acreage by Post-Reclamation Land Use and Section-Township-Range (STR)	October 27, 2011
Table CRP-5:	Wetlands, Streams, and Lakes by Reclamation Parcel	October 27, 2011
Section E Table E1:	Impacts to Wetlands and Other Surface Waters	October 27, 2011
Table E-2:	Project On-Site Mitigation Summary	October 27, 2011
Table EN-7A	UMAM Functional Gain vs. Functional Loss Summary	November 8, 2011
Table EN-7B	UMAM Impact Scores and Functional Loss By Assessment Area	November 8, 2011
Table EN-7C	UMAM Mitigation Scores and Functional Gain By Assessment Area	November 8, 2011
Attached Figures:		**Received Date:**
Figure ERP-A-1:	Adjacent Property Ownership	October 27, 2011
Figure ERP-C-1:	USGS Quadrangle Map	October 27, 2011
Figure ERP-C-2:	Location Map	October 27, 2011
Figure ERP-C-3 (1-15):	DEP Wetlands	October 27, 2011
Figure ERP-C-4:	Mine Plan	October 27, 2011
Figure EN-3:	NRCS Soils Map	October 27, 2011
Figure EN-4:	Existing Topography Overview Map	October 27, 2011
Figure EN-4a (1-4):	Existing Topography Map	October 27, 2011
Figure EN-5:	Existing Land Use Overview Map	October 27, 2011

Figure EN-5a (1-15):	Existing Land Use Map	October 27, 2011
Figure EN-5b:	Generalized Existing Land Use Map	October 27, 2011
Figure EN-6:	FDEP Wetlands Map	October 27, 2011
Figure EN-7:	Impact Areas	October 27, 2011
Figure EN-8:	Wetland Impacts	October 27, 2011
Figure EN-11:	Water Quality and Biotic Sampling Locations Map	October 27, 2011
Figure EN-12:	Current/Without Project UMAM Scores Overview	November 8, 2011
Figure RAI – 11/2/11 UMAM 4:	With Project Summary Scores	November 8, 2011
Figure RAI – 11/2/11 UMAM 4a (1-15):	With Project Summary Scores	November 8, 2011
RAI – 8/17/10 UMAM 8:	OSW Naming Group Locations	October 27, 2011
RAI 8/17/10 UMAM 8a:	RAI 8/17/10 UMAM 8a	October 27, 2011
Figure 10/17/2011	Post-Reclamation OSW Naming Group Locations	November 8, 2011
Figure EN-13:	Proposed Conservation Easement	October 27, 2011
Figure EN-14:	Preservation and Enhancement Areas	October 27, 2011
Figure EN-15:	Reclamation Land Use Overview	October 27, 2011
Figure EN-15a (1-15):	Post-Reclamation Land Use	October 27, 2011
Figure EN-15b:	Generalized Post-Reclamation Land Use	October 27, 2011
Figure EN-16 (1-15):	Post-Reclamation Wetlands	October 27, 2011
Figure EN-17 (Overview):	Post-Reclamation Topography	October 27, 2011
Figure EN-17 (1-4):	Post Reclamation Topography	October 27, 2011
Figure EN-18a:	Pre-Mining Typical Geologic Cross-Section	October 27, 2011
Figure EN-18b:	Post-Reclamation Typical Geologic Cross-Section	October 27, 2011
Figure EN-19:	Ditch Face Stabilization Cross-Sections	October 27, 2011
Figure EN-20:	Typical Ditch Block Details	October 27, 2011
Figure E-11-1:	Monitoring Locations	October 27, 2011
Attached Documents:		**Received Date:**
Appendix 1:	South Pasture Extension Mine and Production Plan	February 7 , 2012
Appendix 2:	South Pasture Extension Stormwater Pollution Prevention Plan	February 7, 2012
Appendix 3:	Brushy Creek Utility Crossing Plan Set	October 27, 2011
Appendix 4:	South Pasture Extension Recharge Modeling Report	October 27, 2011
Appendix 5:	South Pasture Extension Life-Of-Mine Backfill Plan Update	October 27, 2011
Appendix 6:	Flood Modeling of the South Pasture Extension for	October 27, 2011

	Pre-Mining and Post-Reclamation Conditions	
Appendix 7:	Reclamation Plan for the CF Industries, Inc. South Pasture Extension	October 27, 2011
Appendix 8:	Representative Reclaimed Wetland Transect Drawings	October 27, 2011
Appendix 9:	Integrated Simulations for the South Pasture Extension Mine for Pre-Mining and Post-Reclamation Conditions	October 27, 2011
Appendix 10:	South Pasture Extension Stream Restoration Plan	October 27, 2011
Appendix 11:	Mitigation Cost Estimates	November 18, 2011
Appendix 12:	CF Industries South Pasture Extension Wildlife Habitat Management Plan	February 7, 2012
Appendix 13:	BMP's for Non-clay, Phosphate Mining and Reclamation Berms and Impoundments	(attached)
Appendix 14:	CF Industries, Inc. Environmental Management Plan for Water Use Permit No. 20003669.010	July 18, 2011
Appendix 15:	South Pasture Extension Troublesome Creek Reroute Ditch Modeling and Conceptual Design	March 12, 2012

1,161 Pages Attached

Copies furnished via E-Mail to: Hardee County Permitting 2012

Alissa Powers – Manatee Co. Natural Resources Dept. – Alissa.Powers@mymanatee.org
Amelia Savage – Hopping, Green & Sams, P.A. – amelias@hgslaw.com
Charles A. Schnepel – USACE – charles.a.schnepel@usace.army.mil
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Dee Allen – Mosaic Fertilizer, LLC – deedra.allen@mosaicco.com
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Rosemarie Garcia – Mosaic Fertilizer, LLC – Rosemarie.Garcia@mosaicco.com
Bureau of Mining and Minerals Regulation

CERTIFICATE OF SERVICE

The undersigned duly designated Deputy Clerk hereby certifies that this **ENVIRONMENTAL RESOURCE PERMIT**, including all copies, was mailed or e-mailed before the close of business on this 22nd day of June 2012, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, Florida Statutes, with the designated Department Deputy Clerk, receipt of which is hereby acknowledged.

Deputy Clerk: _____ **Date:** 06/22/12

Department of the Army
Permit Number SAJ-1993-01395 (SP-JPF)

Attachment C

Attachment C

AS-BUILT CERTIFICATION BY PROFESSIONAL ENGINEER

Submit this form and one set of as-built engineering drawings to the U.S. Army Corps of Engineers, Enforcement Section, address of Enforcement PM, City, State, zipcode. If you have questions regarding this requirement, please contact the Enforcement Branch at 904-232-3131.

1. Department of the Army Permit Number: SAJ- - (-)

2. Permittee Information:

Name: _____

Address: _____

_____

3. Project Site Identification (physical location/address):

_____

_____

_____

4. As-Built Certification: I hereby certify that the authorized work, including any mitigation required by Special Conditions to the permit, has been accomplished in accordance with the Department of the Army permit with any deviations noted below. This determination is based upon on-site observation, scheduled, and conducted by me or by a project representative under my direct supervision. I have enclosed one set of as-built engineering drawings.

_____ _____

Signature of Engineer Name (*Please type*)

_____ _____

(FL, PR, or VI) Reg. Number Company Name

_____ _____ _____

City State ZIP

(Affix Seal)

_____ _____

Date Telephone Number

Identify any deviations from the approved permit drawings and/or special conditions (attach additional pages if necessary):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Department of the Army
Permit Number SAJ-1993-01395 (SP-JPF)

Attachment D

Attachment D

Prepared by:
Permittee: _____
Address: _____
_____
Phone:_____

NOTICE OF DEPARTMENT OF THE ARMY PERMIT

TAKE NOTICE the U.S. Army Corps of Engineers (Corps) has issued Department of the Army Permit SAJ- - to (Permittee) on , 200 , authorizing impacts to waters of the United States (including wetlands) in accordance with Section 404 of the Clean Water Act on a parcel of land known as Folio/Parcel ID: _____ encompassing _____ acres located within a portion of Section _____, Township _____ south, Range _____ east, _____, _____ County, Florida.

Within 30 days of any transfer of interest or control of that portion of the premises containing the area authorized to be filled (or any portion thereof), the Permittee must notify the Corps in writing of the property transfer by submitting the completed permit transfer page of the permit. Notification of the transfer does not by itself constitute a permit transfer. Therefore, purchasers of that portion of the premises containing the area authorized to be filled (or any portion thereof) are notified that it is unlawful for any person to construct, alter, operate, maintain, remove or abandon any works, including dredging or filling, without first having obtained a permit from the Corps in the purchaser's name.

The subject Permit concerns only that portion of the property determined to fall within the jurisdiction of the Corps and this notice is applicable only to those portions of the subject property containing areas authorized to be filled and wetland mitigation/conservation areas subject to the Permit.

Conditions of the Permit: The Permit is subject to General Conditions and Special Conditions which may affect the use of the subject property. Accordingly, interested parties should closely examine the entire Permit, all associated applications, and any subsequent modifications.

To obtain a copy of the permit in its entirety submit a written request to:
U.S. Army Corps of Engineers
Regulatory Division
Post Office Box 4970
Jacksonville, Florida 32232-0019

Questions regarding compliance with these conditions should be directed to:
U.S. Army Corps of Engineers
Regulatory Division - Mining Team
10117 Princess Palm Drive, Suite 120
Tampa, FL 33610

Conflict Between Notice and Permit
This Notice of Permit is not a complete summary of the Permit. Provisions in this Notice of Permit shall not be used in interpreting the Permit provisions. In the event of conflict between this Notice of Permit and the Permit, the Permit shall control.

This Notice is Not an Encumbrance
This Notice is for informational purposes only. It is not intended to be a lien, encumbrance, or cloud on the title of the premises.

Release
This Notice may not be released or removed from the public records without the prior written consent of the Corps.

This Notice of Permit is executed on this _____ day of _____, 20____. This document is being submitted for recordation in the Public Records of _____ County, Florida as part of the requirement imposed by Department of the Army Permit No SAJ- - issued by the Corps.

Permittee:
_____
Address:
_____
_____
____
Phone:_____
___

STATE OF FLORIDA
COUNTY OF _____

The foregoing instrument was acknowledged before me this _____day of _____, 20____, by _____, who is personally known to me or has produced _____ as identification.

_____
Notary Public

(seal)

_____
Print

My Commission Expires_____

Department of the Army
Permit Number SAJ-1993-01395 (SP-JPF)

Attachment E

Attachment E

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

June 9, 2014

Alan M. Dodd, Colonel
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207

Service CPA Code: 41420-2010-FA-0114
Service Consultation Code: 41420-2010-F-0473
Date Received: August 12, 2013
Formal Consultation Initiation Date: February 28, 2013
Project: South Pasture Extension Mine
County: Hardee

Dear Colonel Dodd:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) for the proposed CF Industries, Inc., (Applicant) South Pasture Phosphate Mine Extension project (SPE), in Hardee County, Florida, and its effects on the threatened Audubon's crested caracara (caracara; *Polyborus plancus audubonii*), threatened eastern indigo snake (indigo snake; *Drymarchon corais couperi*), and endangered wood stork (*Mycteria americana*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 et seq.). The Service concurs with the U.S. Army Corps of Engineers' (Corps) determination of "may affect, but not likely to adversely affect" for the endangered Florida panther (panther; *Puma concolor coryii*), threatened Florida scrub-jay (scrub-jay; *Aphelocoma coerulescens*), and endangered Florida grasshopper sparrow (FGS; *Ammodramus savannarum floridanus*). A complete administrative record of this consultation is on file in the Service's South Florida Ecological Services Office (SFESO), Vero Beach, Florida.

This BO is based on information provided in the July 2012 Biological Assessment (BA) prepared by Cardno Entrix, Inc., (Cardno), as well as letters, maps, meetings, field investigations, telephone conversations, email correspondence, and other sources of information. The Corps provided effect determinations of "may affect" for the caracara, indigo snake, and wood stork; they also provided "may affect, not likely to adversely affect" determinations for the panther, FGS, and scrub-jay. The Service concurs with the Corps' effect determinations.

Consultation History

December 14, 2011 - The environmental consultant (Cardno), the applicant, and the Service met to discuss the project and identify its potential effects on listed species. The Service indicated the focus of the evaluation conducted for assessing potential project impacts to species should be on the caracara, the FGS, and the indigo snake.

February 29, 2012 - Cardno, Flatwoods, Inc., the applicant, and the Service visited the project parcel. The goal of this visit was to inspect the areas identified as potential FGS habitat by the Service.

May 9, 2012 - The applicant submitted an evaluation of the FGS Survey prepared by Cardno to the Service.

March 6, 2013 – The applicant submitted a letter outlining its proposed contribution to the Wildlife Foundation of Florida Fund for purposes of funding caracara surveying and monitoring by the Service in the action area.

July 12, 2012 – The Service received a request for consultation from the Corps, including a copy of their June 1, 2012, Public Notice for the project.

August 1, 2012 - The Service received the BA for the proposed SPE.

February 7, 2013 – Cardno, Flatwoods, Inc., the applicant, his support personnel, and the Service met to discuss the BA, pending needs to initiate the preparation of the BO, and a tentative timeline.

February 13, 2013 - The Service received an e-mail and attached letter discussing conservation measures for the caracara nest on-site.

February 15, 2013 - The Service sent an e-mail to the applicant asking for further details about the conservation measures proposed.

February 28, 2013 - The environmental consultant, the applicant and his lawyer, and the Service discussed the conservation measures for the caracara and reached agreement on the conservation measures with the maximum benefits for the caracara. The applicant agreed to implement these measures as outlined below.

August 5, 2013 – The Service sent the Corps a draft Biological Opinion, with a copy to the applicant requesting clarification on impacts and compensation for the wood stork.

August 22, 2013 – The environmental consultant, the applicant and the applicant's legal counsel, and the Service met to discuss the clarification requests posed by the Service.

September 27, 2013 – The applicant submitted a response to the questions posed by the Service on August 5, 2013, relative to wood storks and hydrology.

November 22, 2013 – The applicant submitted additional information, requested by the Service, regarding wetland hydroperiod compensation.

February 20, 2014 – The Service sent the Corps a revised draft Biological Opinion, with a copy to the applicant containing final comments by the Service.

March 6, 2014 - The applicant provided comments and recommended revisions for the revised Biological Opinion to the Service.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The applicant, CF Industries, Inc., requests a 20-year permit to mine phosphate ore located on 7,512.8 acres (ac) of property in Hardee County, Florida (Figure 1). The applicant proposes to: extract the phosphate ore reserves on the South Pasture Mine Extension parcel for approximately 14 years; hydraulically transport matrix containing ore excavated from the South Pasture Mine Extension site to the existing South Pasture Mine beneficiation plant, across lands subject to Corps permit SAJ-1993-01395 (MOD 15-CJW); and return sand and clay residuals to both the integrated South Pasture Mine and South Pasture Mine Extension tracts. The project will provide phosphate ore to extend the life of the currently operating beneficiation plant. Upon completion of mining operations, all lands disturbed by mining will be reclaimed, with some areas being established as wetland mitigation.

The 7,512.8 ac project site consists of 5,550.5 ac of uplands, 1,769.2 ac of jurisdictional wetlands, and 242.3 ac of non-jurisdictional wetlands. Jurisdictional wetland types include 786.4 ac of forested wetlands, 930.1 ac of herbaceous wetlands, 31.1 ac of intermittent streams, and 21.5 ac of surface waters (ditches and cattle ponds). Non-jurisdictional wetland types include 25.8 ac of forested wetlands, 186 ac of herbaceous wetlands, 0.3 ac of intermittent streams, and 30.2 ac of surface waters (ditches and cattle pond).

The SPE is located in Sections 1, 2, 3, 10, 11, and 12, Township 34 South, Range 23 East, as well as Sections 2, 3, 4, 5, 6, 7, 8, and 10, Township 34 South, Range 24 East, in Hardee County, Florida. More specifically, the site is located south of State Road 62 and north of State Road 64, and is divided by County Road 663 (Figure 1).

As part of the implementation of this project, the applicant proposes direct on-site mining impacts to approximately 4,930.7 ac of uplands, mostly used as pastureland, and 1,487.5 ac of wetlands. The areas slated to be mined are located outside of the "No Mine Area" (Figure 2). Other impacts include 0.9 ac of temporary impacts to wetlands and surface waters of the U.S. to construct a dragline and infrastructure corridor crossing of Brushy Creek. Construction of this crossing will temporarily affect about 0.7 ac of forested wetlands, 0.1 ac of herbaceous wetlands, and 0.1 ac of intermittent streams. The applicant proposes to avoid 1,094.6 ac on-site, composed of 523.1 ac of wetlands and 571.4 ac of uplands. The wetlands include 55,501 linear feet of intermittent streams.

To mitigate for unavoidable wetland impacts, the applicant proposes on-site and off-site mitigation. On-site mitigation consists of 400.4 ac of wetland preservation (66.4 ac of herbaceous wetlands, 321.7 ac of forested wetlands, and 12.4 ac of open waters), 1,568.7 ac of wetland establishment (creation), and 122.7 ac of wetland restoration. In addition, 55,501 linear feet of intermittent stream channel will be avoided and protected. The 1,568.7 ac of proposed wetland establishment consists of: 1,009 ac of herbaceous wetlands, 488.5 ac of forested wetlands, and 71.1 ac of open water. The 122.7 ac of proposed wetland restoration consists of: 92.6 ac of herbaceous wetlands, 25.6 ac of forested wetlands, and 4.6 ac of open water.

As mitigation for the proposed removal of 33,341 linear feet of intermittent stream channel, the applicant proposes to establish 43,838 linear feet of intermittent stream channel on reclaimed lands, and to avoid and then restore 4,204 linear feet of historically disturbed intermittent stream channel located in proposed preservation areas.

The applicant also proposes to grant a permanent conservation easement, prior to commencing mining operations, in order to provide permanent protection to 1,094.6 ac within the proposed preservation area where all mining disturbance will be avoided. This area includes 523.1 ac of wetlands and 571.4 ac of uplands. The applicant proposes to grant the conservation easement to the Florida Department of Environmental Protection (FDEP), with provisions allowing the Corps to enforce the easement. Upon completion of mitigation, a second 1,789.4-ac conservation easement will be granted to provide permanent protection to the established mitigation wetlands and intermittent streams, including stream buffer corridors, also with provisions allowing the Corps to enforce the easement.

Off-site mitigation consists of granting conservation easements to permanently protect 434.5 ac of wetlands and 481.1 ac of off-site uplands associated with Horse Creek and Payne Creek, all within the Peace River watershed and located on applicant property adjacent to South Pasture mining areas. The applicant will place all 915.6 ac that make up these areas under a permanent conservation easement granted to the FDEP, with provisions allowing the Corps to enforce the easement. The applicant will also fund a research project to help understand the effect of mining activities on territorial caracaras by donating $150,000 to the Wildlife Foundation of Florida (WFF) to finance surveys, monitoring, and other associated activities, as set out in greater detail below.

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The SPE is composed of three land parcels totaling approximately 7,512.8 ac; this constitutes the overall action area. However, the action area extends off-site for certain species evaluated in this BO; specific action areas are discussed in the "Environmental Baseline" section, below.

STATUS OF THE SPECIES/CRITICAL HABITAT

Audubon's crested caracara

The following discussion is based on the caracara account provided in the MSRP (Service 1999), augmented with more recent updates from Morrison (1999, 2001, 2003), Morrison and Humphrey (2001), and Nemeth and Morrison (2002).

Federal status

The Florida population of the caracara was listed as threatened under the Act on July 6, 1987. Critical habitat has not been designated for the caracara.

Taxonomy

The caracara is a member of the Class Aves, Order Falconiformes, and Family Falconidae. The species was originally described by John James Audubon (Audubon 1834), who discovered the caracara on November 21, 1831, and published a species account under the name *P. vulgaris*.

