THE BABCOCK RANCH COMMUNITY

Development of Regional Impact

Environmental Methodology Supplement
October 31, 2006

Prepared for:

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Introduction

This revised Environmental Methodology Supplement includes the final revisions based upon the last environmental methodology meeting held on October 10, 2006 and input received since that meeting. It includes those ideas and suggestions appropriate for a DRI methodology statement and as agreed to by the applicant for use in the DRI process. As discussed at the October 10, 2006 methodology meeting, this revised Environmental Methodology Supplement will be provided by Southwest Regional Florida Planning Council (SWFRPC) staff to the participants. As directed by SWFRPC Executive Director David Burr, and in accordance with Rule 9J-2.021(f) F.A.C., any comments, agreement, disagreement or suggested revisions shall be provided in writing to SWFRPC within 14 days thereafter.

There were many ideas and suggestions that will be helpful for other phases of the creation of the Babcock Ranch Community and the management plan for the Babcock Ranch Preserve. Some of these are summarized at the end of this document, in the section entitled "Aspirational Goals," which are not part of the DRI methodology, but instead provide further guidance as to the philosophy for creating the shared future of the Babcock Ranch. Separate initiatives, including surrounding land use and wildlife corridor studies as called for in the Sierra Club Settlement Agreement (available at www.babcockranchflorida.com), the creation of the Management Plan for the Babcock Ranch Preserve, environmental research by Florida Gulf Coast University, and the continuation of the "environmental summit" process begun this past summer, will be utilized to explore and discuss additional ideas and suggestions for the Babcock Ranch Community and the balance of the Babcock Ranch. This unique property presents opportunities and challenges, with potentially competing interests and objectives. Care must also be taken to balance the various aspirational goals with the different interests and objectives. As well, existing statutes, rules and regulations may dictate certain approaches.

A. Site Information

1) Describe the existing land uses and vegetative associations. Provide an aerial photograph of the site.

The Babcock Ranch lands total approximately 91,356 acres and extend between Lee and Charlotte Counties. The Ranch represented one of the largest remaining undeveloped tracts of privately owned land in the State of Florida and had for years been identified as a top priority for acquisition under the Florida Forever program. Today the Babcock Ranch is managed for cattle grazing, silviculture, hunting, and active farming. In addition, it contains large expanses of good quality mesic pine flatwoods, open pastures, freshwater marshes, palmetto prairies, and cypress swamps, including the Telegraph Swamp. The lands serve as the headwaters to important creeks that drain to the Caloosahatchee River. Through the Agreement for Sale and Purchase between MSKP III, Inc. and the State of Florida Board of Trustees of the Internal Improvement Trust Fund, Lee County, Department of Agriculture and Conservancy Services, and the Florida Fish and Wildlife Commission, approximately 74,000 acres (80%) of the Babcock Ranch lands have been purchased by the State and Lee County for conservation and agricultural purposes. These lands represent one of the most ecologically diverse and important areas in the region and connect the western portion of South Florida to Lake Okeechobee. The purchase area includes Telegraph Cypress Swamp, which is

comprised of 8,000 – 10,000 acres of contiguous swamp, marsh habitats, and mesic pine flatwoods which transition into hydric flatwoods, mixed hardwoods, oak hammock, scrub, wet prairies, pasture, and agricultural fields.

The Babcock Ranch Community will be created on the remaining 17,608± acres of the Ranch lands, now owned by Babcock Florida Holdings, LLC. These lands are primarily located along the southwestern portion of the Ranch, adjacent to State Road 31. These lands include vast areas previously cleared for active agricultural use (sod and vegetable farming), cattle grazing, and mining (EarthSource Mine). The lands to be used for development are of lower quality than the lands purchased by the State and Lee County. Further, the development areas themselves within the Babcock Ranch Community have been located to further avoid and then minimize impacts to wetlands and other natural resources.

A Florida Land Use Cover and Forms Classification System (FLUCFCS) map has been developed for the Babcock Ranch Community. Agricultural and mining activities are the dominant land uses. Improved and unimproved pastures and active and fallow farm fields can be found throughout the Babcock Ranch Community. Large borrow lakes associated with the permitted mining activities can be found adjacent to S.R. 31. Silviculture activities have been ongoing in natural areas since the early 1900's. Cattle grazing occurs throughout the Ranch.

In general, the Babcock Ranch Community is comprised of a variety of habitat types, primarily agricultural and mining land uses. Natural communities onsite consist of pine flatwoods, palmetto prairies, mixed wetland hardwoods, cypress, freshwater marshes, and wet prairies. Some hardwood hammocks can also be found on the property. In addition, the Babcock Ranch Community contains manmade ditches which serve to convey water between isolated wetlands and/or downstream into natural waterways which ultimately discharge into the Caloosahatchee River.

An Aerial Map was included as Exhibit B to the original pre-application submittal. The FLUCFCS Map was included as Exhibit D to the original pre-application submittal.

2) Provide a brief environmental assessment of the site, encompassing such topics as the probable occurrence of wetlands and listed plant and animal species.

As outlined above, through the Agreement for Sale and Purchase, approximately 74,000 acres (80%) of the Babcock Ranch lands have been purchased by the State and Lee County for conservation and agricultural purposes. These lands represent one of the most ecologically diverse and important areas in the region, including Telegraph Swamp, which provides habitat for game species, is important for wading birds and supports rookeries for wood storks, great egrets, white ibis, great blue herons, and little blue herons. Another vital habitat found within the public purchase area is mesic pine flatwoods. The mesic pine flatwoods have historically been heavily subjected to clearing for agricultural conversion. In some areas, mesic pine flatwoods provide an upland refuge for non-aquatic animals in the wet season, provide cover for ground nesting vertebrates and bird nesting areas, provide black bear and panther foraging, denning and travel ways, and provide essential red-cockaded woodpecker foraging and nesting habitat. The Babcock Ranch Community lands can be expected to provide habitat for certain listed species although many areas are under active agricultural or mining uses. A Master Development Plan has been developed which provides for habitat linkages that

give listed species the ability to move not just through the Babcock Ranch State and Lee County Purchase areas, but also within the Babcock Ranch Community, and between the conservation lands and the development areas.

Wetland limits for the Babcock Ranch Community have been field verified, flagged, and mapped using GPS technology. Wetland boundaries shown on Exhibit E were established using the adopted state and federal wetland delineation methodologies. Wetland limits were previously approved and are still valid within the limits of the Earth Source Mine permits.

Wetlands within the Babcock Ranch Community have been affected to some extent over the years by ranching and farming activities. When the Babcock Family first acquired the property, numerous ditches and small "canals" were excavated in an effort to drain the land. This program was so successful that the Babcock Family later took steps to limit the drainage. As a result, Big Island Dike was constructed for Telegraph Swamp in the 1970's, which limited downstream flow and enabled a significant portion of the Telegraph Swamp wetlands upstream of the dike to maintain standing water for several months of the year and maintain a more appropriate hydroperiod. Many of the isolated wetlands internal to the Babcock Ranch Community are interconnected by ditches, which have altered historic water levels. The quality of wetlands within the Babcock Ranch Community varies depending upon the surrounding land use. Wetlands located within long-term active farm fields tend to contain exotic and nuisance vegetation and exhibit reduced wetland functions as a result of isolation and water table fluctuation. Wetlands outside the active farming areas tend to provide more wading bird habitat and function more interdependently with surrounding upland habitats. Wetlands interconnected by manmade ditches exhibit periodic inundation but exhibit levels of nuisance vegetation associated with the accelerated "dryout" in the spring.

A review of Florida Natural Areas Inventory (FNAI) and species telemetry data was conducted to obtain preliminary species information. This data indicated some use of the Babcock Ranch Community, in different locations, by numerous wading birds, Florida panther, Florida black bear, Florida scrub jay, and Audubon's crested caracara. In addition to reviewing FNAI and telemetry data, field surveys were conducted for listed species. Listed species observed include various wading birds typical to the area, the Florida panther, gopher tortoises, Sherman fox squirrels, Eastern indigo snake, Florida sandhill crane, Audubon's crested caracara, American alligator, and Florida scrub jay. Several listed plants species were also identified in the field. Reports documenting survey methodologies, results and proposed management plans have been prepared and will be submitted as part of the approval process for the Babcock Ranch Community.

The preliminary Wetland Map was enclosed as Exhibit E to the original pre-application submittal. A Listed Species Map was included as Exhibit F to the original pre-application submittal.

Question 9 (Maps)

Mapping will be done using AutoCAD or ArcGIS. Specific protocols for data transfers will be developed by technical staff on behalf of the Applicant and County staff, when the data is available for transfer. Digital data will be transferred by CD, DVD or FTP, based on which

protocol is the most practical for the specific need. Maps delivered as a part of the application will be as required by current regulations. PDF files will be provided for each application map document. This will facilitate internal staff review of the submitted application along with a restricted access FTP site, which the applicant will coordinate with county staff upon request.

For reference, the "Babcock Ranch Community" is the proposed development area consisting of 17,608± acres (sometimes referred to as Area 6), the "Ranch" is the entire Babcock Ranch consisting of 91,356± acres, including the Babcock Ranch Community and the portion acquired by the State and Lee County, and "south to the river" includes those lands south of the Babcock Ranch Community or the Ranch, respectively, to the Caloosahatchee River. These terms will be used throughout the rest of this document. A map depicting the Babcock Ranch Community, the Ranch, and those lands south of the Babcock Ranch Community or the Ranch to the Caloosahatchee River is provided as Attachment 1 to this Environmental Methodology Supplement.

Any digital mapping information provided will utilize the standard Florida West Zone NAD 1983 Feet coordinate system, as recognized by the Bureau of Surveying and Mapping in Tallahassee, as the regional coordinate state plane system.

Map B - Aerial

The applicant will provide imagery for the Babcock Ranch Community, the Ranch and south to the river generated from photography dated March 2006. This is color imagery, georeferenced to Florida West Zone NAD 1983 feet, with 1 foot pixel resolution. These generate sharp hardcopy plots to about 1"=200' scale. This imagery covers from just north of CR 74 south to the Caloosahatchee River, and from just west of SR 31 east to the county line. The March 2006 imagery is SID format. Infra Red imagery in the form of georeferenced TIF files is also available for the Ranch and south to the river and can be supplied if requested.

Imagery outside of the Ranch and south to the river, in a 2 mile perimeter width, will be provided from 2004 DOQs. These are color tiles with 1 meter pixel resolution. These will be supplied as SID format, georefernced to Florida West Zone NAD 1983 Feet as available from LABINS web site.

Historic photography will be provided for the Ranch and south to the river from USDA sources for 1944-1946. This will be in hardcopy form with the subject boundary overlaid, or as scanned digital files. Additionally, historic photography will be prepared from USDA indexes available for 1953 and 1970 for Lee and Charlotte County, for the Ranch and south to the river. All historic imagery will be in grayscale format sufficient to depict wetlands, uplands, flowways and general physical features.

Based upon the above, aerial photography will be provided, both in hardcopy and digital scanned files, for 6 separate time periods: 1944-46; 1953; 1970; 1994-95; 2004; 2006, for the Ranch and south to the river, from publicly available sources.

Map C – Topography

The applicant will provide topographic mapping for the Lee County portion of the Babcock Ranch Community in the form of 2 foot contours and spot topographic shots, from the 1998 Lee County Planimetric data set. This level of information does not exist at this time for the

remainder of the Ranch, or for the Charlotte County portion of The Babcock Ranch Community. For these areas the applicant will supply best available topographic information available from USGS or other agency sources. Spot elevations from ongoing survey work and limited historic elevations done for the Ranch will be provided in a digital AutoCAD format in State Plane NAD 1983 coordinate values. Additional topographic information will be provided as it is developed.

A generalized one foot contour map for the Babcock Ranch Community will be developed for the Joint-Environmental Resource Permit (ERP) application and will be supplied to County staff, once complete. Detailed topographic information for the Telegraph Swamp itself is generally not available.

Flood plain boundaries will be depicted for the 5 year, 25 year, and 100 year storm events, based on hydrologic analysis and the generalized 1 foot contour map. Hurricane surge zones will be depicted for the Babcock Ranch Community based on the SLOSH model data as provided by the SWFRPC for the landfalling storm.

Map D – Land Use

Land use for the Babcock Ranch Community will be depicted utilizing future land use mapping data as available through County staff. Existing land use for the Babcock Ranch Community will be depicted based on standard FLUCFCS methodology. Land use for the remaining portion of the Ranch and south to the river will be provided from South Florida Water Management District (SFWMD) GIS datasets for the year 2000.

Map E – Soils

The applicant will provide soils mapping information, including delineation of hydric, mesic and xeric soil types, for the Ranch and south to the river, based on digital information generated from standard Natural Resource Conservation Service (NRCS) soils mapping. The digital information will be cross checked against the hardcopy NRCS soils reports for Lee and Charlotte Counties to verify compliance with these documents. The map will include Map Unit identification numbers (MUID) as well as a table listing the MUID and the common soil description.

Map F – Vegetation

The applicant will provide standard FLUCFCS mapping with code numbers, acreages and a summary table for the Ranch and south to the river. Percent coverage estimates will be provided for invasive exotic species for the Babcock Ranch Community and remaining Ranch area. Vegetation for any areas outside the Ranch will be provided from SFWMD GIS land use datasets for the year 2000.

Map G – Wildlife and Plant Surveys

The applicant will provide separate mapping exhibits for specific plant surveys and for specific wildlife surveys for the Babcock Ranch Community. For areas outside the Babcock Ranch Community, including the remainder of the Ranch and south to the river, listed species information will be provided from available agency GIS datasets, including the FNAI or other agency data.

Map H – Master Development Plan

The applicant will depict the master development plan in a color exhibit showing the planned development areas as well as the proposed greenways and flow ways, for the Babcock Ranch Community.

Map I – Master Drainage Plan

The applicant will depict the existing, pre-development conditions in a separate exhibit showing general watershed boundaries, major streams and flow ways, major drainage structures, and arrows indicating direction of flow, for the Ranch. Information on sub basin delineations does not exist at the current time but will be provided as it is developed for the Babcock Ranch Community. General drainage information for areas outside the Babcock Ranch Community, including the balance of the Ranch and south to the river will be depicted based on available historic information from Ranch sources or from available County drainage studies. Major inflow and outflow points will be identified. Drainage easements will be depicted where they are known to exist. Historic flow and water level information is limited but will be provided as separate information for the subject area where it exists. Floodplain extents for the Babcock Ranch Community will be mapped for the 5 year-1 day, 25 year-3 day and 100 year-3 day storm events. Floodplain extents will be available at the time of the ERP submittal.

Question 12 (Vegetation and Wildlife) Methodologies

A general overview of the present site conditions and past site conditions for the Babcock Ranch Community and the balance of the Ranch will be provided. Ancillary data sources, subject to availability, will be reviewed in order to describe historic alterations due to natural and anthropogenic factors.

Aerial photographs, aerial inspection via helicopter and ground-truthing were used for the initial mapping of the vegetative habitats found on the Babcock Ranch Community. The property was mapped according to the FLUCFCS system using the 1999 edition published by the Florida Department of Transportation. These preliminary maps were updated as field biologists performed listed species surveys and wetland delineations on the ground. The FLUCFCS map for the Babcock Ranch Community has been included as Exhibit D. ARC GIS Desktop (Version 9.0) was used to illustrate mapping and associated acreages.

FLUCFCS mapping for the Babcock Ranch Community will be field verified on an ongoing basis through the state and federal permitting process. Percent cover estimates for exotic species will continue to be provided and refined. The remainder of the Ranch will be mapped using the FLUCFCS system to Level III, with limited ground-truthing. Percent cover estimates for exotic species coverage will be provided. Vegetation mapping for the areas south of the Ranch to the river will be provided in the form of existing publicly available data. Specifically, this information will consist of GIS shapefile coverage compiled by the SFWMD.

Prior to field surveys being conducted for listed species, a literature review was completed. The literature review included *Florida's official list of endangered species, threatened species and species of special concern* (FWC, 2004), *Endangered and Threatened Species of the Southeastern United States* (USFWS), and *Notes on Florida's Endangered and Threatened Plants* (Coile and Garland, 2003). Other resources used include the USFWS's *South Florida Multi-Species Recovery Plan* (1999) and the FWC online bald eagle nest database. As part of the Charlotte County Comprehensive Amendment process, a list of potential listed species was identified in the Ecological Assessment dated March 10, 2006.

Field surveys for listed species were conducted using the Standardized State-Listed Animal Survey Procedures for Use in the Review of the Babcock Ranch Development of Regional Impact provided by James W. Beever, III in July 2006 (a copy of the survey methodology is provided in Attachment 2 to this Environmental Methodology Supplement). Listed species surveys included both a.m. surveys (beginning one hour prior to sunrise) and p.m. surveys (ending one hour after dark). Surveys in Lee County consisted of performing meandering pedestrian transects to cover 80 percent of the subject property in accordance with Lee County's Land Development Code. Surveys in the Charlotte County portion of the Babcock Ranch Community were conducted in accordance with FWC guidelines, which require 15 percent of each suitable habitat to be surveyed. In addition to this general species survey, several species specific surveys have been or will be completed. Species requiring specific surveys have been discussed with the Southwest Florida Regional Planning Council (SWFRPC) and Lee County. Species specific surveys will include red-cockaded woodpeckers, Southeastern American kestrels, scrub jays, Audobon's crested caracara, wading bird rookeries and sandhill crane nesting. Each species requires either a specific survey protocol or time of year in order to be effective. The red-cockaded woodpecker (RCW) nesting season survey and Southeastern American kestrel surveys have already been completed.

The RCW survey was conducted for 14 consecutive days in May/June 2006. The methodology employed was consistent with that outlined in the USFWS Standard Local Operating Procedures for Endangered Species (SLOPES). Meandered pedestrian transects were performed in the pine dominated areas of the Babcock Ranch Community identified by Lee County and varied in width from 50 to 200' depending on visibility limits. All surveys were started at sunrise and continued to 11:30 a.m. The RCW vocalization tape was played at approximately 10 minute intervals along the transects while biologists listened for responses by RCWs. Potential cavity trees were examined for the presence of start holes and/or cavities.

Southeastern American kestrel surveys were conducted from mid-July through August 2006. Vehicle transects on an ATV were conducted in habitats open enough to allow sighting of individual birds. In areas with limited access pedestrian surveys were conducted. Using binoculars, observers looked for kestrels perched on fences, telephone poles and lines, or trees; and for kestrels flying or hovering. Mapping identifying Type I and Type II habitat for kestrels will be included in the protected species survey.

Previously identified scrub jays in the southwest corner of the Babcock Ranch Community will be surveyed in October 2006 and March 2007 to map the extent of their territory. Because crested caracaras have been observed on the property, surveys will be conducted in late fall of 2006 and winter of 2007 to determine if caracaras are nesting within the proposed development area. Surveys will be conducted at crepuscular times and will include any observations of Florida mastiff bat. Wetland areas within the Babcock Ranch Community will be surveyed in the spring of 2007 to determine the presence of wading bird colonies, sandhill crane and snail kite nests. A spring 2007 gopher frog survey will also be conducted. This is typically breeding season for gopher frogs and call surveys will be conducted in areas known to have gopher tortoise burrows. Granture will be assumed for Sherman's short-tailed shrew due to invasiveness of trapping.

Locations for all state and federally listed species observed during the course of surveying will be provided for the Babcock Ranch Community. This information will be presented on separate geo-referenced maps for each listed species located. In addition, the locations of transects and sampling sites, and any other ancillary data collection areas will be identified.

Locations of known state and federally listed species observations for the remainder of the Ranch and south to the river will be provided in the form of publicly available data. Examples of data sets include, but are not limited to Florida Natural Areas Inventory (FNAI) Element of Occurrence (EO) GIS shapefile coverage, Florida panther telemetry data, and FWC bald eagle nest locations.

Wildlife and vegetation survey efforts for the Babcock Ranch Community have been and will continue to be coordinated between the USFWS, the FFWCC, the SWFRPC, Charlotte County, and Lee County.

The results and methodologies of all listed species surveys completed for Charlotte County by August 30, 2006, were submitted for review to Charlotte County, Lee County and the SWFRPC prior to the DRI application submittal. The results and methodologies for the Lee County surveys were submitted to Lee County and the SWFRPC. This allowed staff time to comment on listed species survey methodologies prior to the DRI submittal which is anticipated for later in 2006. A copy of "Babcock Ranch Closes The Gap" Florida Forever Act support document will be also provided for review.

Question 13 (Wetlands) Methodology

The onsite wetlands have been field identified, flagged and mapped using GPS technology. Wetlands for the Babcock Ranch Community were delineated based on the criteria outlined in the USACOE Wetland Delineation Manual (1987) and Chapter 62-340, Florida Administrative Code. As follow up to the recent Supreme Court decisions in United States v. Rapanos and United States v. Carabell, the USACOE and Environmental Protection Agency (EPA) are examining the methods in which they describe and document jurisdictional determinations pursuant to the Clean Water Act. In light of this, wetland classifications will be based upon State status, as isolated wetlands may not be under future USACOE jurisdiction. Regardless, the delineation of the lines would not be affected by the federal jurisdiction issue.

The wetland boundaries shown on Exhibit E were established using the adopted state and current federal wetland delineation methodologies. Site inspections will be scheduled with the reviewing agencies to obtain approval of the delineated wetland boundaries as part of the state and federal permitting process. For purposes of the DRI, wetlands will be delineated based on State classifications.

The locations of historic wetlands, major flow-ways and major streams will be depicted with the 1946 aerial as the base map for the Babcock Ranch Community and the balance of the Ranch. Historic wetlands, flow-ways and streams will be delineated based on aerial photo-interpretation. Current wetland data (i.e. hydroperiods, water elevations, groundwater monitoring, and biological indicators) will be provided for select wetlands, major flow-ways and major streams where data collection is ongoing within the Babcock Ranch Community. Topographic information will also be provided for select wetlands within the Babcock Ranch Community. This information will consist of biological indicators to determine wet season water table elevations for thirty (30) wetland areas, upland/wetland interface elevations for the thirty (30) wetland areas, and partial or complete profiles for twenty-six (26) wetland areas. In addition, sixty (60) surficial wells have been installed to record surficial water table elevations every four (4) hours. A location map of the wet season water table elevations, profiles, and well monitoring sites will be provided for review. A functional analysis for all wetlands within the Babcock Ranch Community will be conducted based on the Unified

Mitigation Assessment Method (UMAM). The results of the UMAM will be provided in a tabular form.

Plans for any proposed wetland creation, restoration or enhancement will be supported by the appropriate soils, hydrologic, topographic, and habitat data.

Question 14 – Water General

The historic and existing drainage patterns will be reviewed based on the same aerial base as described in the comments above on Wetlands Methodology and be provided for the entire Ranch. A narrative explanation of the historic, existing and post construction conditions will be provided.

Stormwater Management:
Water Quality Monitoring Program

The data and information collected will be used to produce maps showing watershed divides, conveyance courses, control structures, storage areas, and flow direction in addition to the elevations shown on the topographic map for the Ranch. Cross sections for the conveyances within the Babcock Ranch Community will be shown in graphical form in a variety of typical locations. Detailed sections will be provided in the computer models for the backwater profiles.

Baseline water quality will be provided at 15 locations across the Ranch. The sites are focused on the Babcock Ranch Community, but will also include each of the major streams that are on the Ranch. A map depicting the water quality location sampling sites is provided as Attachment 3 of this Environmental Methodology Supplement. Each location will have the following items tested on a monthly basis from grab samples: total nitrogen, nitrite, nitrate, ammonia, Total Kjeldahl Nitrogen (TKN), total phosphorous, Ortho phosphorous, pH, specific conductance, salinity, dissolved oxygen, temperature, turbidity, total suspended solids, and chlorophyll-a. Pesticides will be tested on a quarterly basis along the perimeter from water sampling and annually for sediment sampling. Enterococci, and fecal coliform will also be tested quarterly. The pesticide, enterococci, and fecal coliform will be sampled at three locations. These will be the inflow along SR 31 to Telegraph Creek, its outflow location at the south end of the Ranch, and the outflow location of Trout Creek at the south end of the Ranch.

Flow measurements will also be done at the 15 water quality sample locations in conjunction with the wet chemistry and biological sampling. This will be done utilizing standard Price Open Cup rotating flow meters and determining cross sectional flowing areas at each location for each event, and utilizing flow measuring methodologies and techniques acceptable to SFWMD criteria for flow measurements, or other suitable techniques adapted to unique field conditions and deemed acceptable by the engineer of record. Summaries of the flow and sampling events will be provided as requested, following appropriate quality assurance procedures.

All testing will be evaluated annually. The list of pesticides will be reduced to those found in the previous year's sampling and those currently being used on the site. The review agencies will be able to audit the field sampling to assure that the methodologies and protocols are being followed.

Ground water monitoring will be done using 28 wells in the surficial aquifer. The parameters measured will include pH, conductance, temperature, dissolved oxygen, BOD, color, sulfate, chloride, totaled dissolved solids, water table elevation; nitrate, and ammonia. Sampling will be done semi-annually from the wells and reported annually.

Fish and Aquatic Macroinvertebrate Sampling:
Fifteen (15) sites within the Ranch will be sampled for fish and aquatic macroinvertebrates. The sampling locations include the major flow-ways leading into and out of the property and were located to include upstream, mid-stream, and outfall locations of the Ranch flow-ways. Sampling will be conducted 3 times during the wet season in order to establish a representative baseline of resident fauna. The sampling will target July-August, October-November, and January-February in plant communities with standing water during those months. This sampling regime is based on the baseline aquatic fauna assessments currently being conducted for the Picayune Strand Restoration Project (PSRP). The PSRP is a Comprehensive Everglades Restoration Project (CERP) and also part of the State of Florida ACCELER-8 project (Ceilley et al. 2005).

Methods:
Fish:

Trained biologists will conduct sampling for freshwater fish. Fish are sampled in July - August, October - November, and January – February to determine species presence/absence, relative abundance, size, approximate age, and plant community associations. Samples are collected from major plant communities in the vicinity of each monitoring site when water is present. Ten (10) clear plastic Breder traps will be placed in those study sites flooded to a sufficient depth to permit effective sampling. Fish traps will be placed in a stratified manor throughout the circular plot to sample all available microhabitats and to maximize capture efficiency (Ceilley et al. 2005) Fish (10 Breder traps) and invertebrate sampling (20 samples) will be divided proportionally among vegetation/habitat zones present (Lane et al. 2003. Bob Rutter, personal communication).

Submergence time is one hour. All fish collected will be identified. Dip net sweeps, as described below for the aquatic macro-invertebrates, will also be utilized. Dip net samples of fish will be recorded separately along with their relative abundance at each site. Any species of fish that cannot be field identified will be preserved and returned to the laboratory for positive identification. In addition, several voucher specimens of each fish species will be

preserved in formalin. An experienced fisheries biologist will be consulted with for these identifications and for the preparation of voucher specimens.

Methods:
Aquatic Macroinvertebrates

Biologists will sample invertebrates with a 30-mesh D-frame dip-net which are an effective sampling method for wetland macroinvertebrates (Cheal et al. 1993, Rader and Richardson 1994, Stansly et al. 1997). Sampling will continue until the peak (asymptote) of the taxa accumulation curve is reached or no additional taxa are observed in replicate dip net samples for approximately 10 minutes. This typically requires about one hour of intensive sampling by a trained and experienced biologist in all major habitats within the wetland. Samples will be field-sorted using forceps, eyedroppers and sorting pans along with hand picking of natural substrates. Not all individuals of an abundant species will be collected for preservation however; each species observed in the pan will be collected in proportion to its relative abundance in the field. This allows for calculation of biometric scoring and some statistical analyses that are useful in comparative wetland studies. Sorted field samples are preserved in 80% ethanol, and delivered to the taxonomic expert at FGCU for identification and preparation of voucher specimens.

Question 18 – Waste Water Management

The Babcock Ranch Community will include additional waste water management treatment that meets or exceeds all current rules, regulations and requirements. By separate agreement between the Sierra Club and MSKP III (Kitson), a privately enforceable commitment has been made for additional treatment. Although not part of the environmental methodology, the excerpt from that July 18, 2006 Settlement Agreement is set forth below for information purposes only. Treatment levels will seek to eliminate as much as possible all harmful nutrients and contaminants. The specific design features of the waste water treatment system are currently under development and will be continually refined through the course of permitting.

Excerpt from Sierra Club Settlement for informational purposes only:

> Tertiary Treatment Component of Wastewater Treatment System
>
> Concurrent with development approvals, Kitson shall provide treatment of the permanent wastewater treatment system serving the BROD to remove phosphorus, nitrogen and biological contaminants from the water. The goal will be no discharge of harmful nutrients and contaminants from the wastewater treatment system. The tertiary treatment will complement the use of reuse water with the specific chemical composition of such treated water to be determined through the permitting process. Kitson will review with the representatives and/or agents of the Sierra Club its proposed design for the wastewater treatment plant and its plan to dispose of remaining solids removed through the wastewater treatment process prior to submission of these plans for approval through the permitting process.

Question 19 - Stormwater Management

The stormwater treatment system will include a backbone system consisting of wet detention areas and dry detention areas. Dry detention areas will not be used as the primary detention/retention component but will be utilized in combination with wet detention/retention facilities. The stormwater treatment system will be designed in accordance with SFWMD Rule 40E-41.421 - 40E-41.463, known as the Southwest Florida Basin Rule Criteria, and will provide 50% retention/detention water quality treatment above that required by Section 5.2.1(a) of the SFWMD Basis of Review. To achieve this level of treatment, Best Management Practices (BMPs) related to source controls, stormwater conveyance and pretreatment, and stormwater management system design enhancements, will be employed within the Babcock Ranch Community.

These BMPs will include, but may not be limited to: reduced turf coverage, native landscaping, created wetlands, filter marshes, phyto-zones, extended hydraulic residence times, and increased flow paths. The final stormwater treatment system will be designed to provide an efficient, aesthetic and sustainable treatment train to achieve the desired level of treatment.

The approach to stormwater management will meet or exceed the requirements of Lee and Charlotte Counties and SFWMD, which are listed below. The following table summarizes the approach to be taken:

EVENT	CHARLOTTE	LEE	SFWMD	ACOE	BABCOCK
Water Quality	Follow SFWMD	Follow SFWMD	First inch of runoff or 2.5 inches times the percent of impervious cover expressed as a decimal.	Compute the existing conditions to determine annual loads from the site. Provide a treatment system for the proposed land use changes that keep the post development loadings at or below the existing conditions.	First inch of runoff or 2.5 inches times the percent impervious cover expressed as a decimal times 1.5. A. Provide monitoring similar to lands in DRGR area of Lee County. B. Establish baseline water quality for surface water and ground water. See question 14 for details. C. Runoff water quality goal is to meet or exceed present condition or state standard, which ever is better for the environment. D. Adopt adaptive management procedures that will adjust design of future portions or guidelines based on monitoring results. E. The proposed treatment factor will consist of source control, pretreatment, primary in lakes and end with filter marshes.