John Cassin changed *P. vulgaris* to *P. audubonii* in 1865. Dove and Banks (1999) conducted a taxonomic analysis of museum specimens of new world caracaras based on plumage and morphological characteristics and concluded that three biological species can be identified in the crested caracaras: the insular Guadalupe Caracara (*C. lutosus*); and two continental species, Northern (also known as Audubon's crested caracara in Florida)(*C. cheriway*) and Southern caracara (*C. plancus*). The taxonomic name *C. cheriway* was subsequently accepted by the American Ornithologists' Union. However, the list of threatened and endangered animals published in 50 CFR 17.11 continues to refer to the old scientific name *P. p. audubonii*.

Distribution

The caracara is a resident, non-migratory species that occurs in Florida as well as the southwestern United States and Central America. Florida's population of caracara is found in the prairie area of the south-central region of the State, from about Polk and Osceola Counties southward to Collier and Broward Counties. The caracara is most abundant in a five-county area that includes Glades, DeSoto, Highlands, Okeechobee, and Osceola Counties (Service 1999).

Species description

The caracara is a large raptor with a crest, naked face, heavy bill, elongated neck, and unusually long legs. The total length of the caracara ranges from about 19.7 to 25.2 inches (in) with a maximum wingspan of 47.2 in. The adult is dark brownish black on the crown, wings, back, and lower abdomen. The lower part of the head, throat, upper abdomen, and under tail coverts are white, and the breast and upper back are whitish, heavily barred with black. The tail is white with narrow, dark crossbars and a broad, dark terminal band. Prominent white patches are visible near the tips of the wings in flight. The large white patches in the primaries and the white tail, broadly tipped with black, are both very conspicuous in flight (Bent 1961).

Juveniles have a similar color pattern but are brownish and buff, with the breast and upper back streaked instead of barred. Subadults resemble adults but are more brownish in color. Adults have yellow-orange facial skin and yellow legs. Facial skin of juveniles is pinkish in color, and the legs are gray (Layne 1978). Full adult plumage is obtained sometime after 3 years of age (Morrison 1997). Male and female caracaras are similar in appearance and do not exhibit sexual dimorphism. Gender can be determined only by surgical inspection or genetic analysis (Morrison and Maltbie 1999).

A caracara's feet and flight behavior are also notable. Their feet are clearly those of a raptor; however, their talons are flatter, enabling caracaras to run and walk more easily than other raptors. Caracaras are terrestrial and often forage by walking for extended periods on the ground (Morrison and Humphrey 2001). Bent (1938) noted the caracara's flight pattern resembles that of a northern harrier (*Circus cyaneus*), but caracaras fly faster and more gracefully. Caracaras are strong fliers and may reach speeds of 40 miles per hour (MPH). They have also been observed soaring in large circles at great heights (Howell 1932).

Life history

Caracaras are diurnal, and non-migratory. Adult caracaras may be found in their territory year round. Territories average approximately 3,000 ac, corresponding to a radius of 1.2 to 1.5 miles

(mi) surrounding the nest site (Morrison and Humphrey 2001). Foraging typically occurs throughout the territory during both nesting non-nesting seasons.

The caracara in Florida historically inhabited native dry or wet prairie areas containing scattered cabbage palms, their preferred nesting tree. Scattered saw palmetto, low-growing oaks (*Quercus minima, Q. pumila*), and cypress also occur within these native communities. Over the last century, many of the native prairie vegetation communities in central and south Florida have been converted to agricultural land uses, and frequently replaced by improved and unimproved pasture dominated by short-stature, non-native, sod-forming grasses. Morrison and Humphrey (2001) hypothesize that the vegetation structure of open grasslands (short-stature vegetation, scattered shrub cover, and nest trees) may be preferred by the caracara, due to its tendency to walk on the ground during foraging activities. The short vegetation stature and relatively simple vegetation structure may directly facilitate foraging by caracaras and provide less cover for predators. Consequently, caracaras appear to benefit from management actions, such as prescribed burning, that maintain habitat in a low stature and structurally simple condition. These activities reduce vegetation cover and may facilitate the observation and capture of prey. Within agricultural lands, regular mowing, burning, and high-density grazing may maintain low vegetative structure, an important habitat characteristic of the caracara's nest stand area (Morrison and Humphrey 2001). Regular prescribed burning maintains habitat in a favorable condition in native dry prairies. These field observations are consistent with the territory compositional analyses that indicate non-random selection of improved and semi-improved pasture land use.

Morrison and Humphrey (2001) characterized caracara distribution, reproductive activity, and land use patterns within a 5,180,000-ac area in south-central Florida. Comparisons of caracara territories to randomly selected areas and available habitat within the study area revealed caracara home ranges contained higher proportions of improved pasture and lower proportions of forest, woodland, oak scrub, and marsh. Territory size was inversely related to the proportion of improved pasture within the territory. In addition, breeding-area occupancy rate, breeding rates, and nesting success were consistently higher on private ranch lands during the study. Although it is unclear exactly which management activities best promote habitat utilization by caracaras, the mowing, burning, and grazing activities associated with improved pastures serve to maintain the short vegetation structure they seem to favor. The scattered cabbage palms that are often present within improved pastures to serve as shade for cattle provide nesting substrate for caracaras.

Additional investigations into habitat suitability for caracara (Morrison et al. 2006) indicate maintaining heterogeneity, which includes specific land cover types as well as small (less than 2.47 ac) freshwater wetlands, is important in maintaining suitable habitat for the crested caracara in Florida. The proportion of six vegetation and land cover types (*i.e.*, cabbage palm-live oak hammock, grassland, improved pasture, unimproved pasture, hardwood hammocks and forest, and cypress/pine/cabbage palm) and two types of aquatic habitats (*i.e.*, lentic and lotic) were determined to be the most important criteria for predicting habitat suitability for caracara. Most known nest locations (72.9 percent) in the study were present on improved pasture, although that habitat type only comprised 12.5 percent of the entire study area. Caracara appear to be exploiting pastures, ditches, and impounded wetlands that have replaced the historic land cover, as shown by the high occurrence of improved and unimproved pastures and lotic waters in caracara home ranges (Morrison et al. 2006).

Caracaras are highly opportunistic in their feeding habits, eating carrion and capturing live prey. Their diets include insects and other invertebrates, fish, snakes, turtles, birds, and mammals (Layne 1978). Live prey also include rabbits, young opossums (*Didelphis marsupialis*), rats (*Rattus* spp.), mice, squirrels, frogs, lizards, young alligators, crabs, crayfish, fish, young birds, cattle egrets (*Bubulcus ibis*), beetles, grasshoppers, maggots, and worms (Bent 1961; Layne et al. 1977; Morrison 2001). Scavenging at urban dumps has also been observed (Morrison 2001). More recent information from Morrison (2005) indicates wetland-dependent prey items comprise about 64 percent of the caracara's total diet. Mammals, primarily in the form of carrion, make up about 31 percent of the diet.

Caracaras hunt on the wing, from perches, and on the ground (Service 1999). Bent (1938) noted the caracara's flight pattern resembles that of a northern harrier (*Circus cyaneus*), but caracaras fly faster and may reach speeds of 40 MPH. The feet of caracaras have flatter talons then those of other raptors and this feature enhances their ability to walk (Morrison and Humphrey 2001). Caracara will also regularly patrol sections of highway in search of carrion (Palmer 1988), and follow mowers in pastures and tractors plowing fields to capture prey exposed by the activity. Agricultural drainage ditches, cattle ponds, roadside ditches and other shallow water features also provide good foraging conditions for caracaras (Morrison 2001). Within native habitats, caracaras regularly scavenge in recently burned areas and forage along the margins of wetlands within dry prairie communities.

Adult caracaras are generally territorial, and usually found within their territories. Oberholser (1974) attributes territoriality to the caracara's habit of feeding on carrion. Nonetheless, Morrison (2005) has noted juvenile caracaras are nomadic. Caracaras are capable of moving long distances. Between the time when young birds leave the natal territory, and when subadults establish a territory, each individual may traverse a large portion of the species' range in Florida. Adults will also occasionally leave their territory and travel great distances, primarily outside of the breeding season. The caracara's movement capability and nomadic character during subadult years may be the cause of occasional observations of caracaras far outside their breeding range. Caracaras have been observed in the Florida Keys and into the panhandle of Florida (Bay County), as well as in other states, though some of these may have been escaped individuals (Layne 1996). There appears to be no migration or genetic exchange between the Florida population and other populations of the northern caracara.

Observations and radio-telemetry monitoring have documented large aggregations of caracaras within several "gathering areas" in south-central Florida. Large numbers of caracaras (up to 50) have been observed along the Kissimmee River north of SR 98; south of Old Eagle Island Road in northern Okeechobee County; south of SR 70, west of Fort Pierce; and south of SR 70 in Highlands County, and on the Buck Island Ranch. These gathering areas are regularly, but not continually, used by subadult and non-breeding caracaras and they generally consist of large expanses of improved pasture. Morrison (2001) suggests gathering areas may be important to caracaras before first breeding during the first 3 years after leaving their natal territory. However, the habitat values of these areas to caracaras have not yet been evaluated.

Details of breeding behavior in the caracara have been documented by Morrison (1997, 1999). Morrison (1999) reported breeding pairs of caracaras seem to be monogamous, highly territorial, and exhibit fidelity to both their mate and the site. The age at first breeding has been

documented as 3 years (Nemeth and Morrison 2002). The initiation of breeding is marked by several behavioral changes, including the pair perching together near the nesting site, preening and allopreening, and sharing food. Caracaras are one of the first of Florida's raptors to begin nesting. Although breeding activity can occur from September through June, the primary breeding season is considered to be November through April. Nest initiation and egg-laying peak from December through February.

Caracaras construct new nests each nesting season, often in the same tree as the previous year. Both males and females participate in nest building. Nests are well concealed and most often found in the tops of cabbage palms (Morrison and Humphrey 2001), although nests have been found in live oaks (*Q. virginiana*), cypress (*Taxodium* spp.) (Morrison et al. 1997), Australian pine (*Casuarina* spp.), saw palmetto, and black gum (*Nyssa sylvatica*). Caracaras usually construct their nests 13.1 to 59.1 feet above the ground. Nests are bulky, loosely woven structures, typically composed of long, slender, dried pieces of vines, weed stalks, briars, twigs, and fruiting clusters of cabbage palm. Nests are round or oval in shape and about 2 feet in diameter (Bent 1938; Sprunt 1954; Humphrey and Morrison 1997; Morrison 2001). Caracaras vigorously defend their nesting territory during the breeding season (Morrison 2001). The clutch size is two or three eggs, most often two. Incubation lasts about 31 to 33 days (Morrison 1999) and is shared by both sexes. Most breeding pairs raise only one brood annually, but around 10 percent of breeding pairs raise a second brood. The young fledge at about 7 to 8 weeks of age, and post-fledgling dependency lasts approximately 8 weeks.

Population status

The great majority of caracara breeding territories occur on private lands in Florida, primarily within the ranchlands of central Florida. This fact makes monitoring the population and determining territory occupancy and nesting effort or success very difficult. Consequently, estimates of the caracara population in Florida have been based on counts of caracaras along roadsides (Heinzman 1970; Layne 1995). These roadside counts also have the potential be strongly affected by the presence of non-territorial juvenile and sub-adult birds during the period when they are nomadic. Because the occurrence and density of caracaras is not evenly distributed within the region they occupy (due to congregations and nomadic individuals), roadside surveys are probably unreliable for estimating the overall population.

Morrison and Humphrey (2001) stated data are not available on historic abundance, habitat use, or nest distribution of caracaras in Florida. The size of Florida's caracara population remains in question, and accurate counts become difficult because of limited access to areas of suitable habitat and the bird's behavior and limited detectability (Humphrey and Morrison 1997). Heinzman (1970) published the results of a 4-year road survey (1967 to 1970), which suggested fewer than 100 individual caracaras at 58 localities remained in Florida. Stevenson (1976) concurred with this estimate in 1974. Layne (1995) monitored caracara distribution and population status in Florida from 1972 to 1989. Based on roadside surveys, Layne (1995) estimated the adult portion of the population was stable, with a minimum of about 300 birds in 150 territories. The immature portion of the population was estimated to be between 100 and 200 individuals, bringing the total statewide population to between 400 and 500 birds. However, given continued landscape change in areas where caracaras have been known to occur, and the

fact not all the probable breeding range has been adequately surveyed for breeding pairs, estimating the caracara's population size remains difficult. It appears the caracara population has remained relatively stable since the late 1990s, but more information is needed to confirm this trend.

The Florida population of caracaras is isolated and habitat-specific. Therefore, it may be susceptible to environmental catastrophes and potentially reduced reproductive rates because of demographic accidents such as skewed sex ratios or disproportionate age-related mortality. Low numbers may also reduce the genetic viability in the population through loss of heterozygosity, thereby increasing vulnerability to environmental stresses. The location of many of the occupied territories on private land, and the inaccessibility of these territories to surveyors, makes it difficult to census the caracara and detect changes in its population size and distribution. This difficulty increases the possibility of not detecting a population decline that could result in extinction.

The caracara's perceived decline, as described in historic literature, is attributed primarily to habitat loss (Layne 1996). Large areas of native prairie and pasture lands in south-central Florida have been converted to citrus operations, tree farms, other forms of agriculture, and real estate development, and this loss has accelerated in the past few decades (Morrison and Humphrey 2001). The perceived population decline and the geographic isolation of the Florida population eventually resulted in the listing of the caracara as threatened in 1987 (52 FR 25232). However, historical conversion of forested habitats to pasture has not been adequately documented as partially offsetting losses of caracara habitat, so a full accounting of historic habitat changes is lacking. The current threat of habitat loss persists as changes in land use continue.

As discussed above, the caracara prefers open habitats with low-stature vegetation for foraging Morrison and Humphrey, 2001). Accordingly, cattle ranching and the creation of extensive pastures appear to be compatible with caracara survival. The number of caracara territories found in improved or unimproved pasture can be expected to increase if sufficiently large overgrown pastures are reclaimed and/or new pastures or restored native prairies are created from lands subject to other agricultural land uses. The conversion of pasture to citrus (Cox et al. 1994), sugarcane, and residential development is cause for concern. Recognizing the habitat value of cattle ranches and enlisting landowner cooperation in the conservation and management of these lands are important elements in recovery of the caracara.

Lack of habitat management is also a potential threat to caracaras in some areas, and can result in habitat degradation to the point where it is no longer suitable for occupancy. In particular, encroachment of woody shrubs and trees into open dry prairies, pastures, and similar habitats will result in some reduction in habitat suitability. Complete clearing of large areas that includes removal of cabbage palms and other trees may also reduce the suitability of habitat, but generally only when very large areas are completely cleared.

Road mortalities may also be a significant cause of caracara decline. Florida's burgeoning human population has increased the number of motor vehicles and the need for roads. The increase in traffic, as well as the caracara's predisposition for feeding on road-killed animals, has probably increased the number of caracaras killed or injured as a result of vehicle strikes. Morrison (2003) identifies highway mortalities as a major cause of juvenile mortalities, with young birds especially vulnerable within the first 6 months after fledging.

Eastern indigo snake

Species/critical habitat description

The eastern indigo snake, which can reach lengths of up to 8.5 feet (Moler 1992), is one of the largest North American snake species. Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (the central 3 to 5 scale rows are lightly keeled in adult males) in 17 scale rows at mid-body. Its anal plate is undivided. In the Florida Keys, adult indigo snakes seem to have less red on their faces or throats compared to most mainland specimens (Lazell 1989). Several researchers have informally suggested Lower Keys indigo snakes may differ from mainland snakes in ways other than color. Critical habitat has not been designated for this species.

Life history

In south-central Florida, limited information on the reproductive cycle suggests that indigo snake breeding extends from June to January, egg laying occurs from April to July, and hatching occurs during mid-summer to early fall (Layne and Steiner 1996). Young hatch approximately 3 months after egg-laying and there is no evidence of parental care. Eastern indigo snakes in captivity take 3 to 4 years to reach sexual maturity (Speake et al. 1987). Female indigo snakes can store sperm and delay fertilization of eggs. There is a single record of a captive indigo snake laying five eggs (at least one of which was fertile) after being isolated for more than 4 years (Carson 1945). However, there have been several recent reports of parthenogenetic reproduction by virginal snakes. Hence, sperm storage may not have been involved in Carson's (1945) example (Moler 1998). There is no information on the indigo snake lifespan in the wild, although one captive individual lived 25 years, 11 months (Shaw 1959).

Eastern indigo snakes are active and spend a great deal of time foraging for food and searching for mates. They are one of the few snake species active during the day and rest at night. The indigo snake is a generalized predator and will eat any vertebrate small enough to be overpowered. They swallow their prey alive. Food items include fish, frogs, toads, snakes (venomous, as well as non-venomous), lizards, turtles, turtle eggs, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983).

Population dynamics

Eastern indigo snakes use a mosaic of habitats. A study in southern Georgia found interspersion of tortoise-inhabited sandhills and wetlands improve habitat quality for the indigo snake (Landers and Speake 1980). Eastern indigo snakes shelter in gopher tortoise burrows, hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs (Lawler 1977; Moler 1985a; Layne and Steiner 1996). In the milder climates of central and southern Florida, indigo snakes exist in a more stable thermal environment, where availability of thermal refugia may not be as critical to snake survival. Over most of its range in Florida, the indigo snake frequents diverse habitats such as pine flatwoods, scrubby flatwoods, floodplain edges, sand ridges, dry glades, tropical hammocks, edges of freshwater marshes, muckland fields, coastal dunes, and xeric sandhill communities (Service 1999). Indigo snakes also use agricultural lands and various types of wetlands, with higher population concentrations occurring in the sandhill

and pineland regions of northern and central Florida. Observations over the last 50 years made by maintenance workers in citrus groves in east-central Florida indicate indigo snakes are occasionally observed on the ground in the tree rows and more frequently near the canals, roads, and wet ditches (Zeigler 2006). In the sugar cane fields at the A-1 Reservoir Project site in the Everglades Agricultural Area, a Comprehensive Everglades Restoration Plan project, indigo snakes have been observed (including one mortality) during earthmoving and other construction-related activities.

In extreme south Florida (*i.e.*, the Everglades and Florida Keys), indigo snakes are found in tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats. It is thought they prefer hammocks and pine forests since most observations occur there and use of these areas is disproportionate compared to the relatively small total area of these habitats (Steiner et al. 1983).

Eastern indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring in the summer and fall (Smith 1987; Moler 1985a). Adult males have larger home ranges than adult females and juveniles; their ranges average 554 ac, reducing to 390 ac in the summer (Moler 1985b). In contrast, a gravid female may use from 3.5 to 106 ac (Smith 1987). In Florida, home ranges for females and males range from 5 to 371 ac and 4 to 805 ac, respectively (Smith 2003). At Archbold Biological Station (ABS), the average home range size for females was determined to be 47 ac, and overlapping male home range size determined to be 185 ac (Layne and Steiner 1996).

Status and distribution

The indigo snake was listed as threatened on January 31, 1978 (43 FR 4028), due to population declines caused by habitat loss, over-collecting for the domestic and international pet trade, and mortality caused by rattlesnake collectors who gas gopher tortoise burrows to collect snakes. The indigo snake ranges from the southeastern United States to northern Argentina (Conant and Collins 1998). This species has eight recognized subspecies, two of which occur in the United States: the eastern indigo and the Texas indigo (*D. c. erebennus*). In the United States, the indigo snake historically occurred throughout Florida and in the coastal plain of Georgia; it has also been recorded in Alabama and Mississippi (Diemer and Speake 1983; Moler 1985b). It may have occurred in southern South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of the indigo snake (Lawler 1977). The indigo snake occurs throughout most of Florida and is absent only from the Dry Tortugas and Marquesas Keys, and regions of north Florida where cold temperatures and deeper clay soils exist (Cox and Kautz 2000).