Roads and Parking lots	Minimum swale flowline gradient shall be one-tenth of one (0.1) percent for grassed swales. For curb and gutter, minimum flowline gradient will be based on hydraulic capacity analysis for a five-year design storm. The minimum elevation of road centerline shall be five (5) feet above mean sea level National Geodetic Vertical Datum (NGVD), or as determined in the SFWMD permits.	The road center line or minimum parking lot elevation is to be at or above the peak of the 5 year-1 day event. Arterial and collector roads are to have one lane passable in a 25 year-3 day event.	The road center line or minimum parking lot elevation is to be at or above the peak of the 5 year-1 day event or the minimum local criteria.		The low edge of pavement for local roads to be at or above the peak stage for the 5 year-1 day event. The arterials and collectors will have one lane above the 25 year-3 day event peak stage and will have all travel lanes above the 25 year-1 day event. Arterials will have the pavement above the 100 year-1 day event. Parking lots are to be at or above the 5 year-1 day event. Minimum swale grades in urban and suburban areas will have a minimum longitudinal slope of 0.2%. Ditches may have a flatter longitude and slopes. The minimum longitudinal slope on roads with curb and gutter is 0.3%
Allowable Discharge	Drainage facilities within the limits of the subdivision, plus all off-site facilities necessary to fully and finally discharge all runoff of the twenty-five year frequency, twenty-four-hour duration design storm.	Follow SFWMD. Lee County and SFWMD had a surface water master plan done that has peak allowable discharge rates in it for properties that do not already have a permitted discharge rate.	25 year-3 day event for peak rate. This requires a perimeter rim elevation control of at least that elevation. Peak rate is determined by past permit or watershed value from study or a pre-vs-post analysis.		25 year-3 day event for peak rate. Use existing peak rate of 39 csm as maximum rate for the design event. The perimeter berm elevation will be 0.3 feet above the peak stage for the 25 year-3 day event and the 100 year-1 day event. .

Compensating Storage			Provide equal pre-development and post development volume for 100 year-3 day event.		Provide equal pre-development and post development volume for 100 year-3 day event.
Stream conveyance	Fill may be used to raise land in areas subject to flooding provided fill does not restrict the flow of water and unduly increase flood heights as determined by the county engineer.	Allowable rise in a 100 year event is from 0 to 1 foot. Determination of this is site dependant based on past flooding.	Allowable rise is not to create adverse impact. This is usually between 0 and 0.3 foot based on the location.		No rise offsite unless requested by the upstream land owner. Allow onsite rise of up to 0.5 feet. Create a map for Babcock Ranch Community that identifies flood plain extents for 5, 25 and 100 year storm events.
Finish Floor Elevation	The finish floor elevation shall be a minimum of eighteen (18) inches above road centerline at the building site as defined in (1) above or as required by floodplain data or the SFWMD permit.	100 year-3 day event.	100 year-3 day event.		100 year-3 day event peak stage plus 0.5 feet.

Further, by separate agreement between the Sierra Club and MSKP III (Kitson), a privately enforceable commitment has been made for additional treatment. Although not part of the environmental methodology, the excerpt from that July 18, 2006 Settlement Agreement is set forth below for information purposes only. The specific design and features of the storm water treatment system are currently being formulated and will be continually refined during the course of permitting.

Excerpt from Sierra Club Settlement for informational purposes only:

> Storm Water Treatment
>
> The development will feature the use of natural systems either through preservation, restoration, or other integrative strategies and avoid the more energy-intensive approaches. Kitson shall implement the use of natural solutions for flow ways, water management and landscaping. The stormwater treatment system shall include a combination of ponds, filter marshes, buffers, manmade stormwater ponds, golf course ponds, created wetland treatment systems, wetland buffers or other appropriate storage and treatment methods, based upon site specific conditions. Golf courses tees and greens shall be designed with underdrains. Seepage from these underdrains will be collected and treated in the stormwater treatment system. The water management system shall be subjected to South Florida Water Management District rules and regulations.
>
> Kitson shall also establish water quality background to facilitate determinations of existing quality compared to post-development quality.
>
> Man-made landscapes and storm water treatment areas will enhance the existing native systems and a native plant nursery will be built to provide the native trees and landscape plants for the community. Kitson and/or its agent shall pre-approve landscape materials and xeriscape plants which will be used throughout the community.

Additional Modeling for Planning and Long-Term Management Purposes

In addition to the traditional modeling that will be necessary for the design and permitting of the storm water system for the Babcock Ranch Community, additional modeling using the MikeSHE and Mike 11 programs will be conducted for the Babcock Ranch Community and the balance of the Ranch. It is important to understand that each modeling tool has strengths and weaknesses, and the goal is to use the tool most appropriate for each situation. Through detailed collection of data and information, already underway, MikeSHE and Mike 11 will be calibrated against the results from AdICPR and HEC-RAS to be used in the design of the system, and will also be used to determine a water budget for the Babcock Ranch Community. Inflows, outflows, rainfall, evapo-transpiration (ET), percolation, and seepage will be assessed and modeled on a predevelopment scenario. During various stages of development and post

development runs to determine changes in elements of the water budget and the total water budget changes that may result from the development activities or circumstances outside the developments boundary.

Data gathered on the entire Babcock Ranch and Babcock Community from 100+ wells of various types and depths, 60+ piezometers, survey elevation topography data points, existing topography mapping, wetland GIS located stakeouts, core borings of sub surface geology strata will be modeled utilizing two dimensional models as well as the three dimensional MikeSHE and one dimensional Mike 11 systems. The information gained will be used in planning the water management backbone, to collect data basic to permitting requirements, creating designs to accommodate various storm water events and monitoring surface water behavior and potential water quality problems in addition to the design modeling with AdICPR and HEC-RAS utilized for the design of the system for the DRI, the DRI Master Plan and for Environmental Resource Permit (ERP) applications and processing.

The applicant is committed to using MikeSHE and Mike 11 as part of the program for Babcock Ranch. The use of MikeSHE particularly to date in South Florida has been for planning purposes and not for DRIs or ERP permitting. As the project unfolds and results are obtained from MikeSHE and Mike 11, calibrated against the other modeling results, and evaluated by project and agency engineers, it may be that the use of these tools will be expanded. However, at this point, they will only be used for planning and management purposes, as has been their only use to date in this area with other projects.

Aspirational Goals

The environmental methodology set forth above provides a summary of the agreed upon assumptions and methodologies in accordance with Rule 9J-2.021(f), F.A.C. for the DRI review of the Babcock Ranch Community. Although not part of this environmental methodology, the following summary outlines several additional aspirational goals for the creation of the community. The purpose of this section is to explain how many ideas from the public charrette process that took place in the Spring of 2006 and continuing input from government agencies and interested groups and citizens can be evaluated and used. In meetings and discussions separate from the DRI process, these and other aspirational goals will be evaluated and incorporated into the community as appropriate.

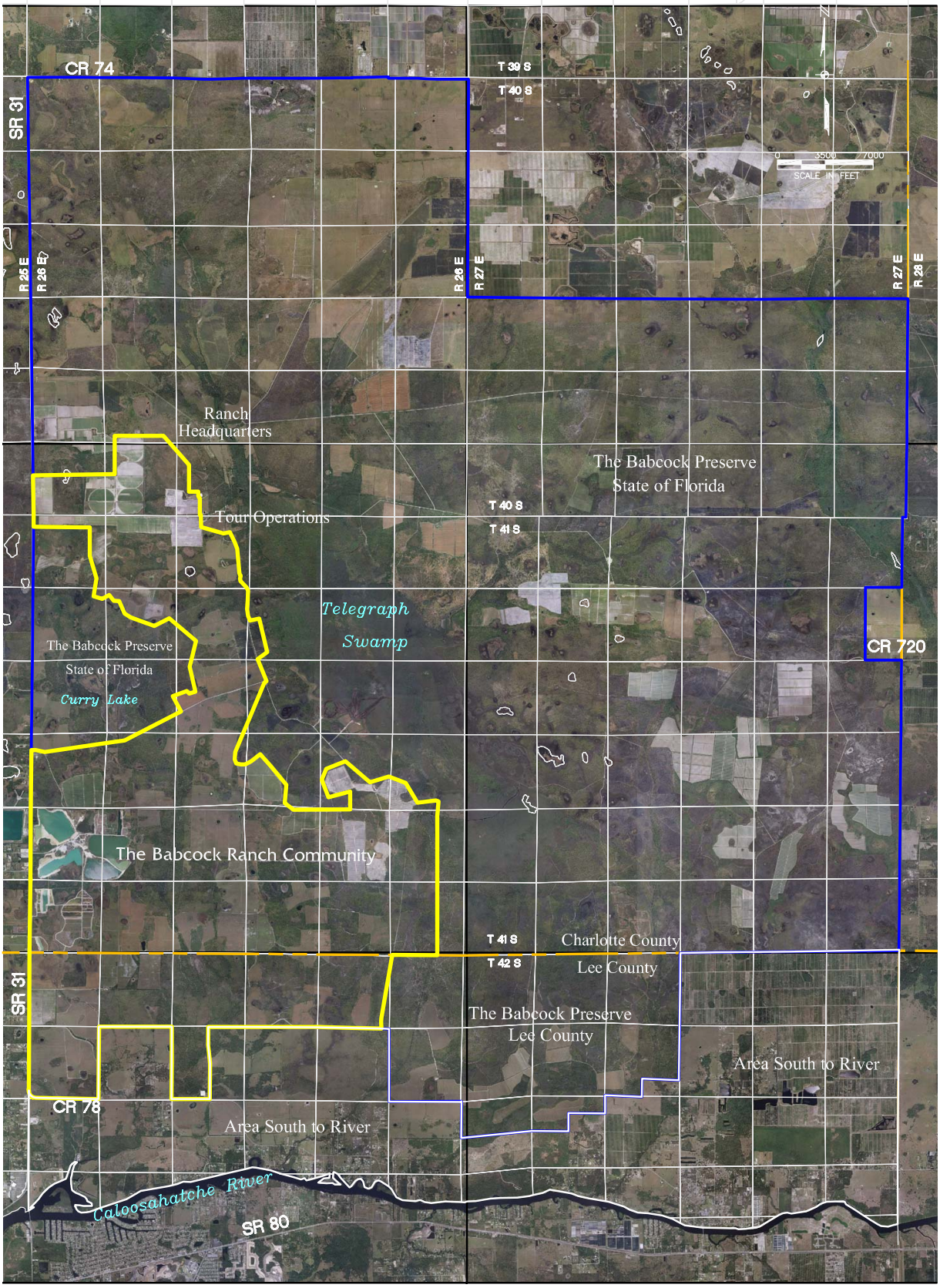
Going forward, there is an opportunity to use the Babcock Ranch Preserve and the Babcock Ranch Community as a laboratory of sorts, for detailed study of wildlife, wildlife movement patterns, treatment of invasive and exotic plants, restoration of native upland and wetland habitat, etc. This study effort will include in part funding of a Florida Gulf Coast University Ecological Research Station. One idea is the creation of a pilot wildlife enhancement program based upon biomimicry strategies such as floating rafts with ramps and log perches that will be placed in lakes and ponds to provide basking, roosting, and resting habitat elements for aquatic systems related species. Nest boxes for kestrels, barn owls, wood ducks, bluebirds and other cavity nesting animals will be installed in certain

restoration areas to serve as a habitat element until restoration trees gain enough growth to provide suitable nesting cavity opportunities.

A comprehensive home and business owner education program focused on the unique relationship of the Babcock Ranch Community to the environment will be created. The goal is to set and maintain high standards for sustaining water quality and implementing water conservation practices, addressing wildlife issues, promoting recycling programs, and using best management practices. The education program will be implemented through the Babcock Community Nature Center staff. It is expected that schools located within the Babcock Ranch Community and non-formal educational institutions will conduct similar programs for a wide variety of community audiences. The purpose for this education strategy is to minimize the discharge of pollutants that often occurs as a result of ignorance of best management practices and alternative methods to manage water effectively on private property. Funding for the ongoing water quality, water conservation and water related education programs within the Babcock Ranch Community will be provided through an Independent Special District, which will also provide funding for the management, maintenance, and enforcement operations of surface water management and greenway systems in the Babcock Ranch Community. Sales and marketing materials will include an explanation of the best management practices and how to live with wildlife and nature. All new property owners will be educated on living with wildlife present in their neighborhoods and will be provided with best practices for minimizing conflicts between wildlife, people and pets.

These are just a few examples of the type of aspirational goals for the Babcock Ranch Community, of many, expected to also address wildlife, water quality, water storage, education, green building, wildlife corridors, agriculture, recreation, employment, environmental restoration, native plant nurseries, long-term planning and monitoring, biological control of mosquitoes and other pests, and other relevant topics. These discussions will likely take place through the ongoing environmental summit process, with the next summit to take place in December 2006.

Attachment 1



Note: Aerial shown is Dated March, 2006
Section Lines are Approximate

N:\20066201\WaterMgmt\AMDA_Exhibits\Exh B Aerial.dwg (Attachment 1) jib Oct 31, 2006 – 3:18pm

Kitson&Partners

Babcock Ranch
A SHARED VISION. A SHARED COMMITMENT.

THE BABCOCK RANCH COMMUNITY
AERIAL MAP
MAP B
ATTACHMENT 1

Attachment 2

Standardized State-Listed Animal Survey Procedures
For Use in the Review of the Babcock Ranch Development of Regional Impact

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July 17, 2006

Listed Animal Species of the Babcock Ranch Community DRI development area footprint in the Order of Endangerment, as of October 10, 2006

Bold italic species are recently confirmed. Potential species are in normal font.

State Endangered Species

Florida panther, Florida mastiff bat, ***wood stork,*** peregrine falcon, snail kite

State Threatened Species

Florida black bear, bald eagle, southeastern American kestrel, ***Florida sandhill crane, Florida scrub-jay, Audubon's crested caracara, least tern, eastern indigo snake***

State Species of Special Concern

Sherman's fox squirrel, Sherman's short-tailed shrew, ***roseate spoonbill, little blue heron, snowy egret, tricolored heron, white ibis,*** whooping crane, limpkin, burrowing owl, red-cockaded woodpecker, ***gopher tortoise,*** Florida pine snake, ***American alligator,*** gopher frog

JWB/SWFRPC

The primary purpose of this document is to establish a standardized recommended survey methodology for documented and potential state-listed species in the project vicinity in sufficient detail to allow a meaningful evaluation of the impact of a proposed projects in the Southwest Florida Regional Planning Council (SWFRPC) on those species that have been afforded listed species status by the State of Florida. For each species and species group, this document presents a survey methodology designed to aid in determining the on-site status of the species. The recommended methods range from general, qualitative reviews to specific quantitative procedures. Some species are extremely difficult to detect due to seasonality of occurrence, large individual ranges, cryptic lifestyle and behavior, or low population size. Cursory survey findings that fail to detect the occurrence of a listed species on the project do not automatically imply species absence. Some situations will require a more intensive sampling approach, coupled with an examination of museum records and the current literature, before an on-site status determination can be made.

In all cases, the investigator (SWFRPC staff or their consultants) should contact the Florida Fish and Wildlife Conservation Commission (FWC) biologists and the staff of the U.S. Fish and Wildlife Service (USFWS), Vero Beach field office for pre-survey assistance in determining the survey information requirements for a given project. In many cases, prior to the survey, investigators are advised to consult the current pertinent scientific literature, including the known geographic range and presence of suitable habitats, and consider the probability of species occurrence within the project area. Some situations may require that the methodologies presented below be modified in order either to achieve the desired level of accuracy or to better reflect actual conditions on a site.

Recommended procedure for addressing listed species concerns for the proposed project consists of five (5) steps:

1) Review of existing data and literature, and consultation with area biologists and species experts;

2) On-site surveys of specific habitats for potential state-listed species;

3) Avoidance of impacts to confirmed listed species;

4) Minimization of impacts to confirmed listed species;

5) Mitigation of unavoidable impacts to confirmed listed species.

This document addresses step 1 and 2 as follows.

STEP 1

Dependence upon single external expert sources or a limited range of scientific literature is not a sufficient review of existing data. For example, existing published range maps may not contain complete up-to-date information on the distribution of listed species. Use of all of available data sources increases the accuracy, utility, and veracity of the listed species survey.

An accurate map of the habitat types within the project and areas within one mile of the project should be made during the initial project review. The map should follow the *Florida Land Use, Cover and Forms Classification System* (FLUCFCS) (Florida Department of Transportation 1999). This FLUCFCS mapping should reflect the actual habitat as characterized by vegetation type, not the human land use or zoning of the site.

A list of potential listed species for mapped areas should be generated, based on the habitat types present. This list is available from the HCS staff upon request. The FLUCFCS map and a list of listed species should be provided to HCS for review.

Existing data sources may confirm the presence of listed species for the project area. A table should be created that indicates which species have been confirmed and which species potentially occur on the site. Additional surveys may or may not be necessary for those confirmed species, depending on how impacts to these species are addressed.

Upon completion of step 1, the project applicant, the FWC, the USFWS, and the SWFRPC will have a complete and agreed-upon FLUCFCS habitat map of the site, a list of potential listed species for the specific project, and an indication of the species that have been confirmed as present on-site by existing data sources.

STEP 2

For those species that have been identified to be present or potentially present in the habitats on the project site, a variety of specific site survey techniques exist. The specific sampling methodologies range from simple to complex, depending upon the level of verification required and the species of interest.

For example:

The presence of the gopher tortoise is easily confirmed by a walking transect of the habitat for visual observation of burrows. In contrast, the presence of a gopher tortoise burrow commensal such as the Florida mouse or gopher frog may require a complex trapping program. Furthermore, while determining gopher tortoise presence is not difficult, but the determination of gopher tortoise population densities and habitat quality for gopher tortoises requires more detailed and complex field effort.

For improved organization and to avoid repetition, the following survey methods for listed species are provided by species group and habitat group where practical or, alternatively, by species. In the following discussion, when a FLUCFCS number is indicated in brackets following a habitat, as for example Wetlands (600), this indicates all wetland cover types; when indicated as Coniferous Swamp (620), this indicates all coniferous swamp wetland types; and when indicated as Pine Flatwoods (411), this indicates all pine flatwood types, including xeric, mesic, and hydric pine flatwoods.

WADING BIRD GROUP

Wood Stork, Florida Sandhill Crane, Whooping Crane, Roseate Spoonbill, Little Blue Heron, Snowy Egret, Tricolored Heron, White Ibis, Limpkin

Generally, rookeries and nesting areas for the wood stork, spoonbills, egrets, and herons are known and documented by the FWC (Runde et al. 1991), the FNAI, and the Audubon Society. Similarly, brown pelican rookeries are typically known and documented. In contrast, cranes and limpkins nest individually and can be verified by ground survey only. Also, new rookeries are found on occasion in freshwater wetlands. Currently all spoonbill nesting sites in Florida is in Mangroves (612) and Cypress (621). The wood stork, little blue heron, tricolored heron, and snowy egret utilize both freshwater and saltwater Forested systems (610, 620, 630) for nesting. Sandhill cranes typically nest in circular ephemeral Ponds and Prairies systems (640, 641, 643). Limpkins utilize Riverine Vegetation (510, 550, 560, 644), Freshwater Forested systems (610, 620, 630), and Marshes (640) for nesting.

Wading birds forage in a variety of wetland systems, including hydric pine flatwoods, seasonal wetlands, and artificial systems (wet 160, 181, 182, 184, drainage structures in 200s, 254, 500s, 600s, 710, 720, 731, 742, 911).

Critical foraging areas can be determined during the woodstork-nesting season during the late wet season when the dry-down hydrology concentrates fish for breeding season foraging. While rookery areas are found in deep wetland Mangrove Islands (612), Cypress Swamps (621) and Forested Wetlands (610 and 620), the principal foraging areas are in depressional wetlands. This critical foraging habitat of 6-10 inches of water, with an abundance of small fishes and other aquatic life, is essential for foraging at the critical February to April breeding season (Ogden

1978d). Wood stork critical foraging habitat is also found in association with Mangrove Fringes and Islands (612), Seagrass Beds (911), Oyster Bars (654), Productive Unvegetated Mudflats (651), and Tributary Stream Marshes (641 and 642).

The Florida sandhill crane prefers Wet Prairies (643), Marshy Lake Margins (652), Low-lying Pasture (211 and 212), Open Marsh (641), and Shallow Flooded Open Areas (653) (Williams 1978). Nesting occurs in marshy depressional ponds vegetated in pickerelweed, arrowhead, fire-flag, maidencane, and other herbaceous wetland vegetation in the upland/wetland matrix. Sparsely canopied Hydric Pine Flatwoods (624), Pastures (200s, 261, 741), and Prairies (310, 321) provide suitable foraging habitat for nesting sandhill cranes, near to ponds and marshes utilized as nesting areas. Sparsely canopied Hydric Pine Flatwoods (624), Pastures (200s, 261, 741), and Prairies (310, 321) provide suitable foraging habitat for nesting sandhill cranes, usually in proximity to ponds and marshes utilized as nesting areas. The Florida sandhill crane will also forage across open recreational areas such as Golf Courses (182).

Limpkins utilize slow-moving Freshwater Streams and Rivers (510), Marsh (640s), Cypress Heads (621), Hardwood Swamps (610), and Shoreline (652 Fresh) habitats. Diet consists of apple snails, other snails, freshwater mussels, lizards, insects, frogs, worms, and crustaceans. Nesting occurs in a mat of aquatic vegetation (Nesbitt 1978). The nests are very hard to find.

Little blue herons utilize a wide variety of Freshwater Habitats (500 and 600) in Florida. Diet consists of crustaceans, insects, small fish, frogs, and lizards. Rodgers (1978) notes that they appear to prefer foraging in freshwater habitats even when nesting in saltwater wetlands. Nesting colonies are located in Mangroves (612); Cypress (621); Willow, Buttonbush, and Red Maple copses (610); and on wetland tree and shrub islands in the center of Ponds and Lakes (520). Breeding occurs during periods of high water.

White ibis utilize a wide variety of Freshwater and Saltwater habitats (500 and 600) in Florida. Diet consists of a variety of invertebrates, particularly burrow dwellers, small fish, frogs, and lizards. They appear to prefer to forage in freshwater habitats even when nesting in saltwater wetlands. Nesting colonies are located in Mangroves (612); Cypress (621); Willow, Buttonbush, and Red Maple copses (610); and on tree islands in the center of Ponds and Lakes (520).

Roseate spoonbills nest predominately in Mangrove Forests (612) and are now reported to nest in cypress (621) (Church Roberts, pers.com. 2006) and forage wherever concentrations of small fish and crustaceans allow the birds to utilize their unique bills for feeding (Ogden 1978b). Seasonal Wetlands (653) and Hydric Pine Flatwoods (624) provide foraging areas during the March dispersal to interior freshwater wetlands (Allen 1942).

Snowy egrets utilize a wide variety of Freshwater and Saltwater habitats (500 and 600) in Florida. Diet consists of crustaceans, insects, and small fish. Nesting can occur in a variety of wetland trees. Ogden (1978c) includes Willow, Wax Myrtle, and Buttonbush (610) as freshwater colony trees. Breeding in Estuarine (612) and Freshwater rookeries (610) occurs during periods of high water in freshwater wetlands.

Tricolored herons utilize a wide variety of Freshwater and Saltwater habitats (500 and 600) in Florida. Diet consists of small fish, crustaceans, and insects. Nesting can occur in a variety of wetland trees. Ogden (1978a) includes Willow, Wax Myrtle, Marsh Elder, Pond Apple, and Buttonbush as Freshwater Colony Trees (610). Breeding in Estuarine (612) and Freshwater (610) rookeries occurs during periods of high water in freshwater wetlands.

All Wetlands (600s) and Beaches (181, 652 and 710), particularly shoreline and upland transitional zones, should be surveyed for wading birds and brown pelicans for a minimum of five days at dawn and dusk. The days do not need to be consecutive. A typical schedule would include three dawn and two dusk surveys at each wetland area. Since wading birds are opportunistic in their foraging patterns, survey times should always be selected to indicate seasonal

use by the species in question.

For herbaceous and non-vegetated wetlands less than 10 acres in size, a visual scanning of the wetland is usually sufficient. Wetlands that are either Forested (610, 620, 630) or exceed 10 acres in size must be sampled by either spot or pedestrian surveys to attain complete coverage. Aerial surveys and airboats may be utilized under a set of agreed-upon criteria, utilizing experienced observers other than from the vehicle operator.

Aerial surveys will not locate limpkin nests. The presence of flightless young limpkins and Florida sandhill cranes is considered presumptive of a nest being present. Surveys for the Florida sandhill crane are only valid to subspecies if performed in a period from March through September, when the migratory sandhill cranes are not present; or if flightless young are observed from January through July. If the applicant specifies that any crane observed is a Florida sandhill crane or, given Florida sandhill crane habitat is present, Florida sandhill crane is present, then the seasonal survey restriction can be omitted. Surveys for the nesting Florida sandhill crane are only valid if performed in a period from January through July. If the applicant specifies that Florida sandhill cranes are nesting on-site, then this seasonal survey restriction can be omitted.

Estimates of individual wading birds by species should be reported for each survey. All observed nesting and roosting sites should be mapped and reported by latitude and longitude. Foraging areas should be mapped.

Powerful optics, spotting scopes, and binoculars are recommended in surveying for this group of birds.

Bald Eagle

Southern bald eagles usually utilize pines as nest trees, particularly where this community is located near a riverine or lacustrine foraging area. One- and two-year-old immature bald eagles, and some adults, may remain in Florida year-round. Large groups of eagles of up to 20 or more individuals may be spotted soaring on thermals during fall and spring migration.

The locations of most bald eagle nesting territories in Florida are available from the HCS Non-Game staff and the Division of Wildlife eagle experts at each regional FWC office. New nests occur each year, however, and new nest locations and new territories unknown to FWC biologists are possible.

Pine flatwood habitats near open bodies of water and landfills should be surveyed for nests. In Monroe, Collier, and Dade counties large mangroves may also support eagle nests. On occasion other tall trees, such as cypress and Australian pines, may support nests. The following FLUCFCS classes are potential bald eagle habitat: Swimming Beaches (181), Open Land (190), Unimproved Pastures (212), Woodland Pastures (213), Coastal Scrub (322) if tall trees are present, Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Pine - Mesic Oak (414), Longleaf - Upland Oak (415), Other Pine (419), Oak - Pine - Hickory (423), Tropical Hardwood Hammock (426), Hardwood - Conifer Mixed (434), Australian Pines (437), Coniferous Tree Plantations (441), Streams and Waterways (510), Lakes (520), Reservoirs (530), Bays and Estuaries (540), Major Springs (550), Sloughs (560), Mangrove Swamps (612), Stream and Lake Swamps (Bottomland) (615), Wetland Coniferous Forests (620), Cypress (621), Pond Pine (622), Hydric Pine Flatwoods (624), Wetland Forested Mixed (630), Vegetated Non-Forested Wetlands (640), Freshwater Marshes (641), Sawgrass (6411), Cattail (6412), Spike Rush (6413), Maidencane (6414), Dog fennel and Low Marsh Grasses (6415), Arrowroot (6416), Saltwater Marshes (642), Cordgrass (6421), Needlerush (6422), Wet Prairies (643), Aquatic Vegetation (644), Submergent Aquatic Vegetation (645), Non-Vegetated (650), Tidal Flats (651), Shorelines (652), Intermittent Ponds (653), Oyster Bars (654), Beaches Other Than Swimming Beaches (710), Sand Other Than Beaches (720), Exposed Rock (730), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), Burned Areas (745), and Sea Grass (911).

All potential habitat within 3,000 feet of open water; open wetlands, shoreline, and open water zones (retention

ponds, reservoirs, etc.); and landfills should be surveyed for nests and foraging. For open habitat patches less than 10 acres in size, a visual scanning of the area is usually sufficient. Areas that are either forested or exceed 10 acres in size should be sampled by either spot, aerial, or pedestrian surveys to attain complete coverage.

Bald eagle use of a site can be divided into two broad categories, based on the structural characteristics of the vegetation. Type I habitats are plant communities with potential nest trees (pines, mangroves, cypress). Type II habitats are those utilized as foraging areas (open water). To define potential bald eagle use of a site prior to transect surveys, Type I and Type II habitats should be mapped.

Surveys must be carried out from October through May (November to April is preferred) for confirmation of breeding activity. Surveys should be conducted on calm, clear days.

The most effective survey technique for bald eagle nests involves the use of aerial surveys of Type I habitat located near Type II habitat, supplemented with on-the-ground site inspections. In order to use aerial methods for a survey, the aircraft should survey all potential bald eagle habitats present. There should be no helicopter or fixed-wing aircraft operation within a 500-foot vertical distance or a 1,000-foot horizontal distance from a known nest. Observers should be separate individuals from the pilot. Two observers with optics should be located to face opposite sides of the aircraft. The observers should be able to communicate with the pilot so as to direct or redirect flight for improved observation. The distance between aerial transect surveys should be spaced according to the limits on visibility imposed by weather conditions, vegetation, and terrain. Air traffic zones and flight path approaches around airports, which do not allow circling or unusual flight patterns, may limit effective use of aerial survey techniques in some areas.

Pedestrian surveys should be conducted in those areas unsuitable for or inaccessible by, aerial survey, or may be performed instead of an aerial survey. Field staff should establish parallel line transects, spaced so that all potential habitat areas that qualify as Type I or Type II habitat are surveyed. Transect length and distances between transect surveys will vary with size of the area, topography, and vegetative structure. All transect surveys should be individually labeled on a map of the project site and individually identified by numbering or labeling.

Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias. The same individual(s) should conduct all surveys to eliminate observer bias. Surveyors conducting ground and aerial transect surveys should observe both sides of the transect for bald eagles perched on trees, snags, or poles; nests in trees; and for bald eagles flying or soaring. When a bald eagle is sighted, the observation should be recorded on the map. Binoculars and spotting scopes should be used to verify identification. The specific habitat category for each bald eagle observed should be recorded at the point where the bald eagle was first observed. If the bald eagle leaves or moves to a new location while being observed, the flight direction and the location where the bald eagle lands should be noted. Behavior and vocalizations (ground survey only) should be noted, especially behavior that would indicate courtship or nesting. Surveyors should walk transect surveys at a steady pace. The surveyors should not knowingly intrude closer than 750 feet to a nest. Birds may silently flush before being observed as surveyors approach a territory. The surveyor should look for and record signs of bald eagle activity (e.g., prey remains, feathers, debris including droppings accumulated at roosts and nests). The surveyor should also look for potential nest sites while conducting foot surveys. Locations of bald eagles, bald eagle activity, roost sites, and nest sites should be recorded on a map (plot compass direction and distance from a permanent landmark), preferably including latitude and longitude for nest and roost sites. Habitat type and use should be recorded for bald eagle sightings. Binoculars should be used to differentiate adult eagles from immature birds.