Effective law enforcement has reduced pressure on the species from the pet trade. However, because of its relatively large home range, the indigo snake is vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985a). Accordingly, the primary threat to the indigo snake is habitat loss due to development and fragmentation. In the interface areas between urban and native habitats, residential housing is also a threat because it increases the likelihood of snakes being killed by property owners and domestic pets. Extensive tracts of undeveloped land are important for maintaining indigo snakes. In citrus groves, indigo snake

mortality occurs from vehicular traffic and management techniques such as pesticide usage, lawn mowers, and heavy equipment usage (Zeigler 2006). Within the last 5 years, since the spread of citrus canker, Zeigler (2006) reported seeing at least 12 dead indigo snakes that were killed by heavy equipment operators in the act of clearing infected trees.

Tasks identified in the recovery plan for this species include: habitat management through controlled burning, testing experimental miniature radio transmitters for tracking juveniles, maintenance of a captive breeding colony at Auburn University, recapture of formerly released indigo snakes to confirm survival in the wild, educational lectures and field trips, and efforts to obtain landowner cooperation in conservation efforts (Service 1999). Left off 3/18/14

To protect and manage this species for recovery, Breininger et al. (2004) concluded the greatest indigo snake conservation benefit would be accrued by conserving snake populations in the largest upland systems that connect to other large reserves while keeping edge and area ratios low. Management of these lands would be directed towards maintaining and enhancing the diversity of plant and animal assemblages within these properties. Where these goals are achieved, indigo snakes will directly benefit because of improved habitat conditions. Land managers are encouraged to utilize fire as a tool to maintain biodiversity in fire-dependent ecosystems.

Wood stork

The wood stork was listed under the Act as endangered on February 28, 1984 (49 FR 7332). No critical habitat is designated for the wood stork; therefore, none will be affected.

Species description

The wood stork is a large, long-legged wading bird, with a head to tail length of 85 to 115 centimeters (cm) (33 to 45 in) and a wingspan of 150 to 165 cm (59 to 65 in) (Coulter et al. 1999). The plumage is white, except for iridescent black primary and secondary wing feathers and a short black tail. Wood storks fly with their neck and legs extended. On adults, the rough scaly skin of the head and neck is unfeathered and blackish in color, the legs are dark, and the feet are dull pink. The bill color is also blackish. During courtship and the early nesting season, adults have pale salmon coloring under the wings, fluffy undertail coverts that are longer than the tail, and their toes are bright pink. Immature wood storks, up to the age of about 3 years, have yellowish or straw-colored bills and varying amounts of dusky feathering on the head and neck (Coulter et al. 1999).

Status and distribution

The wood stork is found from northern Argentina, eastern Peru and western Ecuador north to Central America, Mexico, Cuba, Hispaniola, and the southeastern United States (AOU 1983). Only the population segment that breeds in the southeastern United States is listed as endangered. In the United States, wood storks were historically known to nest in all coastal states from Texas to South Carolina (Wayne 1910; Bent 1926; Howell 1932; Oberholser 1938; Dusi and Dusi 1968; Cone and Hall 1970; Oberholser and Kincaid 1974). Dahl (1990) estimates these states lost about 38 million ac (15.4 million hectares [ha]), or 45.6 percent, of their historic wetlands between the 1780s and the 1980s. However, it is important to note wetlands and wetland losses are not evenly distributed in the landscape. Hefner et al. (1994) estimated 55 percent of the 2.3 million ac (0.93 million ha) of the wetlands lost in the southeastern United States

between the mid-1970s and mid-1980s were located in the Gulf-Atlantic Coastal Flats. These wetlands were strongly preferred by wood storks as nesting habitat. Currently, wood stork nesting is known to occur in Florida, Georgia, South Carolina, and North Carolina. Breeding colonies of wood storks are currently documented in all southern Florida counties, except for Okeechobee County. Additional expansion of the breeding range of wood storks in the southeastern United States may continue in coming years, both to the north and possibly to the west along the Gulf Coast (Service 2007a).

The decline that led to listing in the United States population of the wood storks is thought to be related to one or more of the following factors: (1) reduction in the number of available nesting sites; (2) lack of protection at nesting sites; and (3) loss of an adequate food base during the nesting season (Ogden and Nesbitt 1979). Ogden and Nesbitt (1979) indicate a reduction in nesting sites is not the cause in the population decline, because the number of nesting sites used from year-to-year is relatively stable. They suggest loss of an adequate food base is a cause of wood stork declines. Ogden and Nesbitt (1979) also suggest changes in remaining wetland systems in Florida, including drainage and impoundment, may be a larger concern for wood storks than loss of foraging habitat.

The primary causes of the wood stork population decline in the United States are loss of wetland habitats and loss of wetland function resulting in reduced prey availability. Almost any shallow wetland depression where fish become concentrated, through either local reproduction or receding water levels, may be used as feeding habitat by the wood stork during some portion of the year, but only a small portion of the available wetlands support foraging conditions (high prey density and favorable vegetation structure) that storks need to maintain growing nestlings. Browder et al. (1976) and Browder (1978) documented the distribution and the total acreage of wetland types occurring south of Lake Okeechobee, Florida, for the period from 1900 through 1973. We combined their data for habitat types known to be important foraging habitat for wood storks (cypress domes and strands, wet prairies, scrub cypress, freshwater marshes and sloughs, and sawgrass marshes) and found these south Florida wetland habitat types have been reduced by about 35 percent since 1900.

The alteration of wetlands and the manipulation of wetland hydroperiods to suit human needs have also reduced the amount of habitat available to wood storks. The decrease in wood storks nesting on Cape Sable was related to the construction of the drainage canals during the 1920s (Kushlan and Frohring 1986). Water level manipulation may decrease food production if the water levels and length of inundation do not match the breeding requirements of forage fish. Dry-downs of wetlands may selectively reduce the abundance of the larger forage fish species that wood storks tend to utilize, while still supporting smaller prey fish. Water level manipulation can also facilitate raccoon predation of wood stork nests when water is kept too low (alligators deter raccoon predation when water levels are high). Artificially high water levels may retard nest tree regeneration since many wetland tree species require periodic droughts to establish seedlings.

During the 1970s and 1980s, wood storks have also been observed to shift their nest sites to artificial impoundments or islands created by dredging activities (Ogden 1991). The percentage of nests in artificial habitats in central and north Florida increased from about 10 percent of all

nesting pairs during 1959 and 1960 to 60 to 82 percent from 1976 through 1986 (Ogden 1991). Nest trees in these artificially impounded sites often include exotic species such as Brazilian pepper (*Schinus terebinthifolius)* or Australian pine (*Casuarina equisetifolia*). Ogden (1996) has suggested the use of these artificial wetlands indicates wood storks are not finding suitable conditions within natural nesting habitat or they are finding better conditions at the artificial wetlands. The long-term effect of these nesting areas on wood stork populations is unclear.

Human disturbance is a factor known to have a detrimental effect on wood stork nesting (Service 1997). Wood storks have been known to desert nests when disturbed by humans, thus exposing eggs and young birds to the elements and to predation by gulls and fish crows.

The role of chemical contamination in the decline of the wood stork is unclear. Pesticide levels high enough to cause eggshell thinning have been reported in wood storks, but decreased production has not yet been linked to chemical contamination (Ohlendorf et al. 1978; Fleming et al. 1984). Burger et al. (1993) studied heavy metal and selenium levels in wood storks from Florida and Costa Rica. Adult birds generally exhibited higher levels of contaminants than young birds. The authors attribute this to bioaccumulation in the adults who may be picking up contaminants at the colony nesting site and while foraging at other locations during the non-breeding season. There were higher levels of mercury in young birds from Florida than young birds or adults from Costa Rica. Young birds from Florida also exhibited higher levels of cadmium and lead than young birds from Costa Rica. The authors recommended the lead levels in Florida be monitored. Burger et al. (1993) drew no conclusions about the potential health effects to wood storks.

Prey and foraging

Wood storks feed almost entirely on fish between 1 to 10 in (2.54 to 25.4 cm) in total length (Kahl 1964; Ogden et al. 1976; Coulter 1987). Depkin et al. (1992) studied the diets of wood storks at nesting colonies in east-central Georgia, and observed fish constitute 92 percent of all individual prey items and 93 percent of the diet biomass. The availability of fish to the wood stork may be more a function of the productivity of each wetland rather than the immigration of fish from other adjacent wetlands. Carlson and Duever (1979) noted in their study that long distance movement of fish into deeper habitats is not a regular occurrence in the Big Cypress watershed communities. They also noted in their study that the preponderance of obstacles and plant debris all contribute to hindering mobility and limiting movement across the site. In addition, in Chapman and Warburton's (2006) studies on *Gambusia*, they noted movement between drying pools was limited. Carlson and Duever (1979) concluded in their study that "*density and biomass of both wet and dry season fish populations are dependant primarily on the production of the particular site and not of adjacent habitats from which fish may have migrated.*"

The diet of wood storks may also include crustaceans, amphibians, reptiles, mammals, birds, and arthropods. Depkin et al. (1992) found crayfish to represent 1 percent of the prey item biomass and 1.9 percent of the prey items in the wood stork's diet. Bryan and Gariboldi (1998) also noted a similar frequency of occurrence of crayfish in diet of wood storks, and Lauritsen (2007) observed wood storks foraging on crayfish at the Corkscrew Swamp Sanctuary. Other studies of the wood stork provide little information regarding the

consumption of invertebrates (Ogden et al 1976; Coulter et al. 1999; Carlson and Duever 1979; Turner et al. 1999; Trexler et al. 2002). Ogden et al. (1976) summarized information from Kahl's publications (1962, 1964) on stomach contents of wood storks sampled in south Florida and southwest Florida and noted all individuals examined contained only fish. Ogden et al. (1976) study also noted the prey consumed were fish, although the average density of prawns was 2.5 times the density of the most abundant fish species observed.

To catch prey, wood storks generally employ a specialized feeding method called tactilocation, or grope feeding. This type of feeding consists of wading through the water with the beak immersed and open about 7 to 8 cm (2.5 to 3.5 in). When the wood stork encounters prey within its bill, the mandibles snap shut capturing the prey item, the head is raised, and the food is swallowed (Kahl 1964). Wood storks have also been reported to detect prey visually under some conditions (Kushlan 1979). In addition, wood storks have been observed to stir the water with their feet in an attempt to startle hiding prey (Rand 1956; Kahl 1964; Kushlan 1979). This foraging method allows them to forage effectively in turbid waters, at night, and under other conditions when other wading birds that employ visual foraging may not be able to forage successfully.

Wood storks forage in a wide variety of wetland types. Wetland habitat types used include freshwater marshes, ponds, hardwood and cypress swamps, narrow tidal creeks or shallow tidal pools, and artificial wetlands such as stock ponds, shallow and seasonally flooded roadside or agricultural ditches, and managed impoundments (Coulter and Bryan 1993; Coulter et al. 1999). Optimal foraging habitat consists of shallow-water wetlands (2 to 16 in [5 to 40 cm] in depth) that are sparsely vegetated (Ogden et al. 1978; Browder 1984; Coulter 1987; Coulter and Bryan 1993).

Hydrological patterns of wetlands in south Florida affect wood stork foraging. The annual hydrological pattern of wetland systems consists of water levels rising and peaking during the wet season (June to November) when the majority of the yearly total precipitation occurs, and gradually receding during the dry season (December to May). Shallow water levels within wetlands concentrate prey items (*i.e.*, fish) as they dry out and this is of particular importance during the wood stork nesting season (Kahl 1964). Therefore, a wetland site in south Florida may only provide suitable foraging conditions during part of the year when the water level has receded sufficiently to allow access and concentrate prey items. Consequently, during the nesting season there is a general progression in the suitability of wetlands for foraging based on their hydroperiods, with short hydroperiod wetlands used early in the season, mid-range hydroperiod wetlands used during the middle of the nesting season, and long hydroperiod wetlands used during the later part of the nesting season (Kahl 1964; Gawlik 2002).

Several other factors affect the suitability of foraging habitats for wood storks. Suitable foraging habitats must provide a sufficient density and biomass of forage fish or other prey species, and have vegetation characteristics that allow storks to locate and capture prey. Wetlands that contain deep water may not be accessible to wood storks for foraging. Conversely, wetlands with too little water may not provide adequate habitat for fish or other prey species. Longer hydroperiod wetlands are generally observed to support more fish and larger fish than shorter hydroperiod wetlands (Loftus and Ecklund 1994; Jordan et al. 1997 and 1998; Turner et al. 1999; Trexler et al. 2002). In addition, nutrient enrichment (primarily phosphorus) within the oligotrophic Everglades wetlands generally results in increased density and biomass of fish in

potential stork foraging sites (Rehage and Trexler 2006). Distances from dry-season refugia, such as canals, alligator holes, and similar long hydroperiod sites, may also affect fish density and biomass in southern Florida. However, across the highly modified landscape of southern Florida, fish availability varies with respect to hydrologic gradients and nutrient availability gradients and it becomes very difficult to predict fish density. The foraging habitat for most wood stork colonies within southern Florida includes a wide variety of hydroperiod classes, nutrient conditions, and spatial variability.

Dense submerged and emergent vegetation may reduce foraging suitability by preventing storks from moving through the habitat and interfering with prey detection (Coulter and Bryan 1993). Wood storks tend to select foraging areas that have an open canopy, but occasionally use sites with 50 to 100 percent canopy closure (Coulter and Bryan 1993; O'Hare and Dalrymple 1997; Coulter et al. 1999). Densely forested wetlands may preclude storks from foraging (Coulter and Bryan 1993). However, the presence of minor to moderate amounts of submerged and emergent vegetation does not seem to detrimentally affect stork foraging and may be important to maintaining fish populations.

The altered hydrology of the central and south Florida wetland systems has encouraged the establishment and spread of the exotic plant species melaleuca (*Melaleuca quinquenervia*). This invasive plant produces a dense understory and closed canopy that reduces the suitability of a wetland for wood stork foraging, although sufficient prey base may be present. The primary methods used to control melaleuca infestations are mechanical removal and chemical spraying. Restoring wetland hydrodrology to enhance the recruitment of desirable native plant species has also been employed. The use of biological control agents including a curculionid weevil (*Oxyops vitiosa*), a psyllid (*Boreioglycaspis melaleucae*), and two species of gall midges (*Lophodiplosis trifida, Ferfusionina tuneri*) are currently being evaluated (Pratt et al. 2005, Rayamajhi et al. 2008). Initial studies have shown promising results and suggest that an "integrated pest management" approach combining biological agents in concert with more traditional means of control may enhance the efficacy of management efforts.

During nesting, foraging areas must be sufficiently close to the colony to allow wood storks to efficiently capture prey and deliver prey to nestlings. In Georgia, wood storks generally forage in wetlands within 50 kilometers (km) (31 mi) of the colony site (Bryan and Coulter 1987), but forage most frequently within 20 km (12 mi) of the colony (Coulter and Bryan 1993). Herring (2007) noted similar foraging patterns for wood storks in south Florida with most frequent foraging within 10.29 km (6.4 mi). Maintaining this wide range of feeding site options ensures sufficient wetlands of all sizes and varying hydroperiods are available to support wood storks during shifts in seasonal and annual rainfall and surface water patterns. Storks forage the greatest distances from the colony at the beginning of the nesting season, before eggs are laid, and near the end of the season when the young are large. Wood storks feed nearest the colony during incubation (Browder 1984; Mitchell 1999). In south Florida, wood storks generally use wet prairie ponds early in the dry season and shift to slough ponds later in the dry season following receding water levels (Browder 1984).

Gawlik (2002) characterized wood storks foraging in the Everglades as "searchers" that employ a foraging strategy of seeking out areas of high-density prey and optimal (shallow) water depths,

and abandoning foraging sites when prey density begins to decrease below a particular efficiency threshold. The wood storks' choice of foraging sites in the Everglades was significantly related to both prey density and water depth (Gawlik 2002). Based on this strategy, wood stork foraging opportunities are more constrained than many other wading bird species (Gawlik 2002).

Nesting and reproduction

Wood stork nesting habitat consists of a variety of wooded habitat types including mangroves, cypress (as tall as 30.5 meter [100 feet]), and various other live or dead shrubs or trees located in standing water (swamps) or on islands surrounded by relatively broad expanses of open water (Palmer 1962; Rodgers et al. 1987; Ogden 1991; Coulter et al. 1999). Wood storks nest colonially, often in conjunction with other wading bird species, and generally occupy the large-diameter trees at a colony site (Rodgers et al. 1996). The same colony site will be used for many years as long as the colony is undisturbed and sufficient feeding habitat remains in surrounding wetlands. However, not all storks nesting in a colony will return to the same site in subsequent years (Kushlan and Frohring 1986). Natural wetland nesting sites may be abandoned if surface water is removed from beneath the trees during the nesting season (Rodgers et al. 1996). In response to this type of change to nest site hydrology, wood storks may abandon that site and establish a breeding colony in managed or impounded wetlands (Ogden 1991). Wood storks that abandon a colony early in the nesting season due to unsuitable hydrological conditions may re-nest in other nearby areas (Borkhataria et al. 2004; Crozier and Cook 2004). Between breeding seasons or while foraging wood storks may roost in trees over dry ground, on levees, or on large patches of open ground. Wood storks may also roost within wetlands while foraging far from nest sites and outside of the breeding season (Gawlik 2002).

The majority of wood stork nesting generally occurs within a core of established rookeries that are used annually. However, each year a few new nesting colonies may be established or abandoned (Meyer and Frederick 2004). Abandoned nesting colonies may remain inactive permanently (Meyer and Frederick 2004). The establishment or abandonment of colony sites is likely related to the environmental conditions at the site (*e.g.*, prey availability, water levels, etc.) that make site conducive to successful nesting (Meyer and Frederick 2004).

Breeding wood storks are believed to form new pair bonds every breeding season. Wood storks have been documented to breed as young as 3 to 4 years of age. A single clutch of two to five (average three) eggs is laid per breeding season, but a second clutch may be laid if a nest failure occurs early in the breeding season (Coulter et al. 1999). Eggs are laid as early as October in south Florida and as late as June in north Florida (Rodgers 1990). Yearly, variation in clutch size has been observed and may be related to habitat conditions at the time of laying. The incubation period for the wood stork egg is about 30 days. Egg laying, and subsequently hatching, is staggered resulting in the nestlings varying in size (Coulter et al. 1999). The younger and smaller nestlings are first to die when food is scarce.

The young fledge in about 8 weeks, but will stay at the nest for 3 to 4 more weeks to be fed. Adults feed the young by regurgitating whole fish into the bottom of the nest about 3 to 10 times per day. Feedings are more frequent when the birds are young (Coulter et al. 1999), and less frequent when wood storks are forced to fly great distances to locate food (Bryan et al. 1995).

The total nesting period, from courtship and nest building through independence of young, lasts about 100 to 120 days (Coulter et al. 1999). Nest initiation may be asynchronous within the colony. Adults and independent young may continue to forage around the colony site for a relatively short period following the completion of breeding.

Considerable variation in annual wood stork production may occur in response to local habitat conditions and food availability (Holt 1929; Kahl 1964; Ogden et al. 1978; Clark 1978; Ehrhart 1979; Hopkins and Humphries 1983; Rodgers and Schwikert 1997). Rodgers and Schwikert (1997) documented breeding production of 21 north and central Florida wood stork colonies from 1981 through 1985, and observed an average of 1.29 fledglings per nest and 0.42 fledglings per egg, and survivorship probability from egg laying to fledgling of 42 percent. More recent studies (Rodgers et al. 2008; Bryan and Robinette 2008; Murphy and Coker 2008) have documented production rates similar to rates observed from the 1970s to the 1990s. Rodgers et al. (2008) reported a combined production rate for 21 north and central Florida colonies from 2003 to 2005 of 1.19$\pm$ 0.09 fledglings per nest attempt (n=4,855 nests). Bryan and Robinette (2008) reported rates of 2.3 and 1.6 fledged young per nesting attempt for South Carolina and Georgia in 2004 and 2005. Murphy and Coker (2008) reported, since listing, South Carolina colonies averaged 2.08 young per successful nest (range 1.72 to 2.73). The Palm Beach County (PBC) Solid Waste Authority colony (Morrison 2008) documented 0.86 fledglings per nesting attempt (2003 to 2008) with annual rates ranging from 0.25 fledglings per nesting attempt to 1.49 fledglings per nesting attempt.