American alligator

Detection of individuals can be difficult since this species is aquatic, generally mobile, and can be difficult to observe. For this reason, cursory survey efforts that fail to detect any of this species should not be construed to imply species absence. In areas of documented presence, these species will be considered present if suitable habitat is present.

American alligators utilize a wide variety of water bodies (500s) and wetlands (600s). During late winter and early spring, as wetland areas dry down, alligators move across uplands between wetlands. Large adult alligators construct "gator hole" ponds in herbaceous Wetlands (640) and depressional Pools (653). These gator holes become centers of wildlife activity in the dry season. Young alligators utilize shallow wetlands, including Hydric Pine Flatwoods (624) and Freshwater Marshes (640), with a water depth of 1 to 2 feet throughout the wet season. As adults grow larger, they no longer frequent shallow wetlands, but utilize areas with longer hydroperiods, such as swamps, ponds, lakes, and deep marshes (Fogarty and Campbell 1978).

Specific site surveys may be necessary, due to lack of existing documentation. This typically requires aerial survey or a fully outfitted vessel capable of operating in the water depths and site conditions of the water body. Surveyor expertise should be documented. A basic survey may involve two weeks of time-controlled transect surveys during the breeding season.

PINE FLATWOODS CAVITY NESTING GROUP

Red-cockaded Woodpecker, Southeastern American Kestrel, Mastiff Bat

The red-cockaded woodpecker in Florida utilizes southern slash pine (Pinus elliottii var. densa) flatwoods, often hydric, as nesting and foraging habitat in south Florida (Beever and Dryden 1992), and upland mesic and xeric longleaf pine (Pinus palustris) forest in north, central, and panhandle Florida (Baker 1978, Bradshaw 1990, Crosby 1971, Henry 1989). The territories of red-cockaded woodpeckers in hydric slash pine flatwoods are documented to be larger, on average 356.7 acres (144.4 h), than in northern longleaf pine, which ranges from 172.4 to 233.2 acres (69.8 to 94.4 h) (Nesbitt et al. 1983, Patterson and Robertson 1981).

The following FLUCFCS classes are potential red-cockaded woodpecker habitat: Recreational Land (180), Unimproved Pasture (212), Woodland Pasture (213), Specialty Farms (250), Other Open Lands (260), Coniferous Forests (410), Pine Flatwoods (411), Mixed Pine/Cypress (620), Longleaf-Xeric Oak (412), Pine-Mesic Oak (414), Hardwood-Conifer Mixed (434), Hydric Slash Pine Flatwoods (624), Rural Land in Transition Without Positive Indicators of Intended Activity (741), and Burned Areas (745). Red-cockaded woodpeckers are documented to avoid areas of dense midstory; however, site tenacity influences habitat utilization.

Foraging and cavity tree surveys should be conducted at least one-half mile from a roadway corridor in potential habitat (typically open pinelands with limited midstory). Proposed rights-of-way should be surveyed intensively. Detection of foraging red-cockaded woodpeckers requires an extensive time commitment.

Red-cockaded woodpecker use of a site can be divided into two broad categories based on use by the birds. Pinelands with mature pine trees of known age of 60 years or more, open midstory, and regular burns are potential colony and foraging habitat areas. Pine trees in this habitat will have a 6-inch diameter at breast height (DBH) or greater. Other habitat, such as areas with sparse pine canopy, areas with melaleuca or Brazilian pepper invasion, mixed pine/cypress habitat, cypress heads, open areas between forested habitats (wax myrtle, saw palmetto), and very young pine habitat, is utilized in south Florida, although this habitat use may not be typical throughout this species' range. Red-cockaded woodpeckers will forage on 2 to 5 year-old pine trees (1.5 to 3-inch DBH) in south Florida. To define potential use of a site by red-cockaded woodpeckers prior to transect surveys all forested habitat meeting the initial criteria should be mapped. In areas where other habitat use, as stated, has been documented,

additional habitats should be mapped for survey.

The most effective survey technique for red-cockaded woodpeckers involves the use of parallel pedestrian transect surveys. Surveys from vehicles will often miss red-cockaded woodpecker presence. Pedestrian transect surveys should pass through all potential red-cockaded woodpecker habitats present on the site in order to allow sighting of cavities, start holes, and individual birds. The distance between transect surveys should be spaced according to the limits on visibility imposed by vegetation and terrain. Typically, transect surveys spaced 200 feet apart are acceptable, except for areas of dense midstory or exotic plant invasion. Field staff should establish parallel transect lines spaced so that all potential habitat areas are surveyed. Transect length and distances between transect surveys will vary with size of the area, topography, and vegetative structure. All transect surveys should be individually labeled on a map of the project site.

Surveys for red-cockaded woodpecker presence may be performed throughout the year, but are most effective if conducted during the breeding season (late April to early June) and in the fall. Surveys for breeding must be performed during the breeding season (late April to early June). Conducting surveys in the breeding season will enhance the ability to locate active cavity trees and nest sites. Surveys for cavity trees should be performed in early morning or late afternoon when cavities are most visible because of sunlight shining on the trunks. Surveys for foraging red-cockaded woodpeckers are more successful in the early morning hours, at least during hot weather. Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias and tree face bias. Fall surveys are more conducive to documenting the full non-nesting territory of a red-cockaded woodpecker clan. Both nesting season and non-nesting season surveys should be conducted for a period of two weeks each, for each project.

Surveyors conducting transect surveys should observe all sides of pine trees; look for red-cockaded woodpeckers foraging on trees and in flight. In the early morning, red-cockaded woodpeckers will often forage with other birds, including other woodpeckers, nuthatches, and warblers. The surveyor should listen for red-cockaded woodpecker activity. Tapes of red-cockaded woodpeckers are available from the Audubon and Peterson field guide series and can be used, but not depended on, in surveying for this species. When a red-cockaded woodpecker is sighted, the observer should stop and record the location. Binoculars and spotting scopes should be used to verify identification.

The specific habitat category for each red-cockaded woodpecker should be recorded at the point where the red-cockaded woodpecker was first observed. Data should be collected at half-hour intervals. If the red-cockaded woodpecker moves to a new location while being observed, the flight direction and location where the red-cockaded woodpecker lands should be noted. Behavior and vocalizations should be noted, especially behavior that would indicate courtship or nesting.

Locations of red-cockaded woodpeckers (including vocalizations), cavity trees, and start holes should be recorded on a map (plot compass direction and distance from a permanent landmark). Habitat type and use should be recorded for red-cockaded woodpecker sightings. Tree species, tree height, tree diameter at breast height (DBH), and activity level should be recorded for start holes and cavity trees. Surveys for cavity tree activity should be conducted after initial transect surveys are surveyed across the site.

Surveys to determine cavity tree activity should be conducted during the morning hours, from 1 hour prior to sunrise to 3 to 4 hours past, on calm, clear days. Each cavity should have its individual observer. Cavity trees should be categorized as active, inactive, or abandoned based on appearance and survey of clan activities on the site. Surveyors should observe members of the red-cockaded woodpecker clan for signs of courtship and nesting behavior in late April to early June. Nest site location should be plotted on map, with a record of compass direction and distance from a permanent landmark. The same individual(s) should conduct all surveys to eliminate observer bias.

It is not possible to determine that a cluster is inactive by the appearance of the trees alone, especially over short survey times. Using tree appearance criteria alone, active colonies have been reported to be inactive. In physically undisturbed colony sites in southwest Florida, red-cockaded woodpeckers may utilize what appear to be completely inactive or abandoned cavities for roost trees. Studies (Doerr, 1988) indicate that 60% of inactive clusters in some North Carolina study sites are typically re-activated within 10 years and that red-cockaded woodpeckers may reoccupy abandoned clusters of trees due to a shortage of trees from natural events or interspecies competition. Doerr states that in active cluster sites "it is essential that there be an apparent surplus of trees to provide secure roosting for each bird, in a given year each clan usually uses 2-12 or more cavity trees, and that in a given year not all cavity trees are likely to be used."

Southeastern American kestrel

The southeastern American kestrel is a small falcon that utilizes open habitat for foraging and nests in tree cavities, typically abandoned woodpecker holes in dead pine trees. Foraging is performed from tall pine trees, snags, power and telephone poles and wires, and other tall objects. The kestrel feeds on large insects and, occasionally, on small rodents, reptiles, and birds (Wiley 1978). Open pine flatwoods provide for the life history requirements of the kestrel. The observed foraging areas for these birds often extend to adjacent open habitats, such as pasture, both wet and dry prairies, and mowed roadway edges. Survey guidelines for the resident Florida subspecies are found in Stys (1993) and are recounted here.

The following FLUCFCS classes may be potential kestrel habitat: Recreational Land (180), Improved Pasture (211), Unimproved Pasture (212), Woodland Pasture (213), Specialty Farms (250), Other Open Lands (260), Herbaceous Rangeland (310), Coniferous Forests (4101), Pine Flatwoods (4111), Longleaf-Xeric Oak (4121), Pine-Mesic Oak (4141), Xeric Oak (4211), Hardwood-Conifer Mixed (4341), Mixed Hardwood (4381), Forest Regeneration Areas (443), Hydric Slash Pine Flatwoods (624), Rural Land in Transition Without Positive Indicators of Intended Activity (741), and Burned Areas (745).

Kestrel use of a site can also be divided into two broad categories based on the structural characteristics of the vegetation. Type I habitats are plant communities with less than 10% canopy closure and with at least 60% herbaceous ground cover of less than 25 cm. in height. Type II habitats are open woodland communities with greater than 10% but less than 25% canopy closure and with at least 60% herbaceous ground cover of less than 25 cm. in height. To define potential kestrel use of a site prior to transect surveys, Type I and Type II habitats should be mapped.

The most effective survey technique for kestrels involves the use of vehicle transect surveys supplemented with pedestrian transect surveys. Vehicle transect surveys should include all potential kestrel habitats present on the site, and these habitats should be open enough to allow sighting of individual birds at considerable distance from the vehicle. The distance between transect surveys should be spaced according to the limits on visibility imposed by vegetation and terrain. A driving speed of 10 to 25 MPH is recommended, varying in response to terrain, road condition, or visibility. High-traffic roads that do not allow slow driving or frequent stopping cannot be utilized. On sites with limited vehicular access, vehicular surveys must be supplemented with pedestrian surveys.

Surveyors conducting road transect surveys should observe both sides of the road, looking for kestrels perched on fencerows, telephone poles and lines, and trees; and for kestrels flying or hovering. When a kestrel is sighted, the observer should stop the vehicle and record the location (both by odometer reading and on the map). Binoculars and spotting scopes should be used to verify identification. The specific habitat category for each kestrel observed should be recorded at the point where the kestrel was first observed. The perpendicular distance from the center of the road to the kestrel should be measured by range finder and plotted on the map. An attempt should be made to identify the sex of the kestrel. If the kestrel leaves or moves to a new location while being observed, the flight direction and possibly the location where the kestrel lands should be noted. Behavior and vocalizations should be noted, especially behavior that would indicate courtship or nesting.

For pedestrian surveys, field staff should establish parallel line transect surveys spaced so that all potential habitat areas that qualify as Type I or Type II habitat are surveyed. Transect length and distances between transect surveys will vary with size of the area, topography, and vegetative structure. All transect surveys should be individually labeled on a map of the project site.

Surveyors on foot transect surveys should walk transects at a steady pace. Often birds will silently flush before being observed as surveyors approach a territory. The surveyor should look for and record signs of kestrel activity (e.g., prey remains, feathers at plucking sites, white feces stains accumulated at perches or roosts). The surveyor should also look for potential nest sites while conducting foot surveys. Potential nest sites include dead or dying trees, dead limbs on trees, and buildings.

Surveys must be carried out from April through August. Conducting surveys early in the breeding season will enhance the ability to sight kestrels due to conspicuous courtship behavior. Morning surveys should be conducted 3 to 4 hours following sunrise, on calm, clear days. Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias. Surveys should be conducted 6 to 8 times with 4 to 7 days between each. The same individual(s) should conduct all surveys to eliminate observer bias.

Locations of kestrels, possible kestrel activity, and potential nest sites should be recorded on a map (plot compass direction and distance from a permanent landmark). Habitat type and use should be recorded for kestrel sightings. Binoculars should be used to identify and possibly determine the sex of the birds. Upon completion of all transects, surveys for nest sites should begin.

Foot surveys will be needed in locating actual nests. The surveyor should return to areas where kestrels were repeatedly located; or where kestrel pairs were observed; or where kestrels were exhibiting courtship, breeding, or territorial defense behavior during the transect surveys. If the kestrel(s) are in sight upon arriving in an area, the surveyor should observe the bird for signs of courtship, nesting behavior and vocalizations, and look for kestrel nest sites in snags, old woodpecker cavities, and buildings. Although pine snags are the most frequently used nest trees, surveyors should examine possible nest sites in all types of trees. Nest site location should be plotted on a map with record of compass direction and distance from a permanent landmark.

Locations of snags observed on road and foot surveys should be plotted on the area map. All structures (artificial and natural) that qualify as suitable perch sites should also be recorded and plotted on the area map.

Florida mastiff bat

The Florida mastiff bat is found in south Florida from Charlotte to Palm Beach counties and in the Florida Keys (Belwood 1992). It is found in buildings, in royal palm cavities and shafts, and in pine flatwoods in red-cockaded woodpecker cavity trees. Surveys for red-cockaded woodpeckers in south Florida will address the native habitats utilized by this species. Confirmation of cavity utilization requires trained bat specialists.

Since surveys for cavity nesting species such as Florida mastiff bat require an extensive time commitment and surveyor expertise, granture based on the documented range of this species is highly recommended.

PRAIRIE BIRD GROUP

Audubon's Crested Caracara, Burrowing Owl, Florida Grasshopper Sparrow

Audubon's crested caracara is found in peninsular Florida in open areas and sparsely forested savannas with cabbage palms. Typical range accounts span from Volusia to Collier counties. Nesting typically occurs in a cabbage palm from September through April, with peak reproduction in January through March. It feeds on carrion, small reptiles, birds, and mammals (Layne 1987, Kale and Maehr 1991). Sightings are often made of birds perched on slash pines, cabbage palms, fence posts, spoil piles, and telephone poles, or foraging on carrion by roadways.

The following FLUCFCS classes may be potential caracara habitat: Open Land (190), Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Open Pine Flatwoods (4111), Open Longleaf - Xeric Oak (4121), Cabbage Palm (428), Forest Regeneration Area (443), Hydric Pine Flatwoods (624), Shorelines (652), Beaches Other Than Swimming Beaches (710), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Spoil Areas (743), Fill Areas (744), Burned Areas (745), Open Pasture-Like Areas of Educational Institutions (170), Recreational Areas (180), Airports (811), Ports (815), and Facilities Under Construction (819, 829, 839).