During nesting, wood storks are dependent on consistent foraging opportunities with the greatest energy demands occurring during the middle of the nestling period (*i.e.,* when nestlings are 23 to 45 days old) (Kahl 1964). The average wood stork family requires 201 kilograms (kg) (443 pounds [lbs]) of fish during the breeding season, with 50 percent of the nestling stork's food requirement occurring during the middle third of the nestling period (Kahl 1964). As discussed, receding water levels are necessary in south Florida to concentrate suitable densities of forage fish for wood storks (Kahl 1964; Kushlan et al. 1975).

Short hydroperiod wetlands in south Florida are an important source of forage for wood storks during pre-nesting activities (Fleming et al. 1994; Ceilley and Bortone 2000) and immediately following hatching. As discussed, short hydroperiod wetlands are accessible to wood storks due to their lower water levels. Based on Kahl's (1964) estimate that 201 kg (443 lbs) of forage are required for successful nesting, about 50 kg (110.2 lbs) are needed to meet the foraging needs of the adults and nestlings in the first third of the nesting cycle. Large acreages of short hydroperiod wetlands are required to meet this need because short hydroperiod wetlands are known to produce fewer fish and have lower fish biomass per unit area than long hydroperiod wetlands. Loftus and Eklund (1994) estimated 50 fish per m^2 for long hydroperiod wetlands and 10 fish per m^2 for short hydroperiod wetlands in the Everglades. The disproportionate reduction (85 percent) of this wetland type due to development and over drainage has been proposed as a major cause of late colony formation and survivorship reduction in early nestling survival rates (Fleming et al. 1994).

Following the completion of the nesting season, both adult and fledgling wood storks generally begin to disperse away from the nesting colony. Fledglings have relatively high mortality rates

within the first 6 months following fledging, most likely because of their lack of experience, including the selection of poor foraging locations (Hylton et al. 2006). Post-fledging survival also appears to be variable among years, probably reflecting the environmental variability that affects storks and their ability to forage (Hylton et al. 2006).

In southern Florida, both adult and juvenile storks consistently disperse northward following fledging in what has been described as a mass exodus (Kahl 1964). Storks in central Florida also appear to move northward following the completion of breeding, but generally do not move as far (Coulter et al. 1999). Many of the juvenile storks from southern Florida move far beyond Florida into Georgia, Alabama, Mississippi, and South Carolina (Coulter et al. 1999; Borkhataria et al. 2004; Borkhataria et al. 2006). Some flocks of juvenile storks have also been reported to move well beyond the breeding range of storks in the months following fledging (Kahl 1964). This post-breeding northward movement appears consistent across years.

Adult and juvenile storks return southward in the late fall and early winter months. Borkhataria et al. (2006) reported nearly all radio-tagged wood storks in the southeastern United States moved into Florida near the beginning of the dry season, including all subadult storks that fledged from Florida and Georgia colonies. Adult storks that breed in Georgia remained in Florida until March, and then moved back to northern breeding colonies (Borkhataria et al. 2006). Overall, about 75 percent of all locations of radio-tagged wood storks occurred within Florida (Borkhataria et al. 2006). Range wide occurrence of wood storks in December, recorded during the 1995 to 2009 Audubon Society Christmas Bird Counts for the Southeast United States (Audubon 2009) suggests the majority of the southeastern United States wood stork population occurs in central and southern Florida. Relative abundance of storks in this region was 10 to 100 times higher than in northern Florida and Georgia (Service 2007a). As a result of these general population-level movement patterns during the earlier period of the stork breeding season in southern Florida, the wetlands upon which nesting storks depend are also being heavily used by a significant portion of the southeastern United States wood stork population, including storks that breed in Georgia and the Carolinas, and subadult storks from throughout the stork's range. In addition, these same wetlands support a wide variety of other wading bird species (Gawlik 2002).

Population dynamics

The United States' breeding population of wood storks declined from an estimated 20,000 pairs in the 1930s to about 10,000 pairs by 1960 and a low of 2,500 pairs during a severe drought conditions in 1978 (49 FR 7332). The total number of nesting pairs in 1995 was 7,853 with 11 percent in South Carolina, 19 percent in Georgia, and 70 percent in Florida (Service 1997). However, nesting data from 1981 to 2006 suggest that the wood stork population in the southeastern United States appears to be increasing (Table 1). Population totals indicate the stork population has reached its highest level since it was listed as endangered in 1984. More than 11,000 wood stork pairs nested within their breeding range in the southeastern United States in 2006 (Service 2007a). The nesting data show increases in both the number of nests and the number of colonies, with the greatest increases in both nests and colonies in Georgia, South Carolina, and North Carolina. Recent data also show a decrease in the average size of colonies (Frederick and Meyer 2008). The Florida nesting population appears to fluctuate yearly and vary around a 3-year running average of 5,040 nests and 49 colonies annually (data through 2006).

Total population and nest data are not available for 2007 and 2008 nesting years as all Florida colonies are not monitored from year to year (B. Brooks, Service, personal communication 2009). All south Florida colonies have been continuously monitored since listing and south Florida nesting data (Table 2) show a significant drop in nesting pairs from 2,710 (2006) to 770 (2007), and 704 (2008) (Cook and Herring 2007; Cook and Kobza 2008). Researchers attribute this drop to the severe drought conditions present in south Florida during the nesting periods.

However, wood stork numbers appeared to increase in 2009. During 2009, Corkscrew Rookery produced 1,120 nests and 2,570 nestlings (Audubon 2009). Similar rebounds in nest production were recorded for other south Florida rookeries as well, with probably the largest number of nest starts since 2004 (Cook and Kobza 2009). Approximately 3,000 nest starts were estimated within colonies throughout the Water Conservation Areas (WCA) (District 2009). Data reported by Cook and Kobza (2009) noted approximately 6,452 nests in south Florida during the 2009 breeding season. Reports of breeding during 2009 from rookeries in north Florida and Georgia also noted record numbers of wood stork nests (Georgia Department of Natural Resources [GDNR] 2009; B. Brooks Service, personal communication 2009).

A review of the historic data show that, since the 1960s, the wood stork population declined in southern Florida and increased in northern Florida, Georgia, and South Carolina (Ogden et al. 1987). The number of nesting pairs in the Everglades and Big Cypress ecosystems (southern Florida) declined from 8,500 pairs in 1961 to 969 pairs in 1995. During the same period, nesting pairs in Georgia increased from 4 to 1,501 and nesting pairs in South Carolina increased from 11 to 829 (Service 1997). The number of nesting pairs in northern and central Florida doubled between 1976 and 1986 (Ogden 1991). Although Ogden (1991) attributed this to an increase in the availability of altered wetland and artificial wetland nesting sites, the regional increase coincided with the northward shift of the wood stork breeding population center and the overall population decline in the southeastern United States.

During the period 1958 to 1985, the wood stork breeding population center shifted north from Lake Okeechobee to Polk County, a distance of about 132 km (82 mi) (Ogden et al. 1987). The 1976 breeding season was the last year when more pairs nested in south Florida than in central and north Florida. Production is generally higher in central-north Florida than south Florida. Whereas the number of colonies in south Florida has remained relatively stable, the number of colonies in central and north Florida region continues to increase (Ogden et al. 1987). The increase in central-north Florida is associated with an increase in colony numbers and not colony size. Colonies in the north are smaller than colonies in the south. Historically, colonies in the south were associated with extensive wetlands and food was abundant. The implication is that food resources may be limiting colony sizes in central-north Florida (Ogden et al. 1987). Ogden et al. (1987) suggested the population shift is the result of deteriorating feeding conditions in south Florida and better nesting success rates in central and north Florida that compound population growth in that area.

Wood stork nesting data for the southeast United States indicates wood stork nesting has reached its highest level since it was listed as endangered in 1984 (Service 2007a). In 2006, an estimated 11,232 wood stork pairs nested within their breeding range in the southeastern United States.

Wood stork nesting was again recorded in North Carolina in 2006, 2007, and 2008 after it was first documented there in 2005. This suggests the northward expansion of wood stork nesting may be continuing. New colonies have been documented in recent years (2007 and 2008) including several in Florida and some colonies have become inactive. New colonies were also recorded in 2008 in Georgia and South Carolina (B. Brooks Service, personal communication 2009). The total number of colonies has peaked at over 80 in 2006 (Service 2007a), which is the highest to date in any year. From 2001 through 2006, the number of colonies and nesting wood storks in Florida appears to fluctuate yearly and varies around a 3-year mean of 49 colonies and 5,040 nests annually (Service 2007a).

Wood stork nesting effort within the southeastern United States appears to be increasing. A total of 4,300 nesting pairs were documented in 2007 and 5,900 nesting pairs were documented in 2009. Rangewide nesting data for 2009 is not currently available, but large numbers of wood storks were observed in north Florida (B. Brooks Service, personal communication 2009) and Georgia rookeries during 2009 (GDNR 2009). Wood stork nesting within south Florida rookeries decreased significantly during 2007 (Cook and Herring 2007) and 2008 (Cook and Kobza 2008), most likely due to severe drought conditions experienced by the region. However, large numbers of wood storks nest were observed nesting in south Florida rookeries during 2009 (Cook and Kobza 2009; District 2009; B. Brooks Service, personal communication 2009).

Other species in the action area

Florida panther

The Corps determined this project "may affect, but is not likely to adversely affect" the Florida panther. The Florida panther is one of the most endangered large mammals in the world. It favors native upland forests, especially hardwood hammocks and pine flatwoods, over wetlands and disturbed habitats (Service 1999). However, panthers use wetlands and disturbed habitats as part of their territory. Historically occurring throughout the southeastern United States, today the panther is restricted to less than 5 percent of its historic range in one breeding population of 100 to 120 animals located in south Florida. Although the breeding segment of the panther population occurs only in south Florida, panthers have been documented north of the Caloosahatchee River over 125 times since February 1972. This has been confirmed through field signs (*e.g.*, tracks, urine markers, scats), camera-trap photographs, seven highway mortalities, four radio-collared animals, two captured animals (one of which was radio collared), and one skeleton. From 1972 through 2004, panthers were confirmed in 11 counties north of the Caloosahatchee River (Flagler, Glades, Highlands, Hillsborough, Indian River, Okeechobee, Orange, Osceola, Polk, Sarasota, and Volusia) (Belden et al. 1991; Belden and McBride 2005). However, no evidence of a female or reproduction has been documented north of the Caloosahatchee River since 1973 (Nowak and McBride 1974; Belden et al. 1991; Land and Taylor 1998; Land et al. 1999; Shindle et al. 2000; McBride 2002; and Belden and McBride 2005).

No panthers were observed on the SPE during the 15 years (1998-2012) of listed species surveys, and no telemetry has ever been recorded on the project site. There is one report of a panther on an adjacent property near the study area. Rural landscapes like the project site may support, both before and after project construction, and during project operations, occasional panthers that move through, rest, or hunt north of the Caloosahatchee River.

The project is not in the Panther Focus Area (including the Primary Zone, Secondary Zone, Dispersal Zone, and the primary dispersal/expansion area), according to the Panther Effect Determination Key (Service 19 February 2007) and will not result in a loss of occupied panther habitat. There are no anticipated direct, indirect, or cumulative impacts to the Florida panther. Conservation measures for the entire SPE project include avoidance and minimization, enhancement, implementation of a wildlife habitat management plan, and reclamation, all which are likely to benefit Florida panthers, which may occasionally wander through this area now or in the future. Accordingly, the Service concurs with the Corps' determination for the Florida panther.

Florida grasshopper sparrow

The Corps determined this project "may affect, but is not likely to adversely affect" the FGS. The Service lists the FGS as endangered. This species' demography is strongly influenced by structural habitat characteristics, including time since fire (Aldredge 2009), bare ground (Delany et al. 1985, Delany and Linda 1994, Delany 1996, Tucker and Bowman 2006), and low growing shrubs (Delany and Linda 1994, Delany et al. 2002, Tucker and Bowman 2006, Delany et al. 2007). In addition, the FGS prefers a moderate amount of cover (25%) of low growing (<30cm) native bunch grasses, including bluestem (*Andropogon spp.*) and wiregrass (*Aristida stricta* var. *beyrichiana*) (Delany and Linda 1994, Delany 1996, Delany et al. 2002). The FGS prefers treeless habitat (<1 tree/ha) (Shriver and Vickery 1999, Perkins et al. 2003) that is greater than 100 meters from the forest edge (Delany and Linda 1994, Delany et al. 1995). Male territories almost never contain trees (Delany et al. 1995). FGSs will forage exclusively on the ground (Vickery 1996), with a diet consisting of invertebrates and seeds (Howell 1932). Females will also conceal nests in the sand, at the base of grass clumps or shrubs (Delany and Linda 1998a, Pranty and Tucker 2006). The greatest cause of nest failure is depredation by snakes, skunks, hogs, and armadillos (Vickery 1996). Avian predators are the primary source of adult mortality (Dean 2001, Vickery 1996, Pranty and Tucker 2006).

Florida grasshopper sparrows have not been observed during the 15 years (1998-2012) of listed species surveys, and this species is not anticipated to occur on the property. In the years leading to this project, the applicant conducted sparrow surveys in the CF Industries properties, including portions of the project parcel and adjacent areas. These surveys were conducted consistent with the Service's survey protocol (Service 2004b) and did not document the presence of FGSs. In addition, FGS surveys were conducted by the applicant and its consultants in 2012 in selected areas within the project parcel that were identified as potential FGS habitat by the FWC. However, the 2012 surveys did not document the presence of the species on the property.

A Service biologist inspected the proposed project site and concluded that the potential habitat identified by the FWC exhibits only poor to marginally suitable FGS habitat and lies approximately 30 km from the nearest known historic dry prairie. In addition, it is approximately 45 km away from the nearest historic FGS record. Accordingly, the Service concurs with the Corps' determination for the FGS.

Florida scrub-jay

The Corps determined this project "may affect, but is not likely to adversely affect" the scrub-jay. The scrub-jay is listed as threatened by the Service. The scrub-jay has specific habitat

needs. It is endemic to peninsular Florida's ancient dune ecosystems or scrubs, which occur on well-drained to excessively well-drained sandy soils (Laessle 1968; Myers 1990). Optimal habitat for scrub-jays on the Lake Wales Ridge includes scrub oaks that are 3 to 10 feet high, interspersed with 10 to 50 percent unvegetated, sandy openings, and a sand pine (*Pinus clausa*) canopy of less than 20 percent (Woolfenden and Fitzpatrick 1991).

Scrub-jay nests are typically constructed in shrubby oaks, at a height of 1.6 to 8.2 feet (Woolfenden 1974). The nesting season occurs from 1 March through 30 June (Woolfenden and Fitzpatrick 1984) and clutch size ranges from one to five eggs (Woolfenden and Fitzpatrick 1990). Insects (*e.g.*, locusts, crickets, grasshoppers, beetles, butterflies and moths) are the main food of scrub-jays (Woolfenden and Fitzpatrick 1984).

No scrub-jays have been observed during the 15 years (1998-2012) of listed species surveys. Furthermore, the presence of scrub-jays on this site is unlikely due to the lack of suitable nesting habitat on the property. There is a small area of sand live oak habitat (+/- 28.3 ac) on the western side of the property. This area is described as a forest due to the overgrown nature of the habitat, and is unsuitable for scrub-jays in its current condition. In addition, this habitat will not be impacted by the mining operations. Accordingly, the Service concurs with the Corps' determination for the scrub-jay.

ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the action area. It includes the impact of state or private actions, which occur simultaneously with the consultation in progress.

Status of the species within the action area

Audubon's crested caracara

Caracaras have been observed on the SPE during the listed species surveys (1998-2012). Four total nest locations have been documented since 1998. It is believed one pair of caracaras is responsible for all the nesting attempts on the SPE. Figure 3 shows the known nest locations. Successful nesting attempts have occurred and been documented through observation of fledgling and juvenile caracaras.

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 8402.02). In determining the action area for the caracara, the environmental consultant evaluated the extent that caracaras may be affected by the loss of habitat and disturbance caused by the project. The action area for the caracara includes the entire 7,512.8-ac project site and any part of a nesting territory that extends off-site. The nesting territory of caracaras in Florida averages approximately 3,000 ac, with a radius of about 6,500 feet from the nest tree (Morrison 2001). We calculated any potential caracara nest tree would need to be at least 6,500 feet from the project site in order to consider the project effects to be insignificant or discountable and used this radius to delineate a 6,500 feet (1,970 meter) buffer surrounding the project boundary. Therefore, the action area for caracaras in this BO is a 27,072-ac polygon that includes a 6,500-foot buffer around the entire project site (Figure 4).

One pair of caracaras have used at least four different nests on the project site from 1998 – 2012 (Figure 3), and other nesting territories exist in or adjacent to the action area. During this same monitoring period, one pair nested to the west, about 4 mi from the SPE, on Mosaic's Wingate Mine (f.k.a. Manson-Jenkins Tract); all known nests of this pair were outside of the action area. Another pair nested to the immediate south of the SPE on Mosaic's Ona Mine, within the action area in some years. It is possible that a fourth pair is present on privately-owned lands to the immediate east of the SPE, but those lands have not been surveyed in detail and no caracaras have been observed along the eastern property boundary. Thus, the best available data suggest one pair of caracaras occupies the action area, and the territories of up to two other pairs may intersect the boundary of the SPE action area for caracaras.

The applicant documented juvenile caracaras fledging from the SPE territory and the two other territories on Mosaic lands in certain years, and assumed an average of 1.73 young will fledge from each successful nesting attempt (Morrison 1997). Juveniles are more nomadic than adults, and may forage within the project site or along nearby roads, or may simply fly over on route to and from caracara congregation areas. In Florida, mean annual survival of adult male (0.876) and female (0.906) caracaras is much higher than juveniles (0.694); accordingly, the probability of a fledging surviving to reproductive age (3 years) is only 0.334 (Morrison 2003). Juveniles are less wary of vehicular traffic than adults are, and, consequently, are more likely than adults to be killed or injured when feeding on roadkill (Morrison 2003).

Eastern indigo snake

Five Indigo snakes were observed during the listed species surveys (Figure 3) and are anticipated to occur within all native and semi-natural habitats on the property (+/- 4,123.1 ac). Three snakes were found in palmetto prairies, one in live oak, and one in hardwood conifer mixed; most individuals (three of five) were associated with gopher tortoise (*Gopherus polyphemus*) burrows and detected during pedestrian wildlife surveys (four of five).

The Indigo snake has the largest known home range of any North American snake (Hyslop 2007) and the home range of some individuals almost certainly extends beyond the boundary of the proposed project area. Home range size in snake species often varies with sex, season, habitat type and quality, the number of radiolocations and duration of study, and the method(s) used to calculate home range size (Macartney et al. 1988). In all radiotelemetry studies of the indigo snake conducted to date, males have larger home ranges than females (Moler 1985a, Layne and Steiner 1996, Breininger et al. 2004, Dodd and Barichivich 2007, Hyslop 2007). To be conservative, we used a mean home range size of adult males (520 ha = 1,285 ac) calculated using minimum convex polygon estimates averaged over the 2-year field study of Hyslop (2007). This mean home range estimate is the largest reported in the literature for this species. Thus, the action area of the proposed project for the indigo snake includes areas affected by direct, indirect and cumulative impacts. It is useful to look at these as two zones: direct and indirect impacts to the indigo snake are expected on the 7,512.8-ac SPE site; cumulative impacts to the indigo snake may also occur in an 8,440-foot (approximately 1.6-mile or 35,225.0 ac) buffer. This expandd action area considers potential offsite effects to indigo snakes that may have a home range that overlaps and extends beyond the project boundary.

Wood stork

Wood storks have been observed foraging in wetlands on the SPE during the listed species surveys (1998-2012). The Vero Beach Field Office of the Service issued a South Florida Programmatic Concurrence Letter and Effect Determination Key to the ACOE ("Service Wood Stork Key") on January 25, 2010 (Service 2010). This document determined that the action area for wood storks encompasses an 18.6-mile radius of core foraging area (CFA) around all known wood stork colonies in south Florida that have been active in the last 10 years. Portions of the action area for the SPE project are within the CFAs of the El Claire Ranch wood stork colony (#616016) and an unnamed colony in Hillsborough County. Figure 5 displays the 18.6-mile radius of all wood stork colonies within the vicinity of the project site.