Caracara use of a site can also be divided into two broad categories based on the structural characteristics of the vegetation. Type I habitats are cabbage palm clusters which serve as nesting sites. Type II habitats are foraging habitat. To define potential caracara use of a site prior to transect surveys the Type I and Type II habitats should be mapped.

Survey techniques for caracara are summarized in the general prairie bird survey section.

Burrowing Owl

The burrowing owl is found in open, high sandy ground including prairies, fencerows, sandhills, pastures, and open prairie-like expanses of airports, campuses, industrial areas, and cleared developments, occasionally with sparse open pines. Nesting may occur in the burrow year-round, with March to June being the peak-nesting season (Kale and Maehr 1990, Owre 1987). Contiguous breeding range is from Lake County to the south, although pocket populations are found on I-10 in Suwannee County and Duval County at the former Imesen airport. Most foraging is nocturnal. Some foraging and nest sentry activity occurs during the day.

The following FLUCFCS classes may be potential burrowing owl habitat: Open Land (190), Unimproved Pastures (212), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Other Shrubs and Brush (329), Mixed Rangeland (330), open Pine Flatwoods (4111), open Longleaf-Xeric Oak (4121), open Cabbage Palm (4281), Forest Regeneration Area (443), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Spoil Areas (743), Fill Areas (744), Burned Areas (745), Open Pasture-Like Areas of Educational Institutions (170), Recreational Areas (180), Airports (811), and Facilities Under Construction (819, 829, 839).

Survey technique for burrowing owls may include the use of vehicles, horsebacks transect surveys, or pedestrian transect surveys. Transect surveys should pass through all potential habitat on site at distances that allow sighting of individual birds. The distance between transect surveys should be spaced according to the limits on visibility imposed by vegetation and terrain. A driving speed of less than 5 mph is recommended to spot burrowing owls, varying in response to terrain, road condition, or visibility. High traffic roads that do not allow slow driving or frequent stopping cannot be utilized. On sites with limited road and 4X4 vehicle access, the surveys should be conducted on horseback or on foot. All transect surveys should be individually labeled on a map of the project site.

Simple presence surveys should be conducted from November to June. Breeding surveys must occur in March to June for the burrowing owl. Surveys for burrow use should be conducted on calm, clear days. Surveys should be conducted during the morning and evening hours. Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias. Burrowing owl burrows will be assumed to be active (e.g., potential nest sites) unless extensive surveys are conducted throughout the year to determine otherwise. The same individual(s) should conduct all surveys to eliminate observer bias.

Surveyors conducting transect surveys should observe both sides of the transect, looking for perching burrowing owls and for birds flying, soaring, or hovering. When a bird is sighted, the observer should stop and record the location. Binoculars and spotting scopes should be used to verify identification. The specific habitat for each owl observed should be recorded at the point where the owl was first observed. The perpendicular distance from the center of the transect to the owl should be measured by a range finder and plotted on the map. If the owl leaves or moves to a new location while being observed, the flight direction and the location where the owl lands should be noted. Behavior and vocalizations should be noted, especially behavior that would indicate courtship or nesting.

Pedestrian surveyors should walk transect surveys at a steady pace. The surveyor should return to areas where owls were repeatedly located; or where pairs were observed; or where owls were exhibiting courtship, breeding, or territorial defense behavior during the transect surveys. If the owl(s) is in sight upon arriving in an area, the surveyor should observe the bird for signs of courtship, nesting behavior, and vocalizations, and look for nest sites as described above. Nest site locations should be plotted on a map with record of compass direction and distance from a permanent landmark.

Florida grasshopper sparrow

The Florida grasshopper sparrow is found in south central Florida in treeless, poorly drained open pasture and prairies. The song is very weak and difficult to hear. The nest is built on the ground from early April to late June (Kale and Maehr 1990, Stevenson 1978).

The following FLUCFCS classes may be potential Florida grasshopper sparrow habitat: Open Land (190), Unimproved Pastures (212), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Other Shrubs and Brush (329), Mixed Rangeland (330), Forest Regeneration Area (443), Freshwater Marshes (641) particularly seasonal Juncus marshes, Dog Fennel and Low Marsh Grasses (6415), Wet Prairies (643), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), and Burned Areas (745).

Prairie Bird Survey Techniques

The most effective survey technique for these three prairie birds involves the use of vehicle (typically 4X4) or horseback transect surveys supplemented with foot transect surveys. Transects should pass through all potential prairie bird habitats present on the site and these habitats should be open enough to allow sighting of individual birds at considerable distance from the vehicle. The distance between transect surveys should be spaced according to the limits on visibility imposed by vegetation and terrain. A driving speed of less than 5 MPH is recommended to spot burrowing owls and sparrows, varying in response to terrain, road condition, or visibility. High-traffic roads that do not allow slow driving or frequent stopping cannot be utilized. On sites with limited road and 4X4 access, the surveys must be supplemented with horseback and foot surveys.

Foot and horseback surveys should be conducted in those areas unsuitable for, or inaccessible by, vehicle transect surveys. Field personnel should establish parallel line transects spaced so that all potential habitat areas that qualify as Type I or Type II habitat are surveyed. Transect length and distances between transect surveys will vary with size of the area, topography, and vegetative structure. All transect surveys should be individually labeled on a map of the project site.

Breeding surveys must occur in January to March for caracara, March to June for burrowing owl, and April to June for grasshopper sparrow. Surveys should be conducted during the day, on calm, clear days for caracara, grasshopper sparrow, burrowing owl burrows. Surveys should be conducted crepuscularly during the morning and evening hours, from plus or minus 1 hour before and after sunrise and sunset for burrowing owl burrow use. Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias. Surveys should be conducted 6 - 8 times with 4 - 7 days between each for caracara and grasshopper sparrow presence. Surveys should be performed for 5 consecutive days for burrowing owl nesting. Surveys may be performed 1 time for burrowing owl burrow presence. The same individual(s) should conduct all surveys to eliminate observer bias.

Surveyors conducting transect surveys should observe both sides of the transect, looking for caracaras and burrowing owls perched on objects, and high points and for prairie birds flying, soaring, or hovering. When a prairie bird is sighted the observer should stop and record the location. Binoculars and spotting scopes should be used to verify identification. The specific habitat category for each prairie bird observed should be recorded at the point where the prairie bird was first observed. The perpendicular distance from the center of the transect to the prairie bird should be measured (range finder) and plotted on the map. If the prairie birds leaves or moves to a new location while being observed, the flight direction and possibly the location where the prairie bird lands should be noted. Behavior and vocalizations should be noted, especially behavior that would indicate courtship or nesting.

Surveyors should walk transects at a steady pace. Often Florida grasshopper sparrows will silently flush, fly low, and return to vegetation before being observed as surveyors approach them. The surveyor should also look for potential nest sites while conducting foot surveys. Potential nest sites include cabbage palm trees for caracara, burrows for burrowing owls, and ground nests for grasshopper sparrows. Locations of prairie birds, possible prairie bird activity, and potential nest sites should be recorded on a map by plotting compass direction and distance from a permanent landmark. Habitat type and use should be recorded for prairie birds' sightings. Surveys for nest sites should begin upon completion of all transects.

Foot surveys will be needed in locating actual nests. The surveyor should return to areas where prairie birds were repeatedly located; or where prairie bird pairs were observed; or where prairie birds were exhibiting courtship, breeding, or territorial defense behavior during the transect surveys. If the prairie bird(s) are in sight upon arriving in an area, the surveyor should observe the bird for signs of courtship, nesting behavior, and vocalizations, and look for prairie bird nest sites as described above. Nest site location should be plotted on map with record of compass direction and distance from a permanent landmark.

Florida Scrub Jay

The Florida scrub jay is found in peninsular Florida in areas of xeric oak occurrence. Classic habitats include xeric oak scrub, sand pine scrub, rosemary scrub, and xeric pine flatwoods. The Florida scrub jay can also be found in agricultural and residential situations where sufficient native oaks have been retained to support acorn caching.

The following are potential habitats of the Florida scrub jay: Improved, Unimproved and Woodland Pastures (211, 212, 213), Citrus Groves (221), Rangeland (310-330), Pine Flatwoods (411), Long-Leaf Pine-Xeric Oak (412), Sand Pine (413), Sand-Pine Plantations (4411), Forest Regeneration Areas (443), Sand Other Than Beaches (720), Disturbed Rural Land in Transition Without Positive Indicators of Intended Activity (741), and Disturbed Burned Areas (745).

Three habitat types are utilized by the Florida scrub jay. Two of these habitat types, Type I and Type II, collectively, include any and all areas where one or more species of scrub oak are present, even if only vestigially represented. TYPE I HABITAT: Any upland plant community in which percent cover of the substrate by scrub oak species is 15% or more. TYPE II HABITAT: Any plant community, not meeting the definition of Type I habitat, in which one or more scrub oak species is represented. In most instances, Type I habitat is easily recognized as xeric oak scrub, scrubby pine flatwoods, scrubby coastal strand, or sand pine scrub. Conventional classification schemes

are of less value in identifying or predicting the presence of Type II habitat; the presence of scrub oaks is the key indicator.

The third habitat type includes a variety of plant communities where scrub oak species are not represented, but that are nearby or adjacent to Type I or Type II habitat. TYPE III HABITAT: Any upland or seasonally dry wetland within 1/4 mile of any area designated as Type I or Type II habitat.

Grid the vegetation map in 1-acre units. Label each acre identified as Type I, Type II, or Type III habitat. Qualitative field inspection normally will be adequate for distinguishing Type I from Type II habitat. If a quantitative approach is desired, Breininger's (1981, 1989) modification of Canfield's (1941) line transect method is recommended.

The primary objective of these procedures is to obtain verification of scrub jay presence on the site and an accurate count of the number of jay groups on-site. Secondary objectives include mapping the location of each jay group, and estimating the size and age constituency of each group.

The initial methodology for surveying a site for jays is to traverse the area systematically, using a high quality tape recording of Florida scrub jay territorial scolding, in an attempt to attract the jays. The recording should include clear examples of all typical territorial scolds, including the female "hiccup" call. Copies of taped vocalizations may be obtained from Archbold Biological Station, P.O. Box 2057, Lake Placid, Florida 33852. Establish parallel line transects, and playback stations along each transect, on the vegetation map developed earlier. Space the transects and playback stations so that all Type I, II, and III habitat onsite will be sampled for jays (e.g., so that the taped calls unquestionably will be effectively broadcast across areas of concern). Distances between transects, and between stations along transects, depend on many factors, including the power of the speaker used for broadcasting the calls, topography, and the density of the surrounding vegetation. Adequate spacing between transects can be estimated roughly as the distance at which a person listening to the tape directly in front of the speaker perceives the "bird" to be no more than about 100 meters away. A distance of 100 to 200 meters between transects and between stations is generally adequate when using a good-quality, hand-held cassette player broadcasting at full volume. However, in habitat such as xeric oak hammock where visual and auditory observation is limited, more closely spaced transects are recommended. Surveys should be carried out on calm, clear days about one hour after sunrise, and should terminate before midday heat or wind. Surveys should not be conducted in winds stronger than a moderate breeze (5-8 mph), in mist or fog, or in precipitation exceeding a light, intermittent drizzle. Heat, and especially wind, lowers the tendency for jays to respond to distant territorial scolds, and wind reduces the distance over which recordings can be heard. Furthermore, jays are reluctant to fly on windy days regardless of hour or season.

Tape surveys should be conducted during: 1) spring (especially March), and 2) fall (September and October), when territorial displays (spring) and acorn caching (fall) are most frequent and vigorous.

Transect surveys may be driven or walked. If driven, the vehicle must be stopped and the engine turned off. All extraneous noise (e.g., radios, door-ajar buzzers, mobile telephones) should be stopped. Broadcast the calls at each station for at least 1 minute in all four compass directions around the playback station, emphasizing any direction in which low-growing oak scrub is the predominant vegetation.

The absence of a response to a tape survey is not proof of scrub jay absence. Tape surveys do not always succeed in attracting Florida scrub jays in a variety of situations and are not sufficient without additional pedestrian surveys. Scrub jay populations are not always responsive to tapes in areas of moderate to ambient background noise (e.g., existing highways, airports, waterways, residential neighborhoods), when habituation responses occur, or when scrub jays are elsewhere during tape playback, etc. In addition to tape surveys, pedestrian observations must be performed. This should consist of morning and evening pedestrian surveys across suitable habitat on the site for a minimum of five days in spring and five days in fall. Transect surveys should be meandered through areas of

suitable habitat and changed after each survey to maximize site coverage. Fall transect surveys should be conducted to coincide with acorn caching activities on the site. This is especially true in areas of overgrown habitat, such as xeric hammock, where jay activities are confined to seasonal collection of acorns.

On the vegetation map, plot the locations and indicate group sizes of all Florida scrub jays where they are first seen or heard. Distinguish adult-plumaged jays from juvenile-plumaged jays whenever possible. Once a group is located, stop at that station. Remain at this station until assembly of the entire group.

Sometimes two or more groups will be attracted to one station, usually from different directions. Observers should be careful, therefore, to plot each group where it was first spotted or heard, not at the site to which the jays were attracted. In rare circumstances, especially at sites where numerous groups congregate at artificial food or water sources, it may be difficult to differentiate groups. This is especially true where the jays have become habituated and tame to human approach. Again, in such cases, careful observation is extremely important. Studies of such congregations using color-marked jays have confirmed that they may consist of members of different family groups. Often they may have crossed several territory boundaries to reach a neutral feeding or drinking area. The result gives a false impression of extremely high jay density.

It is essential that the subject area be visited as often as necessary, with a minimum of 5 days in spring and 5 days in fall, to establish Florida scrub jay presence and an accurate count of jay groups. If more than 8 to 10 jays are encountered at a single station during a survey period, the jays at this site should be monitored carefully over several visits and different times of day. Numbers will shift as groups arrive and depart. Often it is possible to watch where the jays come from or return to as a means of determining how many families are represented.

The products of the activity survey are a complete count of all jay groups on-site, and an approximate territory map or home range center for each group.

MAMMAL GROUP

Sherman's Fox Squirrel, Florida Panther, Florida Black Bear

Detection of individuals within this group can be difficult since these species tend to exhibit either inherently low or dispersed populations, cryptic lifestyles, solitary behavior, and/or are nocturnal. For this reason, survey efforts that fail to detect any of these species should not be construed to imply species absence. In areas of documented presence, these species may be considered present if suitable habitat is present.

Note that while vehicles can be used to access a survey site for these species, vehicles should not be used in transects or sighting surveys. Signs of wandering mammals, including tracks, scat, tree scratches, discarded or hidden food and nests cannot be easily observed from a vehicle. Vehicle sound and smell may result in avoidance behavior by these species. Similarly, carrying equipment like car phones or walkie-talkies; making unusual noises; loud talking; wearing bright clothes; and using mosquito repellent, perfumes and colognes, soaps, hair toiletries, and other sources of artificial scent may result in avoidance behavior by these species. Surveying for these listed mammal species requires woods person skills, patience, quiet, and observation.

Specially trained hunting dogs are utilized to track and capture Florida black bear and Florida panthers for research and radio-collaring purposes. Use of these dogs is a regulated activity that requires permits from the FWC. Chasing these species with dogs, without the proper permits, can constitute harassment.