Factors affecting the species environment within the action area

Caracara

The caracara action area and surrounding region have been actively managed as cattle farms, citrus, and row crop production for years. These agricultural operations in the region are intermixed and occasionally rotated, depending on market demands and conservation practices implemented to benefit the land. Current agricultural land uses within the action area and surrounding region, particularly improved and unimproved pastures, provide potential high-quality foraging habitat for caracaras (Morrison et al. 2006).

The mosaic of farming and cattle ranching activities, and other agricultural production, has created an environment that has attracted caracaras to the region including and surrounding the action area. Caracaras have become acclimated to disturbances resulting from agriculture, including: livestock grazing; ranch hands on horseback moving cattle; tractors mowing pastures and baling hay; crop rotation; planting, cultivation, and harvesting of citrus and row crops; creation and maintenance of drainage and irrigation ditches; canal bank maintenance; and vehicle/farm equipment operation on both paved roads and unimproved roads. These agricultural lands are interspersed with forested and herbaceous wetlands, and native grasslands (wet and dry) that form the unimproved pastures, creating a mosaic of habitats well suited for caracaras.

The number of adult or juvenile (*i.e.*, fledglings or older) caracaras that may be injured or killed by vehicular traffic in the action area is difficult to quantify. The slow speeds of travel on mining roads (25 mph) within the SPE probably do not pose a serious risk to caracaras. However, the higher speed and volume of traffic on County Road 663 within the action area is more likely to result in collisions with caracaras (particularly subadults), and some unknown percentage of these injuries or deaths may be attributable to SPE traffic. The SPE project is not expected to increase CF Industries' traffic volume on this public road attributable over existing baseline, but it does represent a continuation of this traffic from 2020 through 2033.

Wood Stork

The loss of wetlands due to agricultural, commercial and residential development has resulted in the decline of the wood stork in the action area as well as throughout its range. A significant proportion of wood stork habitat in the action area has been converted to housing developments,

commercial buildings, roads, golf courses and other land uses. Wood storks are rarely directly killed by land clearing activities and the wetland filling associated with development, but are less likely to persist in developed areas due to reduced food resources, and increased mortality from predators and motor vehicle traffic.

The alteration and control of wetland hydrology for flood control and water supply due to the construction of canals, levees, and water control structures within the action area has also adversely affected the wood stork. Water level manipulation may decrease forage fish production if the water level and length of inundation of wetlands do not match the breeding requirements of forage fish. Maintaining excessively high water levels in wetlands may prevent wood storks from foraging because the water is too deep to effectively catch prey. Artificially high water levels may retard the establishment of trees used for nesting because many wetland tree species require periodic droughts to establish seedlings. Conversely, maintaining wetlands at low water levels may selectively reduce the abundance of the larger forage fish available to wood storks. Maintaining wetlands at low water levels can also increase the likelihood of predation of wood stork nests by allowing raccoons or other predators easier access to the nesting colony.

The presence of invasive and exotic invasive plant species has limited the ability of wood storks to forage in some wetlands in the action area. The exotic tree melaleuca forms dense stands in wetlands that can prevent wood storks from entering the wetland to forage. Similarly, the influx of nutrient laden water (*e.g.,* runoff from agricultural lands, paved roadway) into wetlands promotes the growth of cattail (*Typha spp.*) into dense monocultures that may also limit access to wood stork foraging.

Eastern indigo snake

Little is known about the indigo snake in the action area or the immediate vicinity. As noted above, five adult indigo snakes were observed in approximately 750 hours of field effort at the SPE site, over a total of about 65 days during a period of 10 years (1998 – 2007). However, most of these surveys were not conducted in winter, when this species is most susceptible to direct observation while basking near gopher tortoise burrows (Stevenson et al. 2009). By comparison, on protected habitat with limited access, Stevenson et al. (2008) captured an average of one indigo snake per 5 person-hours during their mid-November through March survey periods in Georgia, and Layne and Steiner (1996) marked and released an average of 12.4 indigo snakes per year during intensive efforts from 1980 – 1987 at Archbold Biological Station (ABS).

The effect of road mortality and intentional killing of indigo snakes in the action area cannot be estimated accurately, but it is assumed to be potentially significant (Enge and Wood 2002, Breininger et al. 2004). Furthermore, paired drift fence/funnel trap surveys showed indigo snakes were proportionately trapped three times more frequently in intact habitats on public lands than on this rural site, suggesting that road mortality had reduced the indigo snake population at the rural site (Enge and Wood 2002). Deliberate killing of snakes on roads is known to be a common activity throughout the world (Andrews and Gibbons. 2006).

The ±7,512.8-ac (3,040 ha) SPE is bifurcated by CR 663 (Figure 1). Using a combination of radio telemetry and population models, Breininger et al. (2004) investigated the effects of habitat fragmentation on the viability of indigo snake populations in east central Florida. In this study males had an average home range of 120 ha (females = 41 ha); snakes living along primary roads soon died, and edge/area effects were more important than area alone in determining population survival (Hyslop 2007). Breininger et al. (2004) estimated the adult annual survivorship of indigo snakes decreased from 0.88 to 0.67 in females and from 0.80 to 0.53 in males if a primary road intersected a 120-ha home range grid. If the average size of the home ranges of male indigo snakes at SPE approaches that of those in Georgia (520 ha; Hyslop 2007), then almost 20 percent of the adult male ranges may be intersected by CR 663. Layne and Steiner (1996), Enge and Wood (2002), Hyslop (2007), and Hyslop et al. (2009) also found roads to be an important source of mortality in indigo snakes. Moler (1992) suggested at least 1,000 ha (2,471 ac) of contiguous habitat is required to sustain indigo snakes.

Climate change

According to the Intergovernmental Panel on Climate Change Report (IPCC 2007), warming of the earth's climate is "unequivocal," as is now evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level. The IPCC Report (2007) describes changes in natural ecosystems with potential wide-spread effects on many organisms, including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution is dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the Department of the Interior requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007a).

Climate change at the global level drives changes in weather at the regional level, although weather is also strongly affected by season and by local effects (*e.g.*, elevation, topography, latitude, proximity to the ocean). Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing and distribution), storms (frequency and intensity), and sea level rise. However, the exact magnitude, direction and distribution of these changes at the regional level are not well understood or easy to predict. Seasonal change and local geography make prediction of the effects of climate change at any location variable. Current predictive models offer a wide range of predicted changes.

Prior to the 2007 IPCC Report, Titus and Narayanan (1995) modeled the probability of sea level rise based on global warming. They estimated the increase in global temperatures could likely raise sea level 6 in by 2050 and 13 in by 2100. While these estimates are lower than the estimates described in the IPCC Report (2007), Titus and Narayanan's (1995) modeling efforts developed probability-based projections that can be added to local tide-gauge trends to estimate future sea level at specific locations.

Climatic changes in South Florida could exacerbate current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008). Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006a).

It should be noted Titus and Narayanan's (1995) worst-case scenario was premised on a 1 percent chance that global warming would raise sea level that high. However, most climate change researchers agree with the findings in the IPCC Report (2007) which estimates a 90 percent probability of 7 in to 23 in of sea level rise by 2100. Scientific evidence that has emerged since the publication of the IPCC Report (2007) indicates an increase in the speed and scale of the changes affecting the global climate. The Arctic Monitoring and Assessment Programme (2011; AMAP) stated: "Total projected sea-level rise resulting from all sources by 2100 cannot be estimated with high confidence at present. Lower and upper limits have a range of 31 in to 79 in. A range of 35 in to 63 in is considered the more plausible current estimate by the authors..." As reported in the 2011 AMAP evaluation, important aspects of climate change may have been underestimated, and the resulting impacts are being felt sooner. For example, early signs of change suggest the less than 1.8°F of global warming the world has experienced to date may have already triggered the first tipping point of the Earth's climate system – the disappearance of summer Arctic sea ice. This process could open the gates to rapid and abrupt climate change, rather than the gradual changes that have been currently forecasted.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and/or critical habitat and its interrelated and interdependent activities. No critical habitat has been designated for the federally listed species covered in this BO; therefore, no impacts to critical habitat will occur.

Audubon's crested caracara

Factors to be considered

Potential effects to caracara due to the proposed action include a number of direct and indirect effects on the caracara and its habitat. Potential direct effects to the caracara or its habitat include: (1) direct mortality from vehicular traffic; (2) harassment by the proposed action; and (3) missed foraging and breeding opportunities. Indirect effects include primarily post-construction maintenance of the site.

Analyses for effects of the action

The total area affected is approximately 7,512.8 ac of largely improved pastures. The potential direct and indirect effects of the action on caracara within the action area are discussed below.

Direct effects

Direct effects are those effects that result from the proposed action (including the effects of interrelated and independent actions) that affect the species or its habitat. The direct effects from the project include potential direct injury or mortality and loss or degradation of available caracara habitat for foraging and breeding.

We anticipate there will be some disturbance of foraging adult and juvenile caracaras by pedestrian or vehicular traffic, as well as other mining activities. The level of disturbance to nesting caracaras can vary by the distance these activities occur from the nest, as well as the tolerance of the pair to human activities (Morrison 2001). A lower reproductive success may result if adult caracaras spend more time away from the nest (foraging or otherwise) due to the disturbance from the project. Therefore, we anticipate the reproductive potential for the pair may be affected each year by project construction. Due to the nature of the proposed construction (*i.e.*, disturbance of the site by mine construction, canal filling or dredging, and berm construction), and the propensity of caracaras to be disturbed during the breeding season by heavy equipment, additional traffic, or people, we estimate up to two caracara pairs could be adversely affected during the construction and operational phases. This would include any caracara pairs nesting on the project or in the action area, if greater than 50 percent of their 3,000-ac nesting territory is affected by the project.

Pasture is considered acceptable caracara habitat (Morrison et al. 2006); therefore, we assume that all improved pasture (2,630.7 ac) on the SPE project is potential foraging habitat for both adult and juvenile caracaras. This is supported by the number of caracara observations (Figure 3) and the amount of caracara habitat around the site (Figure 6). As a result, we estimate that the caracara pair could temporarily lose up to 300 ac of foraging habitat in a given year from construction of the mine pits until reclamation is completed. This acreage is based on the annual land clearing acreage, and may be overestimated if habitats other than pasture are being prepared for mining. We define this habitat loss as temporary because 3,182.2 ac of pasture (net increase of 624.9) will be reclaimed and preserved post-mining (Figure 7). However, approximately 50 percent of this total pasture acreage will be reclaimed on clay settling areas, which will not be reclaimed to pasture for approximately 15 years post-disturbance.

The four known caracara nest locations on the SPE (Figure 3) are proposed to be mined between 2024 and 2031, with reclamation following shortly thereafter. Potential nesting habitat (*e.g.*, cabbage palm hammocks) will be preserved in the No Mine Areas (Figure 2). Additional No Mine Areas with cabbage palm hammocks and newly reclaimed lands will exist to the immediate north on CF Industry Inc's existing South Pasture Mine. These areas are currently being mined and, in their reclaimed state, may provide alternate habitat for caracaras displaced the mining activities on the SPE.

We do not know if this level of disturbance will cause the temporary or permanent abandonment of the nesting territory on the SPE or other territories in the action area, or if it will result in intraspecific aggression with adjacent pairs of caracaras in the action area. The SPE caracara pair may, because of the action, adjust their territory and occupy portions of adjacent caracara territories. In turn, those adjacent pairs may also be affected by the action (*i.e.*, intraspecific

aggression, lower reproductive potential). The degradation and loss of caracara foraging habitat when the pastures and other foraging habitats are temporarily converted to mine pits may be offset somewhat if prey items for the caracara become available at sufficient densities inside the ditches, mine pits and created littoral shelves within them, and adjoining created uplands and wetlands. Since some of this foraging habitat is on the perimeter of the site, we expect that other caracaras from outside the project area may occasionally use this habitat, assuming prey is available in sufficient densities. It is difficult to estimate how many caracaras will use the site following construction and reclamation.

Indirect effects

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The indirect impacts include: post-construction maintenance of the roads, berms, pump stations, mine pits and ditches (including vegetation management methods such as mowing, herbicide application, and physical removal). Routine post-construction maintenance may result in temporary disturbance to caracaras. Vehicular activity associated with operation and maintenance may put some juvenile caracaras at risk if they forage along roads on the site. Given the size of the project site and the anticipated abundance of prey items that could become established in the reclamation areas, drainage ditches, created littoral shelves of the mine pits, and adjoining created wetlands and undeveloped upland areas, we anticipate caracaras may occupy the project area post-construction. We also anticipate caracaras may be disturbed each year in the project and in the action area by vehicles and equipment.

Interrelated and interdependent actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. No interrelated or interdependent actions are expected to result from the project.

Species response to the proposed action

Implementation of the proposed action may adversely affect caracara. The adverse effects range from direct mortality of eggs, nestlings, or recent fledglings to displacement of adults and possible resultant mortality due to intraspecific aggression. Disturbance resulting from the proposed action may disrupt normal behavior, causing birds to temporarily leave the area and/or suffer reduced nesting, breeding, and foraging opportunities.

The long-term aspects of the proposed action tied to reclamation, as well as the habitat avoidance, creation and preservation, are specifically intended to enhance the continued existence of this species by improving habitat conditions. Long-term negative impacts are expected to be minor.

Eastern indigo snake

Factors to be considered

Factors considered include the distribution of the geographic areas where disturbance will occur relative to the potential habitat value of that area to indigo snakes, the type of disturbance, the proximity of the action to natural areas outside of the project site but within the action area that

may support indigo snakes, the timing of project activities relative to sensitive periods in the snake's life cycle, the duration of potential effects on indigo snakes and their habitat, and the construction, operation and maintenance of the project. Besides potentially lost cover, habitat, and associated prey, disturbance may occur in the form of pedestrian, equipment, and vehicular traffic, as well as vibration from on-site activities. Construction noise and vibration could disturb snakes where it exceeds ambient conditions. Visual disturbance from personnel during construction could also affect snakes; however, this potential disturbance may lessen when these altered areas are reclaimed and post-construction vegetation conditions provide more or better cover. The timing and duration of clearing and reclamation activities will vary with the activities proposed at specific locations. Although construction personnel will be advised to avoid indigo snakes, the operation of equipment in brushy, grassy, or otherwise vegetated areas may disturb snakes that are not readily visible.

Construction and maintenance activities are most likely to occur during daylight hours – the same time that indigo snakes are active. Construction likely will occur year-round in at least some areas of the site. Indigo snake nesting season occurs between April and July, and potential loss of nest sites is anticipated.

Analysis for effects of the action

The indigo snake is difficult to detect and quantify for the following reasons: (1) it has a wide-ranging distribution; (2) it has a patchy distribution within suitable habitat; (3) it has limited detectability due to use of burrows or holes for shelter; (4) there is likely unoccupied suitable habitat; (5) juveniles have limited detectability due to their affinity for thick vegetation; and (6) it may use cryptic sheltering areas that may be temporarily established during construction (*e.g.*, brush piles, equipment stockpiles, and dirt mounds). This makes the quantifiable determination of effects of the action difficult.

Direct effects

The direct effects of the project to indigo snakes include disturbance prior to and during construction; injury and mortality; and habitat conversion, reclamation, and conservation, as described below.

Disturbance prior to and during construction: As a standard practice to minimize incidental take, the applicant will follow the guidance in the Standard Protection Measures for the Indigo Snake (Service 2013). The applicant will complete pre-clearing surveys for each mining unit or sub-parcel to document gopher tortoise abundance and presence of indigo snakes. If an indigo snake is found, it will be allowed to move out of harm's way and not handled or relocated along with other commensal species found in tortoise burrows. The applicant will also directionally clear the land prior to mining in a manner that encourages indigo snakes and other wildlife to move into adjoining unmined habitat. The increased human presence on the site during construction along with the operation of construction equipment and vehicles may disturb indigo snakes to the point they leave the project area. This may avoid mortality, but also may result in missed foraging and mating opportunities, and these individuals may be more vulnerable to predation and intraspecific aggression; however, this is difficult to estimate.

Under current guidelines, the Service (2013) requires the excavation of potential indigo snake refugia (such as tortoise burrows) prior to land clearing, with any exposed indigo snakes being allowed to move out of harm's way without being handled or relocated. As noted above, to minimize take (harm) CF Industry, Inc., proposes to directionally clear the land and to mine up to about 300 ac per year. Under these circumstances, it is likely some indigo snakes will be harassed on multiple occasions, as mining and reclamation proceeds across the project. The extent of multiple harassments of the same individual(s) cannot be determined without capturing and marking the snakes.

Injury and mortality: The proposed action includes vegetation removal, debris piling and burning, mining, reclamation, and truck traffic within the mine, to, and from CR 663. Indigo snakes present at the time of the above noted actions could be adversely affected by the project activities. Snakes in the portion of the mine under construction or on the CR 663 access route are presumed to be most at risk for injury or mortality.

It is difficult to determine the number of indigo snakes (adults, juveniles, hatchlings, and nests), as no reliable estimate of the population density in the action area exists. A 26-year study conducted by Layne and Steiner (1996) at ABS estimated a population density of 2.6 adult indigo snakes per 100 ha (247 ac). They also estimated a lower density based on five adult snakes (3 males and 2 females) that occupied 314 ha (775.9 ac) at 1.6 indigo snakes per 100 ha. The best estimate at the Kennedy Space Center (Breininger et al. 2004) was six adults and subadults per 100 ha. No statistical confidence limits around these means were published. Both of these sites are considered near-optimal habitat for the species, with an abundance of gopher tortoise burrows, foraging habitat, and controlled access to limit road mortality.

Assuming that indigo snake densities in native habitats on the SPE are similar to ABS (1.6 to 2.6 adult indigo snakes per 247 ac), then the ±4,123.1 ac of native habitat may support from 31.6 to 51.4 indigo snakes on the proposed project. Assuming similar habitats and relative densities in the surrounding landscape, the ±35,225.0-ac action area (including the project and the buffer for purposes of cumulative effects) may support 125.2 to 203.5 adult indigo snakes. To estimate the number of juveniles and subadults in the population (<4 years old), the female portion of the Leslie matrix for indigo snakes in Table 27.2 of Breininger et al. (2004) was used to iteratively estimate a stable age distribution for their "Least Favorable" and "Best Estimate" calculations for survival and fecundity. This data assumes that these survival and fecundity estimates are constant over time and independent of population density (Begon et al. 1996). These simplifying assumptions are requirements of the model (Begon et al. 1996), and the former assumption is probably unrealistic, as the indigo snake population on the project and in the action area probably is declining as a result of road mortality, fire suppression, and habitat conversion. We judge the habitat conditions at SPE to be more similar to the least favorable than the best estimate of Breininger et al. (2004). Thus, under least favorable conditions, the SPE alone (direct and indirect effects) would support 40.0 - 65.0 total indigo snakes, and the overall action area (considering cumulative effects) would support 158.1- 257.0 snakes.

We suspect these figures may over-estimate the number of indigo snakes on the project and in the action area to some unknown degree for three major reasons:

1. Unlike the intact habitat at ABS, the remaining native and semi-natural communities on the SPE and in the surrounding action area are fragmented (Figure 3), which likely has reduced the carrying capacity for this wide-ranging species.

2. Although no detailed gopher tortoise burrow surveys have been conducted on the SPE, relatively little native xeric habitat (Figure 6) or well-drained soils exist on the site. Quest Ecology, Inc. (2006) suggested tortoise populations on the SPE were limited by these factors, which also probably limits the availability of high quality over-wintering sites for indigo snakes.

3. Much of the landscape north of the SPE has been mined or otherwise altered, reducing the indigo snake population in this portion of the action area. Alternatively, some unknown number of snakes may have temporarily emigrated from these recently mined lands to the SPE and increased the population.