The Sherman's fox squirrel inhabits a wide variety of upland areas including Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Pine- Mesic Oak (414), Longleaf - Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Oak - Pine - Hickory (423), Temperate Hardwood Hammock (425),

Tropical Hardwood Hammock (426), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle - Willow (429), Beech - Magnolia (431), Sand Live Oak (432), Hardwood - Conifer Mixed (434), Dead Trees (435), Australian Pines (437), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Coniferous Tree Plantations (441), Hardwood (442), Forest Regeneration Area (443), Experimental Tree Plots (444), Seed Plantation (445), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

This fox squirrel forages into wetland habitats: Sloughs (560), Wetland Hardwood Forests (610), Bay Swamps (611), Stream and Lake Swamps (Bottomland) (615), Wetland Coniferous Forests (620), Cypress (621), Hydric Pine Flatwoods (624), Wetland Forested Mixed (630), Vegetated Non-Forested Wetlands (640), Freshwater Marshes (641), Spike Rush (6413), Maidencane (6414), Dog fennel and Low Marsh Grasses (6415), Wet Prairies (643), and Intermittent Ponds (653) on a seasonal basis as part of its large home range (26 hectares or greater) utilizing plant and animals from a wide variety of habitats.

The principal Sherman's fox squirrel habitat in north and central Florida is Longleaf Pine-Turkey Oak Sand Hills (412 and 415) (Moore 1956, Ehrhart 1978, and Kantola 1992). In the Tampa Bay region, Rough Pastures (212 and 213), Pine Flatwoods (411), Mixed Flatwood-Hardwood (438), Hydric Pine Flatwoods (624), and Riverine Forests (630) are the principal habitats for this subspecies of the fox squirrel. They are documented to use improved pasture (300's) in Osceola and Okeechobee counties.

The Sherman's fox squirrel is found south into Palm Beach County on the east coast. The southern limit of the Sherman's fox squirrel on the west coast of Florida includes the hydric pine flatwoods and riverine hardwood forests of Charlotte and Lee counties north of the Caloosahatchee River. Its range extends west into Gilchrist and Levy counties. The principal north and central Florida habitat of Longleaf Pine-Turkey Oak Sand Hills (412 and 415) (Moore 1956, Ehrhart 1979 and Kantola 1992), is not found in southwest Florida. In the Tampa Bay region and southwest Florida, Rough Pastures (212 and 213), Pine Flatwoods (411), Mixed Flatwood-Hardwood (438), Hydric Pine Flatwoods (624), and Riverine Forests (630) are the principal habitats for this subspecies of the fox squirrel.

Sherman's fox squirrels forage on both male and female pinecones. Acorns from a variety of oaks (live, laurel, and sand live), cabbage palm fruits, bromeliad buds, and insects are also consumed. Hydric pine flatwoods adjacent to oak and hardwood hammocks, xeric sandhill ridges, small stands of longleaf pine, and riverine forests provide additional forage on a seasonal rotational basis. Nesting occurs in pines; hardwoods, including oak and bay; cypress; cabbage palms; and bromeliad clumps. In southwest Florida it appears that Sherman's fox squirrels occupy a smaller territory than do Big Cypress fox squirrels, and are more site constant. This appears to be related to the availability of oak trees and water.

Florida black bear

The black bear is a forest habitat generalist with seasonal preference for wherever food is most available. Black bears utilize all the natural forested systems of Florida, with a decided preference for upland/wetland ecotones (Maehr and Wooding 1992). The documented movements of radio-collared Florida black bears; documented sign and sightings of Florida black bears; and periodic road kills indicate that the large areas of relatively undisturbed forested wetlands, mesic upland forests and the major wetland basins provide the principal habitat of the black bear in Florida (Brady and Maehr 1985, Maehr 1984, Maehr et al. 1988).

The black bear utilizes a wide variety of areas including: Unimproved Pastures (212), Woodland Pastures (213), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Pine - Mesic Oak (414), Longleaf - Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Oak - Pine - Hickory (423), Melaleuca (424), Temperate Hardwood Hammock (425), Tropical

Hardwood Hammock (426), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle - Willow (429), Beech - Magnolia (431), Sand Live Oak (432), Western Everglades Hardwoods (433), Hardwood - Conifer Mixed (434), Dead Trees (435), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Streams and Waterways (510), Sloughs (560), Wetland Hardwood Forests (610), Bay Swamps (611), Mangrove Swamps (612), Gum Swamps (613), Titi Swamps (614), Stream and Lake Swamps (Bottomland) (615), Wetland Coniferous Forests (620), Cypress (621), Pond Pine (622), Atlantic White Cedar (623), Hydric Pine Flatwoods (624), Wetland Forested Mixed (630), Vegetated Non-Forested Wetlands (640), Freshwater Marshes (641), Sawgrass (6411), Cattail (6412), Spike Rush (6413), Maidencane (6414), Dog Fennel and Low Marsh Grasses (6415), Arrowroot (6416), Wet Prairies (643), Intermittent Ponds (653), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

Surveys for Florida black bear presence should begin with a request for information from the FWC's Division of Wildlife and Habitat Conservation Scientific Services, and the USFWS for the area of interest; review with black bear experts familiar with the project area; and consultation with local biologists. These sources should have pertinent data on Florida black bear use for specific sites and areas.

An accurate survey of habitat for Florida black bear presence is difficult and time-consumptive. Surveys typically require a tracking and sign expert. A review of a surveyor's expertise to perform such surveys should be made with the USFWS and FWC. A basic survey should involve at least two weeks of tracking in the area.

Pedestrian survey technique for the Florida black bear requires surveys across suitable habitat for a minimum of two weeks. Transect surveys should consist of meandered walks through all potential black bear habitats present on the site. Transect surveys should be changed after each survey to maximize site coverage. The distance between transects should be spaced according to the limits on visibility imposed by vegetation and terrain. A slow walking speed is recommended, varying in response to terrain, or visibility. Transect length and distances between transects will vary with size of the area, topography, and vegetative structure. All transect surveys should be individually labeled on a map of the project site.

Surveys are best carried out in autumn and winter. Extreme weather condition days (excess heat, freezing cold, storms, and fog) should be avoided. Direction of travel along transect surveys should be reversed on alternate surveys to eliminate direction of travel bias. The same individual(s) should conduct all surveys to eliminate observer bias.

Surveyors conducting transect surveys should observe both sides of the transect, looking for Florida black bear sign (scat, tracks, remnants of foraging activity, claw mark trees, denning areas, crushed down cabbage palms and palmettos, and raided bee hives). When sign is sighted, the observer should stop and record the location on the map. Samples of scat, hair, and tracks should be taken to confirm the siting for scientific record. The specific habitat category for each sign found should be recorded. The perpendicular distance from the center of the transect to the sign should be measured (range finder) and plotted on the map.

Florida panther

Pine flatwoods, in combination with other forested upland and seasonal wetland habitats, provide critical foraging, breeding, and wildlife corridor habitat for the Florida panther. The documented foraging and breeding territories of radio-collared Florida panthers and documented sightings of Florida panther include large expanses of undisturbed forests (Maehr 1992). The panther utilizes hydric, mesic, and xeric pine flatwoods, and savanna, hardwood hammocks, and mixed swamp forest. Ecotones are particularly important to the panther because they support an increased variety and density of species. Prey animals, including white-tailed deer and wild hog, utilize the plant diversity of edge communities such as the hydric pine flatwoods (Layne and McCauley 1976). Recently burned pine flatwoods provide more prey for panther, and panthers are documented to move toward fires and stay in areas of recent burns (Belden 1986).

Panthers require large territories and abundant prey. Adult male panther territories average 400 square kilometers and adult female territories average 200 square kilometers (Maehr 1992). Panthers may travel up to 19 miles overnight, or stay in the same wooded habitat for a week or more (USFWS 1987). Additionally, forests associated with natural drainage patterns provide the travel corridors essential to the panther for moving between the fragmented foraging areas remaining in Florida.

The Florida panther utilizes a wide variety of areas including: Unimproved Pastures (212), Woodland Pastures (213), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Pine- Mesic Oak (414), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Melaleuca (424), Temperate Hardwood Hammock (425), Tropical Hardwood Hammock (426), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle - Willow (429), Sand Live Oak (432), Western Everglades Hardwoods (433), Hardwood - Conifer Mixed (434), Dead Trees (435), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Streams and Waterways (510), Sloughs (560), Wetland Hardwood Forests (610), Bay Swamps (611), Mangrove Swamps (612), Gum Swamps (613), Stream and Lake Swamps (Bottomland), (615), Wetland Coniferous Forests (620), Cypress (621), Pond Pine (622), Atlantic White Cedar (623), Hydric Pine Flatwoods (624), Wetland Forested Mixed (630), Vegetated Non-Forested Wetlands (640), Freshwater Marshes (641), Sawgrass (6411), Cattail (6412), Spike Rush (6413), Maidencane (6414), Dog Fennel and Low Marsh Grasses (6415), Arrowroot (6416), Wet Prairies (643), Intermittent Ponds (653), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

Florida panther and introduced western cougar in central, north and panhandle Florida also use: Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Longleaf - Upland Oak (415), Oak - Pine - Hickory (423), Beech - Magnolia (431), and Titi Swamps (614).

Surveys for Florida panther presence should begin with a request for information from the FWC's Division of Wildlife and Habitat Conservation Scientific Services, and the USFWS for the area of interest; review with panther experts familiar with the project area; and consultation with local biologists. These sources will have pertinent data on Florida panther use for specific areas.

An accurate survey of habitat for Florida panther presence is difficult and time-consumptive. Surveys typically require a tracking and sign expert. A review of a surveyor's capabilities to perform such surveys should be made with the USFWS and FWC.

Survey technique for Florida panther should follow the methods outlined by Roof and Maehr (1988). When sign is sighted, the observer should stop and record the location on the map. Samples of scat, hair, and tracks should be taken to confirm the siting for scientific record. The specific habitat category for each sign found should be recorded. The perpendicular distance from the center of the transect to the sign should be measured (range finder) and plotted on the map.

Since surveys for large mammals such as black bears and panthers require an extensive time commitment and surveyor expertise, granture based on the documented range of this species is highly recommended.

TERRESTRIAL REPTILES AND AMPHIBIANS

Gopher Tortoise

The gopher tortoise utilizes dry, well-drained soils with areas of open herbaceous understory (Auffenberg 1978).

Sampling for gopher tortoises should be performed in the following habitat types: Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Pine- Mesic Oak (414), Longleaf - Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Brazilian Pepper (422), Oak - Pine - Hickory (423), Melaleuca (424), Temperate Hardwood Hammock (425), Tropical Hardwood Hammock (426), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle - Willow (429), Beech - Magnolia (431), Sand Live Oak (432), Western Everglades Hardwoods (433), Hardwood - Conifer Mixed (434), Dead Trees (435), Australian Pines (437), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Coniferous Tree Plantations (441), Hardwood (442), Forest Regeneration Area (443), Experimental Tree Plots (444), Seed Plantation (445), Beaches Other Than Swimming Beaches (710), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

In most of south Florida, perennially dry habitats exist as islands surrounded by a reticulation of hydric habitats. The gopher tortoise forages in both the upland and the adjacent hydric habitats when water levels recede and throughout the dry-season. The gopher tortoises that utilize natural hydric habitats construct dry-season burrows in hydric habitats, and wet-season burrows in dry, upland ridge islands. In drained Hydric Pine Flatwoods (624), gopher tortoises construct dry-season burrows in the upper portions of the flatwoods.

If granture indicates that each habitat area identified by cursory pedestrian survey is significant habitat, then no additional survey for gopher tortoises is required. If granture is not indicated, at least 15% of each appropriate habitat type within the project right-of-way should be surveyed for tortoise burrows. Transects should be 270 yards long, and all tortoise burrows found within 10 yards of either side of the transect are counted. The area covered by this transect is 1.2 acres. The number of transects needed, when acres are used as the unit for area, is approximately 1 transect per 8 acres for areas larger than 50 acres, and 1 transect per 7 acres for areas smaller than 50 acres. Cross-sections of habitat extending outside the right-of-way may be used to determine density in each habitat type. Surveys of 100% of the habitat are typically less time-consumptive than partial surveys and may be used as an alternative. Where dense vegetative cover may result in reduced visibility, transect width should be narrowed and a corresponding number of transects added to ensure equal site coverage.

Each burrow detected within 10 meters of the transect line is classified as "active", "inactive", or "abandoned" using the following criteria: "Active": obvious tortoise tracks or shell scraping signs at the burrow mouth; "Inactive": no tracks or shell scrapings, burrow unblocked by debris, but recent use apparent; and "Abandoned": burrow covered with sticks, weeds, grass, burrow collapsed, dilapidated.

Unless a site-specific conversion factor can be documented, the conversion factor recommended by Auffenberg and Franz (1982) is to be used to relate the density of "active" and "inactive" gopher tortoise burrows to the density of gopher tortoises on a site. This conversion factor is 0.614 unless sufficient site-specific documentation is provided to demonstrate that the factor is incorrect.

Utilizing the methods specified in Cox et al. (1987), each habitat should be designated as valuable, significant, or less than significant. This information should be provided in a tabular format and indicated on a map.

Indigo Snake, Florida Pine Snake, Gopher Frog

The species in this group are extremely difficult to census due to their highly cryptic behavior and activity patterns. Investigators should be aware of how seasonal and local conditions may influence individual species sampling success (Moler 1992).

Eastern Indigo Snake

The eastern indigo snake utilizes a wide variety of habitats throughout Florida, in habitats ranging from mangroves to xeric scrub. Populations in the panhandle may be very localized. Where available, gopher tortoise burrows are utilized as shelter, particularly in winter in north Florida. Kochman (1978) states that eastern indigo snakes are susceptible to desiccation and are more characteristic of mesic than xeric habitats in south Florida. It is diurnal and actively searches for prey particularly at upland/wetland ecotones. Summer range extends from 125 to 250 acres or more. Winter range tends to be smaller as the snakes stay close to shelter. Shedding occurs frequently. Breeding occurs from November through April. Eggs are laid from May through June. Diet includes small mammals, birds, frogs, lizards, and other snakes (Moler 1992). In the dry season indigo snakes are found in the moister, but not submerged, areas of marshes, hydric pine flatwood and other seasonal wetlands.

Indigo snakes occur in and should be surveyed for in the following habitats: Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Coastal Scrub (322), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf - Xeric Oak (412), Sand Pine Scrub (413), Pine - Mesic Oak (414), Longleaf - Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Brazilian Pepper (422), Oak - Pine - Hickory (423), Melaleuca (424), Temperate Hardwood Hammock (425), Tropical Hardwood Hammock (426), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle - Willow (429), Beech - Magnolia (431), Sand Live Oak (432), Western Everglades Hardwoods (433), Hardwood - Conifer Mixed (434), Dead Trees (435), Australian Pines (437), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Coniferous Tree Plantations (441), Hardwood (442), Forest Regeneration Area (443), Experimental Tree Plots (444), Seed Plantation (445), Streams and Waterways Edges (510), Lakes Edges (520), Reservoirs Edges (530), Major Springs Edges (550), Sloughs (560), Wetland Hardwood Forests (610), Bay Swamps (611), Mangrove Swamps (612), Gum Swamps (613), Titi Swamps (614), Stream and Lake Swamps (Bottomland) (615), Wetland Coniferous Forests (620), Cypress (621), Pond Pine (622), Atlantic White Cedar (623), Hydric Pine Flatwoods (624), Wetland Forested Mixed (630), Vegetated Non-Forested Wetlands (640), Freshwater Marshes (641), Spike Rush (6413), Maidencane (6414), Dog Fennel and Low Marsh Grasses (6415), Arrowroot (6416), Saltwater Marshes (642) High Marsh, Wet Prairies (643), Shorelines (652), Intermittent Ponds (653), Beaches Other Than Swimming Beaches (710), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

Burrowing Snakes and Skinks

The Florida pine snake is found in xeric upland communities including Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Xeric Pine Flatwoods (411), Longleaf-Xeric Oak (412), Sand Pine Scrub (413), Pine-Mesic Oak (414), Longleaf-Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Temperate Hardwood Hammock (425), Cabbage Palm (428), Sand Live Oak (432), Hardwood-Conifer Mixed (434), Dead Trees (435), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Coniferous Tree Plantations (441), Hardwood (442), Forest Regeneration Area (443), Experimental Tree Plots (444), Seed Plantation (445), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas

(743), Fill Areas (744), and Burned Areas (745). This species is also found in former xeric habitat such as old fields and vacant lots. During drought conditions, the Florida pine snake will seek open habitats near wetlands. This snake is a burrowing snake that seeks out both pocket gopher and gopher tortoise burrow systems. Pine snakes are most active in May, June, July, and October during the breeding, laying, and the hatching season (Franz 1992).