As noted above, we assume most injury and mortality to indigo snakes will occur during land clearing/construction activities on the project, or because of vehicular traffic entering or leaving the action area. The SPE will provide replacement phosphate ore for the existing CF Hardee Phosphate Complex and beneficiation plant, which already uses this same road network; therefore, no increases in mine-related vehicular traffic over baseline conditions on the mine entrance road or on CR 663 are anticipated in the action area. Accordingly, we assume the best estimate of injury and mortality to indigo snakes and their potential offspring (egg clutches) is the total number of snakes that may be on the project area at any one time under baseline conditions. The applicant provided a model (discussed below), which estimated this number; it assumes indigo snakes within the project footprint at the time of land clearing/construction will seek shelter in the surrounding action area and avoid injury or death. A spatial randomization model was developed to estimate the number of indigo snake home ranges within the SPE Project Area (project site) and the surrounding Action Area (8,440-foot buffer around the Project Area). During the modeling effort, 100 sets of random points were created within the Project Area and Action Area, each to represent theoretical indigo snake locations, and home ranges were assigned to each point according to the previously stated estimates of the population age distribution, home range size, adult sex ratio, and population density within the two areas. The model output was analyzed to determine the overall mean (and 95% confidence interval [CI]) number of indigo snake home ranges that were either within the Project Area or outside of the Project Area in the overall Action Area.

Both the lower and upper bounds of the density estimates were modeled (40.0 - 65.0 snakes in Project Area, 158.1 - 257.0 snakes in Action Area). The model used home range sizes for each age class and sex, and an adult sex ratio (2M: 1F) based on literature values.

In the model, 100 model runs of simulated random points were created for each scenario. For each set of simulated random points, the assigned home range radii were used to create buffers around the points to estimate the size and spatial distribution of potential indigo snake home ranges. All of the simulated point buffers were clipped by the Project Area boundary in order to calculate the percent of each buffer within the boundary. The percent calculation was used to

determine the total number of home ranges per model run contained within the Project Area, as well as the average (and 95% CI) number of home ranges within the Project Area over all 100 model runs.

Of the 40.0 – 65.0 indigo snake points simulated within the Project Area, all had at least part of their home range within the boundary; when the partial home ranges were summed, a mean of 31.6 – 51.2 (29.4 – 53.3 with 95% CI) home ranges were within the boundary. In the Action Area outside of the Project Area, 248-395 indigo snake points were simulated, but only about a quarter of the points in each model run had simulated home ranges partially within the Project Area. When the partial home ranges were summed for the points simulated in the entire Action Area (including the Project Area), 38.6 - 62.6 (34.4 - 67.2 with 95% CI) home ranges were within the Action Area boundary.

Habitat conversion and reclamation/conservation: The mine will represent a temporary change to about 4,928.7 ac (65.6%) of the project landscape for indigo snakes. This species should recolonize the site as reclamation is completed and gopher tortoises are restocked to the reclaimed upland habitats. The temporal lag in habitats actively being cleared and not yet reclaimed will negatively affect indigo snake breeding, feeding, and sheltering in areas lacking vegetative cover, prey, and structure.

Indirect effects

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The indirect impacts include: post-construction maintenance of the roads, berms, pump stations, mine pits and ditches (including vegetation management methods such as mowing, herbicide application, and physical removal). Routine post-construction maintenance (an associated vehicles and equipment) may also result in temporary disturbance to indigo snakes.

There are no known interrelated or interdependent actions for this project.

Species response to the proposed action

Implementation of the proposed action may adversely affect the indigo snake. The adverse effects range from direct mortality to displacement of adults. Disturbance resulting from the proposed action may also disrupt normal behavior, causing snakes to temporarily leave the area.

Many aspects of the proposed action, such as avoidance and minimization efforts, reclamation, and enhancement and preservation, are specifically intended to enhance the continued existence of this species by improving habitat conditions on-site. Long-term negative impacts are expected to be minor.

Wood stork

Factors to be considered

Potential effects to wood storks due to the proposed action include a number of direct and indirect effects on the wood stork and its habitat. Direct effects include: (1) direct mortality

from vehicular traffic; (2) harassment by the proposed action; and (3) missed foraging opportunities. Indirect effects include long term changes in prey availability and future disturbance.

Analyses for effects of the action

All wetlands (1,769.2 ac of jurisdictional and 242.3 ac of non-jurisdictional) on-site are considered suitable wood stork habitat and will be impacted by changes in hydrology and direct mining.

Direct effects

Direct impacts that are primarily habitat-based may include: (1) the temporary loss of available habitat for foraging, feeding, breeding, and dispersing wood storks; (2) changes in hydroperiods of wetlands that support wood stork foraging; and (3) harassment by construction activities. No wood storks are known to have nested within the project area in the recent past and all of the wading bird censuses conducted to date have demonstrated that some wetlands on the project are utilized as foraging sites by resident and/or migratory, over-wintering wood storks.

Temporary loss of habitat: The project will result in the temporary loss of about 2011.4 ac of wetlands on-site (excluding other surface waters).

Harassment by construction: The timing of construction for this project relative to sensitive periods of the wood stork's lifecycle is unknown and land clearing associated with the development will occur in phases. . However, we anticipate that construction and reclamation activities for this project will occur during the wood stork nesting season, which potentially could harass storks during a sensitive time in their life cycle. There are no known active roosting or colony sites within the project development boundaries and only a small portion (25%) of the project is within the CFAs of the two colonies described above. Therefore, we believe wood stork usage of the SPE is limited and that project construction will not result in direct wood stork take in the form of harassment.

Changes in hydroperiods/loss of foraging opportunities: Stork nesting success generally relies on wetlands with a mosaic of hydroperiods within the CFA of the colony. Storks nest during the dry season, and rely on the drying wetlands to concentrate prey items in the ever-narrowing wetlands (Kahl 1964). Because of the continual change in water levels during the stork nesting period, any one site may only be suitable for stork foraging for a narrow window of time when wetlands have sufficiently dried to begin concentrating prey, making water depths suitable for storks to access the prey. Once the wetland has dried to where the water levels are near the ground surface, the area is no longer suitable for stork foraging, and will not be suitable until water levels rise and the area is again repopulated with fish. Consequently, there is a general progression in the suitability of wetlands for foraging based on their hydroperiods, with the short hydroperiod wetlands used early in the season, the mid-range hydroperiod sites being used during the middle of the nesting season, and the longest hydroperiod areas being used later in the season (Kahl 1964; Gawlik 2002).

The applicant obtained data for the wood stork foraging analysis from various sources. The hydroperiod class assigned to each wetland FLUCFCS code represents the best scientific judgment of the average length of inundation in a normal rainfall year for these habitat types on this site and in this region. Most of the values for pre-development wetlands were derived in consultation with FDEP and/or available literature resources, and the Service's Babcock Ranch Community BO (41420- 2007-F-0900). The predicted hydroperiods for reclaimed wetlands were modeled by BCI Engineers and the results reviewed by FDEP. The hydrologic results were also submitted to and reviewed by the Service.

To conform to the Service's Wood Stork Methodology, which can found online at http://www.fws.gov/verobeach/ListedSpeciesBirds.html , all wetland habitat types (by FLUFCS code) were assigned to a single average hydroperiod class, which artificially constrains the natural variation in these systems. For example, we assigned Natural Streams (FLUCFCS 5110) an average hydroperiod class of 6 (300 – 330 days), but some headwater streams on this site may only flow 60- 120 days per year (Class 2). In fact, with a few exceptions (FLUCFCS 6250, 6260, 6270), we expect that the range of variation for most wetland habitat types in both natural and reclaimed systems will span at least one hydroperiod class on either side of the predicted average. For permanent water lakes (5300) and cattle ponds (5340), we assume the available prey biomass is not vulnerable to wood stork predation because these lotic environments are too deep for foraging, except along the edges, which are ignored for computational purposes. Finally, we assigned all wetland habitat types a Foraging Suitability value of 100%, as melaleuca is rare in Hardee County.

To evaluate the potential significance of wetlands on the SPE to wood storks nesting in the vicinity of the project (Figure 5), 2008 SWFWMD land use data for wetlands in the CFAs of these colony were calculated. A wood stork foraging prey analysis of the proposed project provides a biomass foraging loss to wood storks of 1,249.4 kg of prey biomass. The prey base loss is based on 109.4 ac of short hydroperiod wetlands, and 242.32 ac of long hydroperiod wetlands (Table 3). The applicant considered the wood stork suitable fish density (grams per m2 per hydroperiod class) to be as described in the earlier section relating to fish densities in each wetland class. As noted in the Service's South Florida Programmatic Concurrence for Wood Stork (2010), the wood stork consumption percentage is 32.5 percent (*i.e.*, 32.5 percent of the biomass will actually be consumed by wood storks).

The prey base loss will be mitigated by type-for-type reclamation of mined land at a ratio greater that 1:1. The wood stork foraging analysis indicates that a total of 1,322.4 kg of prey biomass, based on 125.4 ac of short hydroperiod wetlands and 253.1 ac of long hydroperiod wetlands will be available to the wood stork through the implementation of the reclamation plan proposed by the applicant. The reclamation will result in increased prey biomass for both short hydroperiod wetlands (25.21 kg) and long hydroperiod wetlands (47.97 kg), and it ensures the same or better opportunities for wading birds post reclamation (Table 3).

Indirect effects

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur.

The indirect effects this project may have on the wood stork within the project are discussed below. They include: (1) increases in disturbance frequency, intensity, or severity to wood storks in the project vicinity due to human activities; (2) changes in the wood stork prey base; and (3) changes in value of wood stork habitat adjacent to the project due to project related hydrological alterations.

Increased disturbance in the future: Post-construction maintenance of the roads, berms, pump stations, mine pits and ditches (including vegetation management methods such as mowing, herbicide application, and physical removal). Routine post-construction maintenance (an associated vehicles and equipment) may also result in temporary disturbance to storks that continue to use the area.

Changes in wood stork prey base: The proposed action will result in the temporary loss of 2011.3 ac of wetlands, which are considered suitable for foraging by wood storks. In our assessment of adverse effects to the resident prey base available to foraging wood storks, we calculated an at-risk prey base of 1,249.38 kg of fish biomass within the CFA (Table 3). We do not believe additional indirect effects to the prey base will occur. Increases in the availability of potential foraging habitat and prey resulting from the proposed restoration and enhancement measures are expected to exceed the estimated loss of 1,249.38 kg of fish prey base within the CFA. The restoration, enhancement and wetland creation activities will result in a net increase in wood stork suitable foraging biomass of 73.04 (Table 3). The total increase results from an increase in both short hydroperiod (Class 1 through 3) wetlands (25.12 kg increase) and long hydroperiod (Class 4 through 7) wetlands (47.92 kg increase).

Hydrologic changes in adjacent wood stork habitat: Hydrologic effects center on water imbalances that spread onto adjacent properties pre-mining, during mining, and post-reclamation. To test the potential effect of the proposed mine, the applicant modeled multiple scenarios using MIKE SHE, a sophisticated hydrological model developed by DHI Water and Environment, Inc. MIKE SHE provides a physics base representation of all the components of the hydrologic system and incorporates aspects of the water budget in situations where calibration in not an option.

A flood modeling effort was also performed to assess the reclamation plan design with regard to comparisons between pre-mining and post-reclamation flood flows. Results indicate that the peak flood values will be maintained or attenuated by the reclamation design. Peak flood flows determine the extent of hazard from flood events, with higher values representing higher hazard. Overall, the results indicates that the proposed land use, topography, and soil distribution are not expected to result in any adverse changes in the peak discharge in comparison to pre-mining conditions for flood flows. Therefore, the reclamation plan will not result in increased local flood hazards for Brushy Creek, Lettis Creek, and Troublesome Creek.

In addition to the flood modeling, an integrated hydrological modeling report was prepared to assess hydrologic impacts for the action area. This long-term simulation provides further reasonable assurance that the proposed post-reclamation design will (a) restore on-site wetland functions where they have been significantly damaged by existing artificial drainage, (b) promote the maturation of wetlands, and (c) avoid adverse effects on preserved or offsite wetlands. The

plan also provides an overall water balance consistent with the region that is compatible with the Peace River watershed surface hydrology, given that the combined ground water and surface water outflow volumes from the property are reasonably similar to pre mining conditions. The water balance model demonstrates that the hydrology of preserved and off-site streams and wetlands will not be adversely affected by mining.

During mining, recharge systems will be used to hydrate offsite and preserved wetlands and water bodies. The design basis and operation of each recharge system depends on localized soil and lithological conditions. Further, baseline monitoring and during-mining monitoring of wetlands near mining boundaries will occur as part of the environmental management plan. The plan contains adaptive management, maintenance, and monitoring measures to prevent adverse drawdown effects in adjacent wetlands and streams during mining.

The applicant proposes a comprehensive compensatory mitigation plan that provides both increased acreage and functions of streams and wetlands, as well as permanent protection over 3,800 acres of uplands, wetlands, and streams. Achievement of increased function will be accomplished by using the best available technology in planning and implementation, and through application of decades of similar experience and adaptive management in this specific geographic region, all of which are documented in the application materials provided to the Corps and supported by the hydrologic modeling and water balance analysis that were performed by the applicant and submitted to the Service.

There are no known interrelated or interdependent actions for this project.

Species response to the proposed action

Implementation of the proposed action may adversely affect the wood stork. The adverse effects range from direct mortality to displacement of adults. Disturbance resulting from the proposed action may also disrupt normal behavior, causing birds to temporarily leave the area.

Many aspects of the proposed action, such as avoidance and minimization efforts, reclamation, and enhancement and preservation of wetlands, are specifically intended to enhance the continued existence of this species by improving habitat conditions on-site. Long-term negative impacts are expected to be minor.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Audubon's crested caracara

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are not related to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Act.

Conversion of surrounding pasture lands to residential or other uses that would support fewer caracaras would be the most likely cumulative effect on the species. Phosphate mining, which mostly surrounds the SPE on three sides, is not a cumulative effect under the Act, as these other mines have or will undergo Section 7 consultation. To estimate the potential cumulative effects on caracaras, using Hardee County Tax Assessor's information, we first mapped the lands owned and not owned by phosphate companies in the action area and determined that 19,559.2 acres may be subject to cumulative effects (not owned by phosphate companies). To estimate the percentage of this land that may be subject to cumulative effects, we assumed that the amount and distribution of uplands, Corps-jurisdictional wetlands, surface waters, and non-Corps-jurisdictional wetlands were similar on the SPE and on the 172 parcels of land not owned by phosphate companies within the action area. Using this approach, 3.2 percent of the 5,328.8 acres of non-phosphate-owned lands (170.5 acres) may be subject to cumulative impacts. This acreage represents 5.7 percent of the mean territory size (3,000 acres) of caracaras in Florida. As noted above, caracaras may not nest to the east of the SPE where these parcels are most prevalent, but almost certainly use other private habitats south and west of CR 663. We consider this level of cumulative effects to be unlikely to appreciably affect caracaras in the area.

Eastern indigo snake

The primary threat today to the indigo snake is habitat loss and fragmentation, caused by development (Lawler 1977; Moler 1985). Besides loss of habitat, residential developments also increase risk of harm to indigo snakes in the interface between urban and native habitats because they increase the likelihood of snakes being killed by property owners and domestic pets. Increased traffic associated with development may also lead to increased indigo snake mortality. Areas mined within the action area will be reclaimed to suitable indigo snake habitat. The mosaic of habitat reclaimed and the preserve areas should resemble the habitat conditions available to indigo snake before mining. Indigo snakes are likely to re-colonize reclaimed habitat from the surrounding landscape within the action area, as indigo snakes have been documented from a number of other reclaimed phosphate-mined sites (Durbin et al. 2008).

In the action area, CF is currently mining the Hardee Phosphate Complex and Mosaic Fertlizer owns most or all of the lands to the west of CR 663; these lands either have been or will be covered under a separate Federal permit action subject to Section 7. These areas also will be reclaimed to contain suitable indigo snake habitat. Most of the remaining surrounding landscape in the action area consists of cattle ranches, agricultural land, and public utilities. Habitat loss to residential and industrial development is unlikely to occur in this part of Hardee County as most areas surrounding the project parcel are not currently subject to habitat conversion. The likelihood of land conversion of reclaimed habitat to residential development is possible, but deemed unlikely in the foreseeable future. We anticipate the action area will support indigo snakes in the future with little to no cumulative effects.

Wood stork

For evaluation purposes, we considered the action area for the wood stork to include the CFA of the El Claire Ranch and the unnamed Hillsborough County nesting colony, which are depicted in Figure 5. The pre-base loss describe above, from impacts to onsite wetlands account for less

than 0.2% of the total wetland acreage within the CFAs of these colonies (Figure 5). We assume the cumulative, permanent losses of non-Corps jurisdictional wetlands will be minimal in these CFAs because the Water Management Districts and/or DEP regulate and require permits and compensatory mitigation for all isolated wetlands greater than 0.5 ac in size. Conversion of non-Corps jurisdictional (isolated) wetlands to residential uses would be the most likely cumulative effect on the species. It is difficult to predict the spatial extent or timing of wood stork foraging habitat loss due to land use conversion within the action area.

CONCLUSION

Audubon's crested caracara

After reviewing the current status of the caracara, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for the species; therefore, none will be affected.

We anticipate limited or no mortality of caracaras resulting from increased vehicular traffic, given that no increase in traffic above the environmental baseline is proposed for the project, and temporary nest abandonment due to the mining activities. All mined lands will be reclaimed to the pre-mining habitat type. Reclamation activities will be directed towards enhancing the diversity of plant and animal assemblages within the action area. Where these goals are achieved, the caracara may directly benefit from reclaimed and restored habitats similar or better than those areas before mining. The action will not substantially reduce the numbers, distribution, or reproduction of the caracara. The applicant will provide funds for the caracara monitoring and surveying by the Service within the action area, as described below.

Eastern indigo snake

After reviewing the current status of the indigo snake, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for the species; therefore, none will be affected.

We anticipate limited mortality of indigo snakes and nests from mining activities. We also anticipate limited mortality of indigo snakes from increased vehicular traffic. Indigo snakes have some ability to move away from situations that may result in direct injury and mortality and can access adjacent habitat or underground refugia, if escape opportunities are available.

All mined lands will be reclaimed to the pre-mining habitat type. Reclamation activities will be directed towards enhancing the diversity of plant and animal assemblages within the action area. Where these goals are achieved, wood storks may directly benefit from reclaimed and restored habitats similar or better than those areas before mining. The action will not substantially reduce the numbers, distribution, or reproduction of the indigo snake.

Wood stork

After reviewing the current status of the wood stork, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for the species; therefore, none will be affected.

We anticipate limited mortality of wood stork from increased vehicular traffic. All mined lands will be reclaimed to the pre-mining habitat type. Reclamation activities will be directed towards enhancing the diversity of plant and animal assemblages within the action area. Where these goals are achieved, wood storks may directly benefit from reclaimed and restored habitats similar or better than those areas before mining. The action will not substantially reduce the numbers, distribution, or reproduction of the wood stork.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary and must be undertaken by the Corps so they become binding conditions of any grant or permit issued to the C.F. Industries, Inc., as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require C.F. Industries, Inc., to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or CF Industries, Inc., must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Audubon's crested caracara

The Service expects the proposed action could cause incidental take of caracara. Take is expected in the form of harm and harassment, including potential loss of reproductive

productivity. The incidental take is expected due to mining activities and increased vehicular traffic within the action area.

We anticipate up to 300 ac of caracara habitat will be degraded annually through conversion of pasture and other habitat to mine pits and stock pile areas, and that caracaras may be adversely affected by project construction and operations. Incidental take in the form of harm and harassment may occur, including potential loss of reproductive productivity and potential injury or mortality of juvenile and adult caracaras. Incidental take may occur as a result of habitat modification within the territories of known and potential nest locations, and potential caracara vehicle collisions on CR 663 associated with construction and operation of the project. As noted above, this would include any caracara pairs nesting on the project or in the overall caracara action area if greater than 50 percent of a 3,000-ac nesting territory is affected by the project. The extent of incidental take caused by the project is difficult to quantify because 1) nest locations and productivity may change from year to year, 2) the number of nesting pairs and individuals in the action area cannot be reliably estimated, 3) finding an injured or dead caracara is difficult, and 4) assigning the cause of a caracara-vehicle collision to the project also will be difficult.

Based on the observations to date, two caracara pairs currently nest on or in buffer zone of the project site. As a result, up to four adults could be incidentally taken by the project in the form of harassment. If this harassment of adult caracaras occurs during the nesting season, then this could result in a loss or reduction of reproductive success for that breeding season.

The proposed actions will also increase vehicular traffic within the action area and we anticipate that adult and juvenile caracaras will forage on roads; therefore, the Service anticipates the harm (injury or death) of one caracara from vehicular collision.

Eastern indigo snake

The indigo snake is difficult to detect and quantify for the following reasons: (1) it has a wide-ranging distribution; (2) it has a patchy distribution within suitable habitat; (3) it has limited detectability due to use of burrows or holes for shelter; (4) there is likely unoccupied suitable habitat; (5) juveniles have limited detectability due to their affinity for thick vegetation; and (6) it may use cryptic sheltering areas that may be temporarily established during construction (*e.g.,* brush piles, equipment stockpiles, and dirt mounds). The lack of practical methods of survey, in conjunction with wide-ranging activity and use of a variety of habitat types, makes it difficult to determine the exact number of indigo snakes that will be impacted by the proposed action. We have, nevertheless, used the best available science in an attempt to quantify the number of indigo snakes potentially present on the site.

Within the project area, the best estimate of the total population of indigo snakes of all age classes is from 31.6 to 51.2 individuals (area of potential direct and indirect take), and from 38.6 to 62.6 individuals in the action area (including the project and buffer zone of cumulative impacts), which may have a portion of their home range that overlaps the project. Accordingly, no more than six (6) indigo snakes can be taken over a rolling 5-year period to account for the predicted 38.6-62.6 individuals with home ranges in the Action Area. CF Industries, Inc. will report any detected dead or injured indigo snake to the Service and FWC within one business day

of occurrence. Assuming an adult sex ratio of 2 males to 1 female (Stevenson et al. 2009), that 9.6 to 14.7 adult (4+ years old) females have home ranges on the project site under Least Favorable conditions, and that females nest each year, then about 9.6 to14.7 clutches may be deposited on the project site each year. Accordingly, no more than four (4) eastern indigo snakes clutches can be taken over a rolling 5-year period.

The applicant anticipates incidental take may occur throughout the entire project area (7,512.8 ac) in the form of injury or death during project construction activities and reclamation. Some incidental take related to the project also may occur in the action area, particularly from truck traffic on CR 663, but this take is not anticipated to exceed baseline conditions. However, any snakes taken on CR 663 due to project-related traffic are to be counted in the six indigo snakes that can be taken over a rolling 5-year period.

Harassment is predicted for all indigo snakes inhabiting the project immediately prior to and during construction, and likely will occur on multiple occasions to some individuals, as described above. Harassment to individuals will occur during pre-clearing surveys when tortoise burrows and other potential refugia are being excavated, during directional land clearing in preparation for mining, and during other construction activities. Harassment will be biased toward adult males because of the biased sex ratio reported above (two males: one female), the likely dominance of adults in the population, and the larger home range of adult males which increases their likelihood of occurrence on the project. The only direct measure of harassment of indigo snakes will be the annual counts of indigo snakes recorded on the site and reported during annual monitoring events.

Wood stork

The Service expects the proposed action could cause incidental take of a work stork. The incidental take is expected due to increased vehicular traffic within the action area; therefore, the Service anticipates the harm (injured or killed) of one wood stork from vehicular collision over the course of the mining activities. This project may also affect the wood stork foraging habitat by disrupting the prey base available to this species. However, the loss/reduction of foraging value to the wood storks associated with these systems will be temporary, as the prey base will be restored and increased by the process of wetland creation and reclamation. Therefore, we do not anticipate any appreciable take in the form of lost nest productivity.

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), provided such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

EFFECT OF THE TAKE

In the accompanying BO, the Service determined that this level of anticipated take is not likely to result in jeopardy to these species, destruction, or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take of the caracara, indigo snake, and wood stork. The applicant proposes the following conservation measures: (1) to minimize disturbance and injury that may

result from vehicular traffic and other mining activities; (2) to reduce habitat fragmentation after land reclamation; (3) to fund surveys and monitoring of resident caracaras; and (4) to report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement (50 CFR § 402.14(i)(3)).

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline the required reporting and monitoring requirements. These terms and conditions are non-discretionary:

1. The Corps will provide a copy of the final permit to the Service upon issuance. The Corps will require the applicant to abide by the permit conditions regarding conservation measures to minimize incidental take of the caracara, indigo, and wood stork; a report shall be provided to the Service on implementation and compliance with the conservation measures within 1 year of the issuance date of the permit;

2. To minimize disturbance and injury to the caracara, indigo, and wood stork from vehicular traffic, a speed limit of no more than 35 mph will be posted for all vehicular traffic on the mine site. CF Industries, Inc., will enforce the speed limit. The applicant will also implement an educational program for the on-site personnel. All contractors, lessees, and mine employees will be briefed of the possible presence of and to avoid the caracara, indigo snake, and wood stork. If any of these species are encountered, it will be avoided and allowed to leave the area on its own. The applicant will also implement the Service's Standard Protection Measures for the Indigo Snake (Service 2013), to help minimize disturbance and injury to the indigo snake.

3. To reduce habitat fragmentation the applicant will plan and implement a reclamation plan that focuses on creating an interconnected mosaic of habitats that enable movement of fish and wildlife resources across the landscape. The reclamation plan will be reviewed and approved by the appropriate State and Federal permitting and wildlife agencies prior to implementation.

4. To fund a research project to help understand the effect on mining activities on territorial caracaras, the applicant shall donate $150,000 to the Wildlife Foundation of Florida (WFF) to finance surveys, monitoring, and other associated activities. The proposed $150,000 will be deposited in the WFF over 3 years at $50,000 each year. The Year One payment will be paid within 60 days of issuance of the Corps permit for the project, barring challenges to the permit. Should the Corps permit be challenged, the Year One payment will be made within 60 days of issuance of the final Corps permit after resolution of such challenges. The Year Two payment will be paid no more than 12 months from the anniversary date of the Year One payment. The Year Three payment will be paid no more than 24 months from the date of the Year One payment. The applicant will promptly provide payment receipts from WFF to the FWS the Corps for each payment made.

5. Reporting: Upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office; Fish and Wildlife Service; 9549 Koger Boulevard, Suite 111; St. Petersburg, Florida 33702; 727-570-5398. Secondary notification should be made to the FWC; Southwest Region; 3900 Drane Field Road; Lakeland, Florida; 33811-1299; 1-800-282-8002. Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or, in the handling of dead specimens, to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured caracaras or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends CF Industries discuss and coordinate the implementation of its restoration plans with the plans from adjacent mining companies. In the next 20 years, several mining companies will be actively mining and restoring their land. A coordinated effort is more likely to result in significant, interconnected wildlife habitat that accommodates the home range and mobility needs of wildlife.

REINITIATION NOTICE

This concludes formal consultation on the CF Industries, Inc. SPE project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation in the effort to protect fish and wildlife resources. If you have any questions regarding this project, please contact Al Begazo at 772-469-4234.

Sincerely yours,

Craig Aubrey
Acting
Field Supervisor
South Florida Ecological Services Office

cc: electronic only
Corps, Fort Myers, Florida (Angela Ryan)
Corps, Tampa, Florida (John Fellows)
EPA, Atlanta, Georgia (Duncan Powell)
EPA, West Palm Beach, Florida (Ron Meidema)
FWC, Tallahassee, Florida (FWC-CPS)
NOAA Fisheries, Saint Petersburg, Florida (Mark Sramek)
Service, Jackson, Mississippi (Linda LaClaire)
Service, Jacksonville, Florida (Billy Brooks)
Service, Tallahassee, Florida (Jerry Ziewitz)
Service, Vero Beach, Florida (Brian Powell)

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Table 1. Wood Stork Nesting Data in the Southeastern U.S. (Gawlik 1987, Service 2009)

YEAR	TOTAL		FLORIDA		GEORGIA		SOUTH CAROLINA		NORTH CAROLINA	
	Nesting Pairs	Colonies	Nesting Pairs	Colonies	Nesting Pairs	Colonies	Nesting Pairs	Colonies	Nesting Pairs	Colonies
1981	4,442	22	2,365	19	275	2	11	1		
1982	3,575	22	778	19	135	2	20	1		
1983	5,983	25	2,350	22	363	2	20	1		
1984	6,245	29	1,550	25	576	3	22	1		
1985	5,193	23	1,455	17	557	5	74	1		
1986	5,835	36	5,067	29	648	4	120	3		
1987			**		506	5	194	3		
1988			**		311	4	179	3		
1989			**		543	6	376	3		
1990			**		709	10	536	6		
1991	4,073	37	2,293	23	969	9	664	3		
1992			**		1,091	9	475	3		
1993	6,729	43	4,262	28	1,661	11	806	3		
1994	5,768	47	3,589	26	1,468	14	712	7		
1995	7,853	54	5,617	33	1,501	17	829	6		
1996			**		1,480	18	953	7		
1997	5,166	59	2,870	36	1,379	15	917	8		
1998			**		1,665	15	1,093	10		
1999	9,978	71	7341	42	1,139	13	520	8		
2000			**		566	7	1,236	11		
2001	5,582	44	3,246	23	1,162	12	1,174	9		
2002	7,855	70	5,463	46	1,256	14	1,136	10		
2003	8,813	78	5,804	49	1,653	18	1,356	11		
2004	8,379	93	4,726	63	1,596	17	2,034	13		
2005	5,572	73	2,304	40	1,817	19	1,407	14	32	1
2006	11,279	82	7,216	47	1,928	21	1,963	12	132	1
2007	4,406	55	1,553	25	1,054	15	1,607	14	192	1
2008	6,118	73	1,838	31	2,292	24	1,839	16	149	1
2009	12,720	86	9,428	54	1,676	19	1,482	12	134	1

**Some data from Florida not readily available due to inconsistent survey or reporting.

Table 2. Total Number of Wood Stork Nesting Pairs within the Everglades and Big Cypress Basins, 1996 to Present

Year	Nesting Pairs	Colonies	3-Year Running Average	
			Nesting Pairs	Colonies
1996	1,215	1	--	--
1997	445	4	--	--
1998	478	3	713	3
1999	2,674	16	1,199	8
2000	3,996	8	2,383	9
2001	2,888	9	3,186	11
2002	3,463	11	3,449	9
2003	1,747	9	2,669	10
2004	1,485	9	2,232	10
2005	591	3	1,274	7
2006	2,648	9	1,575	7
2007	696	7	1,312	6
2008	344	4	1,229	7
2009	5,816	25	2,285	12

Table 3. Results of the wood stork foraging habitat assessment using Service's Methodology available at: http://www.fws.gov/verobeach/BirdsPDFs/20120712_WOST%20Forage%20assessment%20Methodology_Appendix.pdf.

Description	Total Combined Hydroperiod Classes			Hydroperiod Class 1			Hydroperiod Class 2			Hydroperiod Class 3		
	Acres	*TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)
Wetland Impacts Within CFA	388.4	1,033.19		0.00	0.00		8.20	5.64		145.00	228.85	
Post Reclamation Wetlands Within CFA	486.3	1,073.76	40.57	20.1	6.51	6.51	96.70	66.53	60.89	17.20	27.15	-201.70
Wetland Impacts Outside CFA	1,622.90	3,887.72		77.00	24.93		139.77	96.11		557.40	880.54	
Post Reclamation Wetlands Outside CFA	1,604.00	4,220.16	332.44	60.10	19.46	-5.47	53.60	36.87	-59.24	536.30	846.42	-34.12
Total			373.01			1.04			1.65			-235.82

*TBWS - Total Biomass Available to predation by Wood Stork

Description	Hydroperiod Class 4			Hydroperiod Class 5			Hydroperiod Class 6			Hydroperiod Class 7		
	Acres	*TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)	Acres	TBWS (Kg)	Gain/Loss (Kg)
Wetland Impacts Within CFA	50.2	144.24		177.00	630.34		5.90	24.12		2.00	0.00	
Post Reclamation Wetlands Within CFA	78.3	224.97	80.73	207.8	740.02	109.68	2.10	8.58	-15.54	64.10	0.00	0.00
Wetland Impacts Outside CFA	163.00	468.35		650.00	2,314.79		25.20	103.00		10.50	0.00	
Post Reclamation Wetlands Outside CFA	127.50	366.33	-102.02	805.60	2,868.92	653.83	20.10	82.16	-20.84	0.90	0.00	0.00
Total			-21.29			763.51			-36.38			0

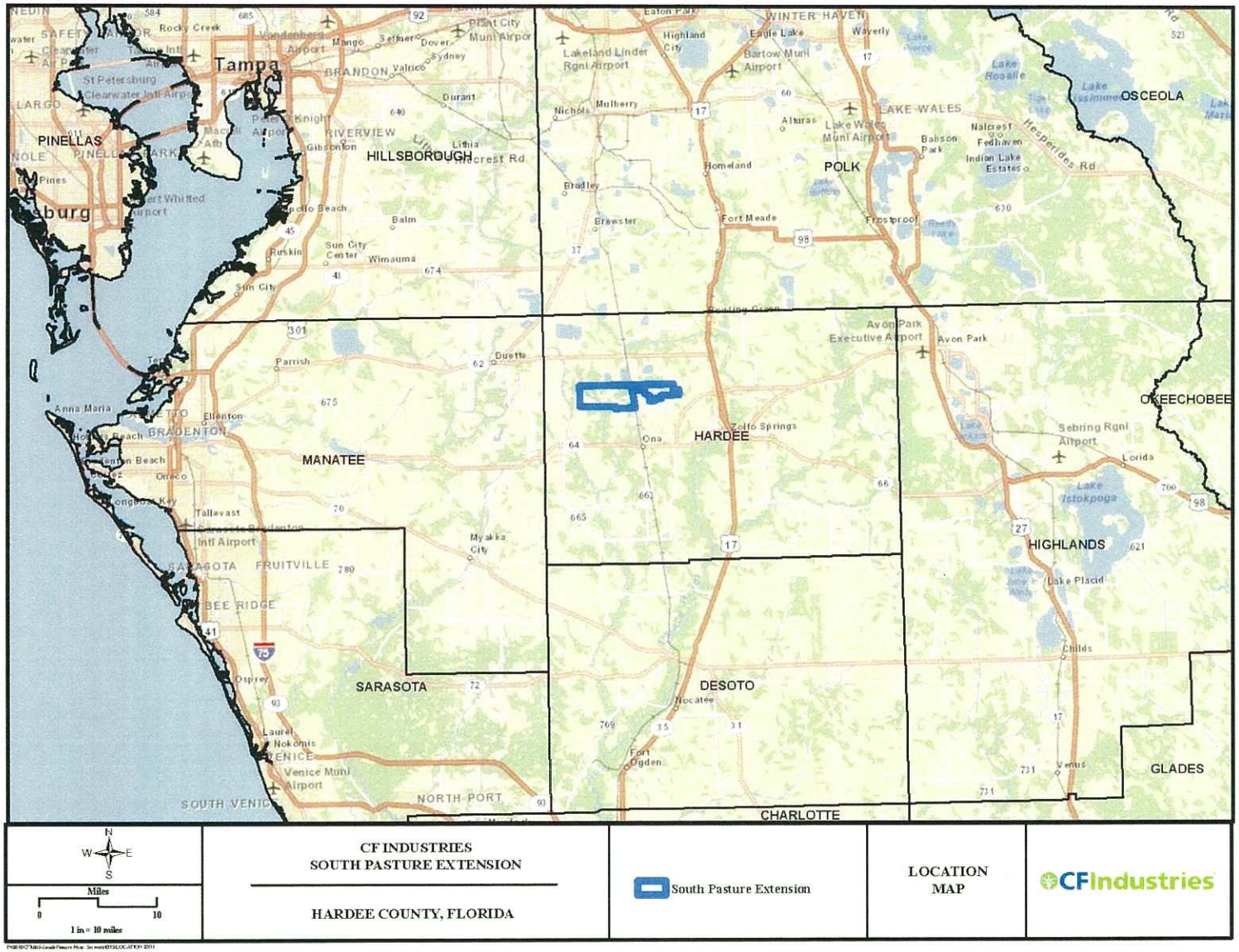

Figure 1. Map of the project site.

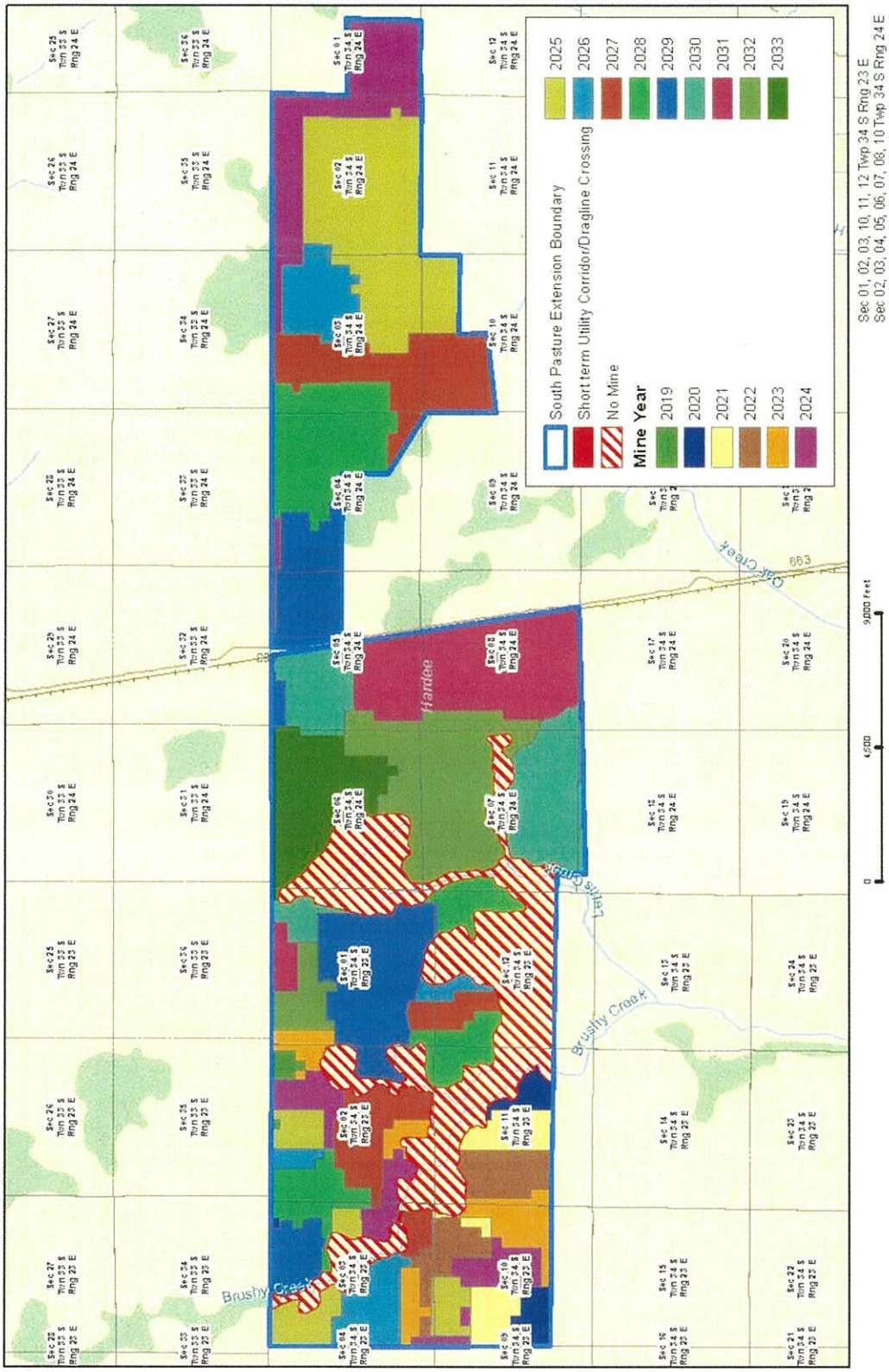

Figure 2. Mine plan showing the parcels slated for mining.

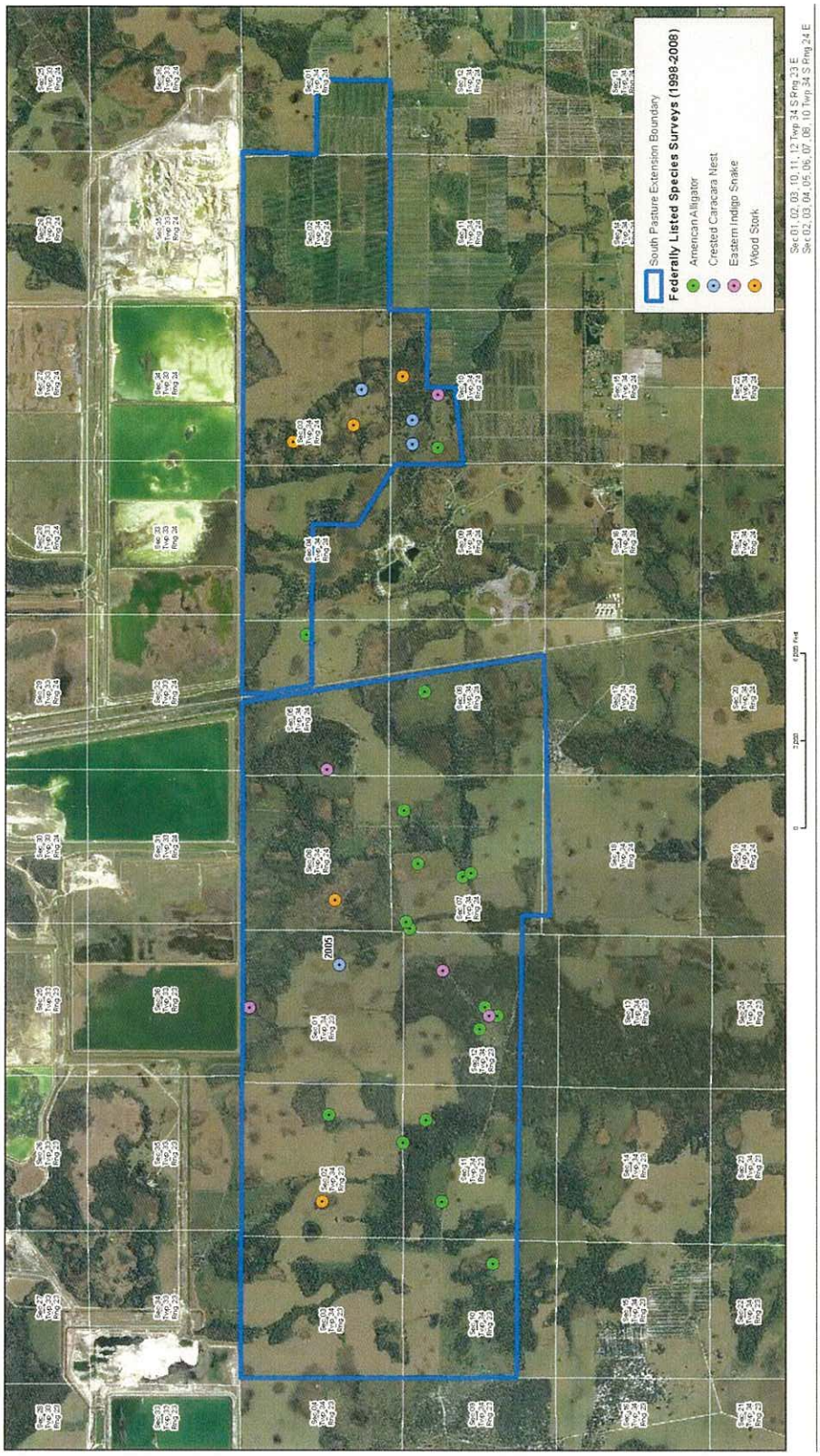

Figure 3. Map showing the location of listed species on the project site.

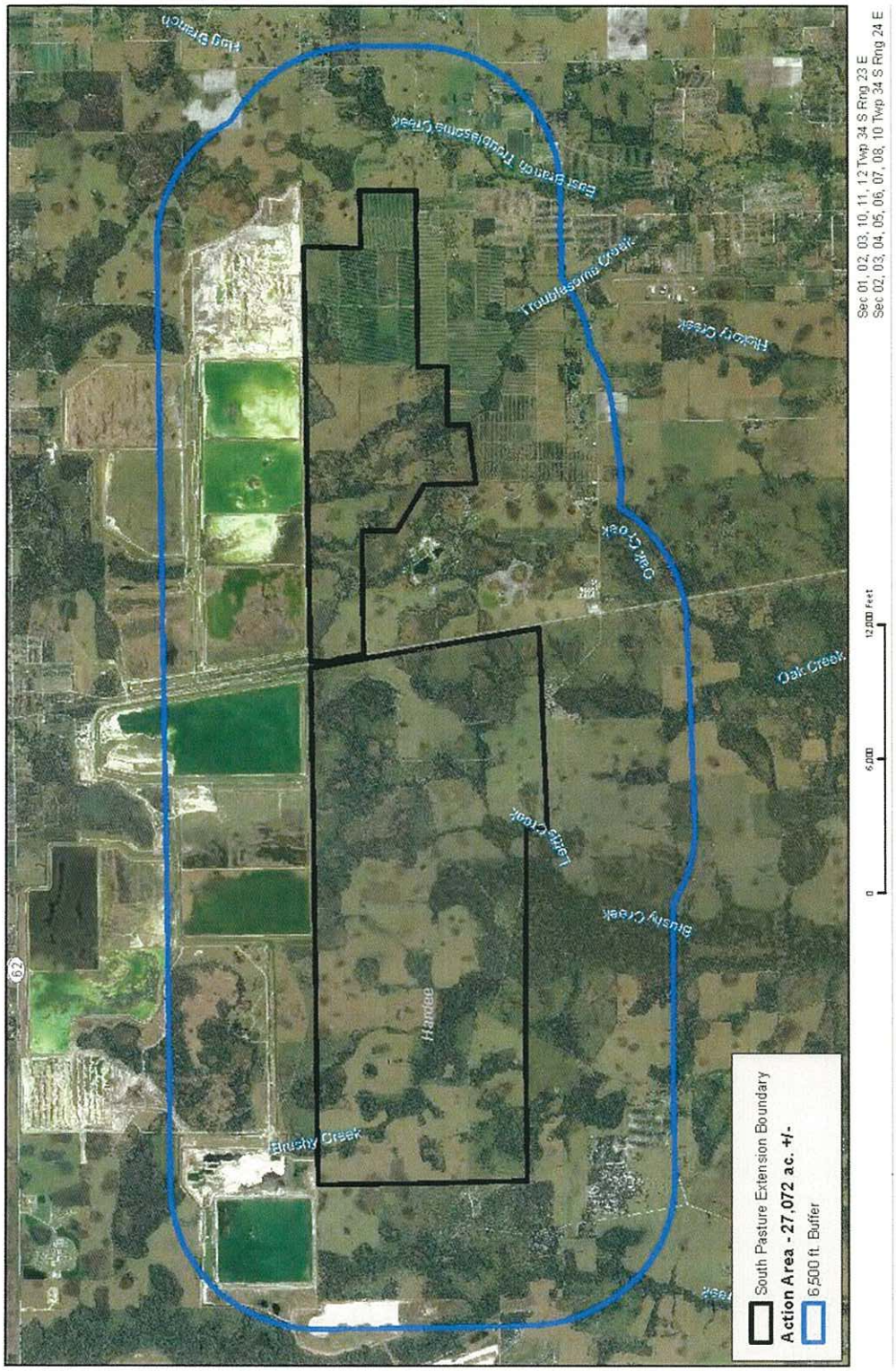

Figure 4. Map showing the estimated action area for the caracara.

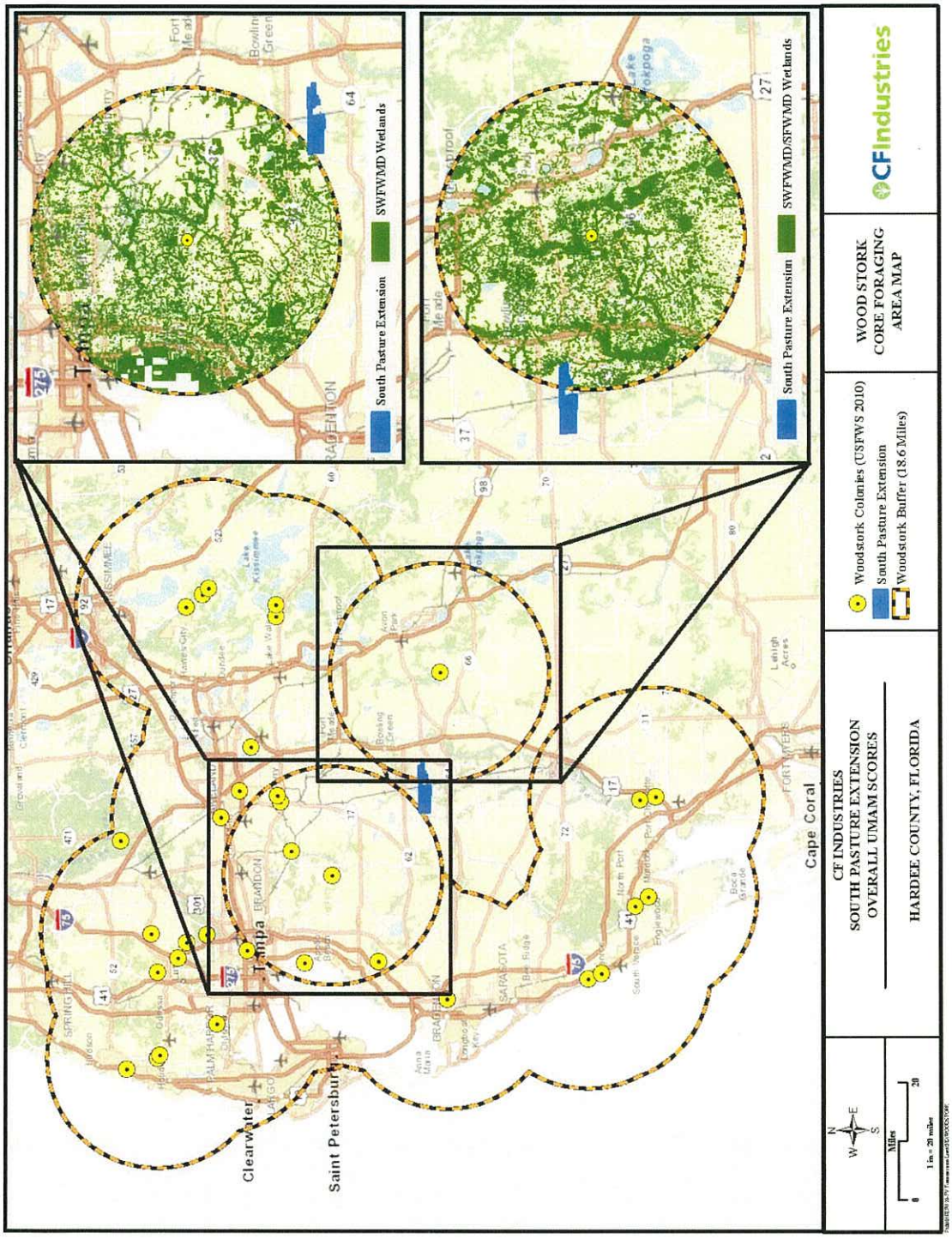

Figure 5. Wood stork colonies and buffers within the vicinity of the CF South Pasture Extension Mine.

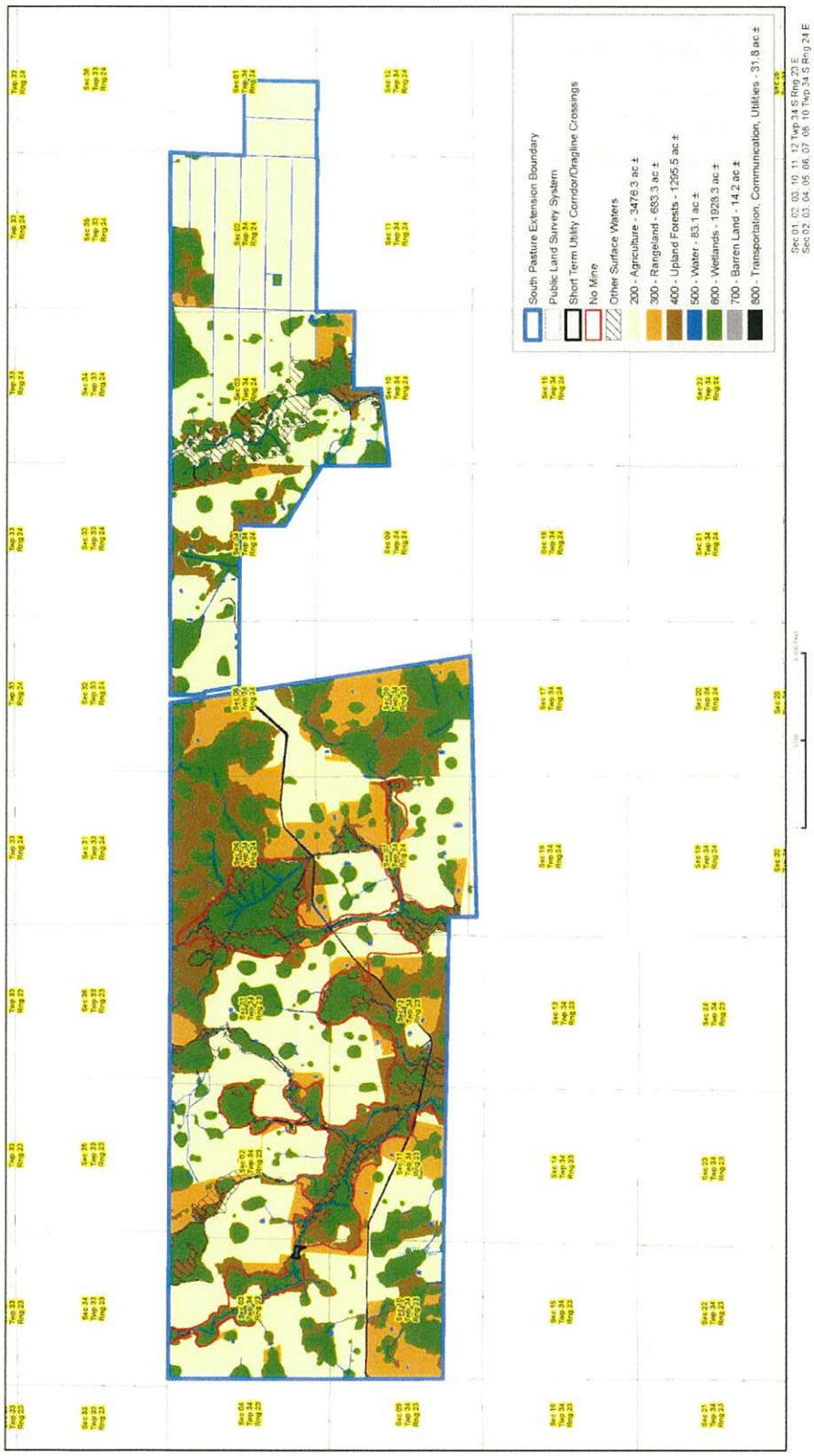

Figure 6. Map showing the current use of the land within the project site.

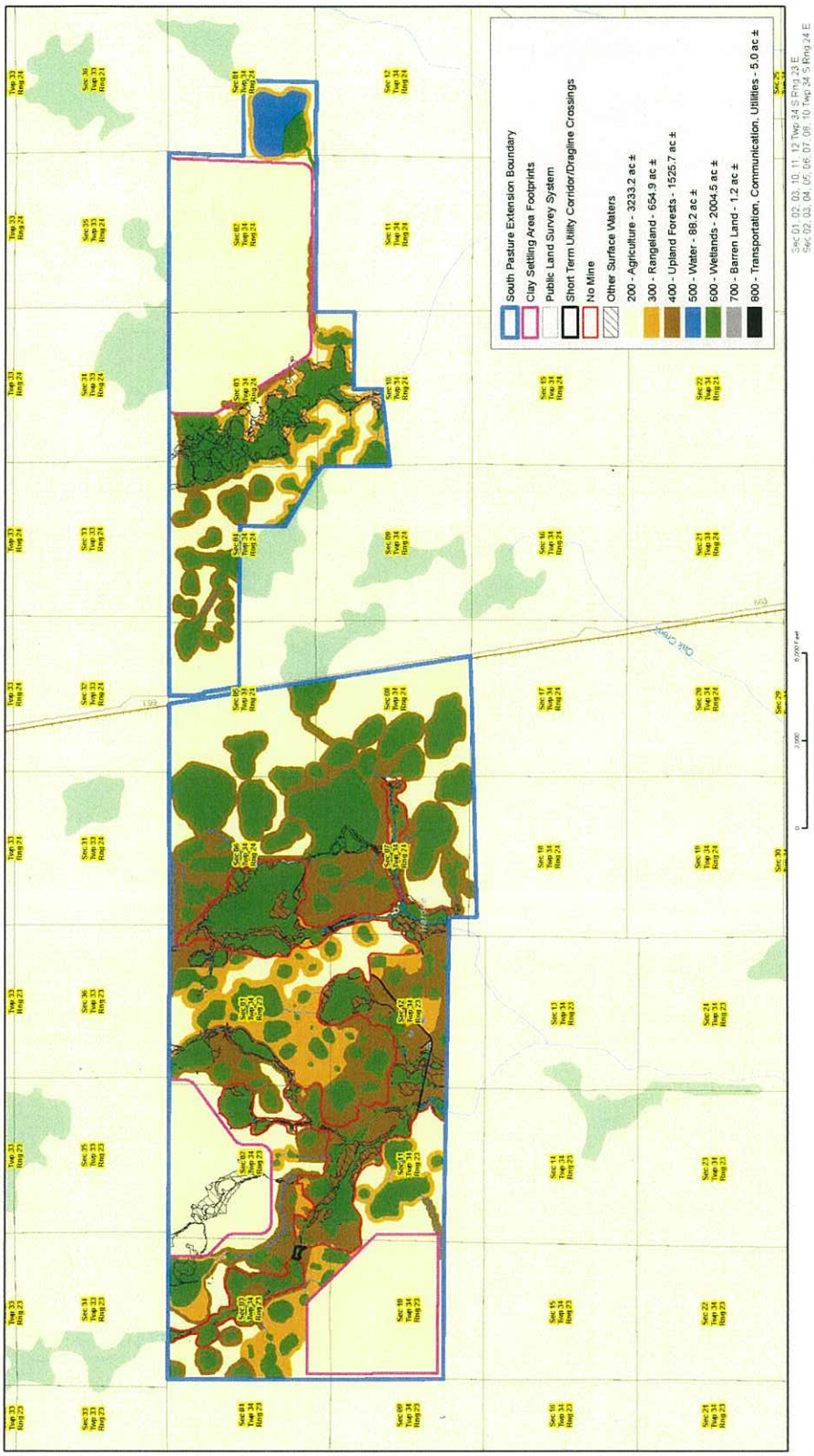

Figure 7. Map showing the habitat types and use of the land post reclamation.

Department of the Army
Permit Number SAJ-1993-01395 (SP-JPF)

Attachment F

Attachment F

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or "approval" from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or "approval" from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11" x 17" or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A <u>LIVE</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A <u>DEAD</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.

2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.

3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).

2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.

3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

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August 12, 2013

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.