It is extremely unlikely that burrowing snakes will be observed above ground during a visual survey of habitats. Sites located within suitable habitat in the documented range of burrowing snakes should be surveyed for presence of listed snake species by the drift fence array method described by Campbell and Christman (1982). A minimum of two arrays (situated at least 500 feet apart) is recommended for each 100 acres of suitable habitat. Arrays should be monitored twice a week for a minimum of six weeks.

If gopher tortoise burrows are present, portions of the site that support moderate to high densities of gopher tortoises (0.4 individuals per acre or greater) should have one-way funnel traps (minimum three-foot length) placed at the burrow entrance of at least twenty-five percent of the active and inactive gopher tortoise burrows on a site. Traps should be shaded and left in place for at least four consecutive days and checked twice each day.

Active searching with raking and pitfall traps can be employed as an alternative method for burrowing skinks, if survey plans and surveyors qualifications are submitted for prior review by the FWC.

Gopher Frogs

During the months of February through October, (March through September is best) following heavy rains, nighttime monitoring of frog vocalizations from appropriate wetland habitats intermittent wetlands can be conducted to determine the presence of listed frog breeding habitat within a site. Visual observation of listed frogs is possible in suitable habitat and suitable time of day during breeding periods.

The gopher frog utilizes gopher tortoise burrows, mouse burrows, stump holes, and postholes in the habitats where the gopher tortoise is found. In the breeding season, gopher frogs congregate at night in shallow, vegetated ponds to breed (Fogarty 1978b). Preferred breeding habitats include seasonally flooded grassy ponds and cypress heads that lack predatory fish populations (Godley 1992). The adults are nocturnal, but may be observed at the mouth of burrows on dark, damp days. Breeding occurs in February through April in north Florida and in spring and summer, depending on hydrology, in south Florida. The gopher frog may call throughout the year, but it is most likely to be heard in the breeding season. Sampling for gopher frog should be performed whenever gopher tortoises or their burrows are found in any or all of the following habitat types: Unimproved Pastures (212), Woodland Pastures (213), Herbaceous (310), Shrub and Brushland (320), Palmetto Prairies (321), Other Shrubs and Brush (329), Mixed Rangeland (330), Coniferous Forests (410), Pine Flatwoods (411), Longleaf-Xeric Oak (412), Sand Pine Scrub (413), Pine-Mesic Oak (414), Longleaf-Upland Oak (415), Other Pine (419), Upland Hardwood Forests (420), Xeric Oak (421), Temperate Hardwood Hammock (425), Live Oak Hammock (427), Cabbage Palm (428), Wax Myrtle-Willow (429), Sand Live Oak (432), Hardwood-Conifer Mixed (434), Dead Trees (435), Australian Pines (437), Mixed Hardwoods (438), Other Hardwoods (439), Tree Plantations (440), Coniferous Tree Plantations (441), Hardwood (442), Forest Regeneration Area (443), Experimental Tree Plots (444), Seed Plantation (445), Sand Other Than Beaches (720), Disturbed Lands (740), Rural Land in Transition Without Positive Indicators of Intended Activity (741), Borrow Areas (742), Spoil Areas (743), Fill Areas (744), and Burned Areas (745).

The gopher frog should be censused using a combination of directed pedestrian surveys and funnel trapping. At portions of the site that support moderate to high densities of gopher tortoises (0.4 individuals per acre or greater), one-way funnel traps (minimum three-foot length) should be placed at the burrow entrance of at least twenty-five percent of the active and inactive gopher tortoise burrows on a site. Greater sampling effort for gopher frog populations should be expended on burrows within one-half mile of intermittent wetlands. Traps should be shaded and left in place for at least four consecutive days and checked twice each day.

Upland pedestrian surveys must be performed during the active months (March through September) for the gopher

frog. During cool weather, investigators should closely observe gopher tortoise burrows for gopher frogs, just inside the burrow entrance.

SMALL MAMMAL GROUP

Florida Mouse, Sherman's Short-tailed Shrew

The endemic Florida mouse is found in association with gopher tortoise burrows in xeric upland habitats on well-drained soils (Layne 1992). It has its southern limits of range in the coastal ridges and dunes of Charlotte County including the barrier island and mainland relictual Pleistocene sand ridges on the west coast, and Boca Raton, Palm Beach County on the east coast. Taylor County is the contiguous range western limit. An isolate population occurs in Carabelle, Franklin County (Layne 1992).Sampling for Florida mouse should be conducted in any or all of the following habitat types: Sand Pine Scrub (413), Longleaf Pine-Turkey Oak Sandhills (412 and 415), Mixed Hardwoods and Pines (423 and 438), Upland Hardwood Hammocks (427), Oak Hammocks (425), North and South Florida Flatwoods (411) - particularly xeric, Sand Live Oak Scrub (432), Palmetto Prairie (321), Mixed Rangeland (330), Unimproved Pasture (212), Woodland Pasture (213), Rangeland (300), Tree Plantations (440), Sand (720), and Disturbed Lands (740). To maximize Florida mouse capture, sampling stations should be located in the immediate vicinity of stumps, fallen logs, pathways, and gopher tortoise burrows. In some cases, it may be appropriate to rely on gopher tortoise survey results to assist with the location of live trap transects.

Sherman's short-tailed shrew was described in 1955 from a location two miles north of Fort Myers, in drainage ditches with Dense Grass (641). This site corresponds with an area in the historic distribution of Hydric Pine Flatwoods (624) in northern Lee County. It is also recorded in 1980, 1984, and 1985, perhaps as intergrades with the Florida short-tailed shrew, in the Hickey Creek area of Lee County south of the Caloosahatchee River in Mesic Oak Hammock (427) and Pine Flatwoods (411) (Layne 1992).

The location and number of small mammal transects should be based on the distribution of available target habitat across the site. In sampling for mice, drift fences should be incorporated to funnel animals into traps. Each transect should consist of a minimum of 25 stations (two live-traps placed within a 10-foot radius of the station) per 50 acres of suitable habitat. Each transect should be sampled for four consecutive 24-hour periods to obtain the necessary 200 trap-nights per transect. Traps should be shaded and checked twice each day to prevent dehydration of captured animals. Captured animals should be identified to species and released. Final survey reports should include all habitat/transect data.

MIGRATORY PASSERINE BIRD GROUP

Bachman's Warbler, Kirtland's Warbler

Kirtland's Warbler is a migratory species that travels through Florida between northern Michigan and the Bahamas. They are present in Florida from April through May, and from September through October. Most observations occur on the east coast of Florida (Stevenson 1987).

Bachman's Warbler is a migratory species that traveled through Florida between bottomland hardwood swamps of the central south United States to Cuba. They are recorded as present in Florida from February through April, and from July through September. Most recorded observations occur in Key West during autumn migration (Stevenson 1987).

Migratory bird habitats consist of thickly Vegetated Coastal Forests (425, 426, 427, 428, 433, 434, 437, 438, 439) often at the end of peninsulas or on barrier islands. Often, these habitats are found within an Urban (100) or suburban matrix in Undeveloped Land (190) and Recreational Facilities (180). Bachman's warbler may use Bamboo

Thickets and Cypress systems (621, 624) in Florida.

An appropriate survey methodology for migratory warblers consists of morning pedestrian surveys across the suitable migratory bird habitats for a minimum of five days in spring and five days in fall. Survey days should occur during the appropriate months. Autumn surveys should be performed the day following a cold front. Transects should be meandered through areas of suitable habitat and changed after each survey to maximize site coverage. Map all observations of listed species as well as nests, and song/call observations.

GENERAL FINAL SURVEY REPORT INFORMATION REQUIREMENTS

1. A valid collector's permit is required by Chapter 39-9.002 (F.A.C.) for individuals engaged in the handling and collection of birds, mammals, and all listed species. If such collection occurs, the FDOT or their consultant must provide the permit number, expiration date, and name(s) of the individuals(s) involved with sampling activities that require a permit.

2. Based on literature review, substantiate reports from authorities, on-site observations, sampling, and survey results; and list all evidence of endangered species, threatened species, and species of special concern observed on the project site. The status of a species can be determined by reviewing either Chapter 39 (F.A.C.), or the most recent edition of OFFICIAL LISTS OF ENDANGERED AND POTENTIALLY ENDANGERED FAUNA AND FLORA IN FLORIDA. Copies of this publication may be obtained by writing to the FWC, Endangered Species Coordinator, 620 South Meridian Street, Tallahassee, Florida 32399-1600.

3. Report which species were surveyed for and what sampling methodologies were employed, as well as any variations from the methodologies described above. This report should also include the names of the field surveyors, the sampling dates and times, weather conditions, and any other factors that may have influenced the results of the sampling effort.

4. Identify on a map (minimum scale 1"=200') the location of all-pedestrian transects, trap grids, reptile arrays, or other sampling plots used to determine the on-site status of listed species.

5. Present the results of all sampling efforts in terms of the number of individuals recorded, and map (minimum scale 1"=200') the locations of all observed individuals and/or colonies.

6. For each listed species observed on the site, discuss what habitat factors influence or contribute to the occurrence of the species on the site. Relevant literature, survey, and sampling information should be used to discuss the perceived home range, distribution, and population of each species. Indicate whether use of the site is considered to be year-round permanent, year-round transitory, or migratory.

7. For each species known to utilize the site, discuss what measures will be employed to avoid and minimize the proposed project's impact on both the individual and its habitat. If on-site protection is judged to be inappropriate or unfeasible, discuss in detail any provision for off-site mitigation.

In conclusion, this letter addresses the procedures for steps 1 and 2 of the recommended listed animal species review for a proposed FDOT project:

1) Review of existing data and consultation with area and species experts, and

2) Onsite sampling specific to the habitats present and the potential state-listed species.

Upon completion of the above survey phases we will confer with you and provide our recommendations

with regard to:

3) Avoidance of impacts to verified/confirmed listed species.

4) Minimization of impacts to verified/confirmed listed species, and

5) Mitigation of unavoidable impacts to verified/confirmed listed species.

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Appendix A Addresses of Wildlife Agency Contacts

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Appendix B

Listed Animal Species of Florida in the Order of Endangerment, as of April 5, 2002

State Endangered Species

Florida panther, everglades mink, Key deer, West Indian manatee, Lower Keys marsh rabbit, Goff's pocket gopher, Chadwick beach cotton mouse, Anastasia Island beach mouse, Choctawhatchee beach mouse, pallid beach mouse, Perdido Key beach mouse, St. Andrews beach mouse, Key Largo woodrat, silver rice rat, Key Largo cotton mouse, Florida saltmarsh vole, Florida mastiff bat, gray bat, Indiana bat, wood stork, snail kite, Bachman's warbler, Kirtland's warbler, Florida grasshopper sparrow, Cape Sable seaside sparrow, dusky seaside sparrow, American crocodile, lower Florida Keys striped mud turtle, Atlantic green turtle, leatherback turtle, Atlantic ridley turtle, Atlantic hawksbill turtle, shortnose sturgeon, Okaloosa darter, Blackmouth shiner, Schaus' swallowtail butterfly, Stock Island tree snail

State Threatened Species

Florida black bear, Big Cypress fox squirrel, southeastern beach mouse, bald eagle, Florida sandhill crane, least tern, roseate tern, piping plover, southeastern snowy plover, white-crowned pigeon, red-cockaded woodpecker, Florida scrub jay, Audubon's crested caracara, blue-tailed mole skink, sand skink, eastern indigo snake, short-tailed snake, Atlantic salt-marsh water snake, Big Pine key ringneck snake, Miami black-headed snakes, lower Florida Keys Florida brown snake, lower Florida Keys Florida ribbon snake, Atlantic loggerhead turtle, Crystal darter, Key silverside

State Species of Special Concern

Sherman's fox squirrel, eastern chipmunk, Florida mouse, Sanibel Island rice rat, Sherman's short-tailed shrew, Homosassa shrew, roseate spoonbill, little blue heron, reddish egret, snowy egret, tricolored heron, white ibis, whooping crane, limpkin, brown pelican, American oystercatcher, black skimmer, lower Florida Keys osprey, burrowing owl, southeastern American kestrel, Worthington's marsh wren, Wakulla seaside sparrow, Scott's seaside sparrow, gopher tortoise, Florida mole skink, Florida pine snake, lower Florida Keys red rat snake, Suwannee cooter, Barbour's map turtle, alligator snapping turtle, American alligator, gopher frog, bog frog, Pine barrens treefrog, Georgia blind salamander, flatwoods salamander, Atlantic sturgeon, Lake Eustis pupfish, harlequin darter, southern tessellated darter, saltmarsh topminnow, Suwanee bass, shoal bass, bluenose shiner, mangrove rivulus, key blenny, Black Creek crayfish, Econfina crayfish, Sims Sink crayfish, Florida tree snail

Note that the down-listing of the West Indian manatee and the delisting of the bald eagle will not take effect until the adoption of an approved management plan by the FWC.

Appendix C

Florida Land Use, Cover and Forms Classification System (FLUCCS)(Florida Department of Transportation 1985) codes utilized in this document.

300 RANGELAND

- 310 Herbaceous
- 320 Shrub and Brushland
  - 321 Palmetto Prairies
  - 322 Coastal Scrub
  - 329 Other Shrubs and Brush
- 330 Mixed Rangeland

400 FORESTLAND

- 410 Coniferous Forests
  - 411 Pine Flatwoods
  - 412 Longleaf - Xeric Oak
  - 413 Sand Pine Scrub
  - 414 Pine- Mesic Oak
  - 415 Longleaf - Upland Oak
  - 419 Other Pine
- 420 Upland Hardwood Forests
  - 421 Xeric Oak
  - 422 Brazilian Pepper
  - 423 Oak - Pine - Hickory
  - 424 Melaleuca
  - 425 Temperate Hardwoods (Hammock)
  - 426 Tropical Hardwoods (Hammock)
  - 427 Live Oak - Upland Temperate Hammock
  - 428 Cabbage Palm
  - 429 Wax Myrtle - Willow
- 430 Upland Hardwood Forests (Continued)
  - 431 Beech - Magnolia
  - 432 Sand Live Oak
  - 433 Western Everglades Hardwoods
  - 434 Hardwood - Conifer Mixed
  - 435 Dead Trees
  - 437 Australian Pines
  - 438 Mixed Hardwoods
  - 439 Other Hardwoods
- 440 Tree Plantations
  - 441 Coniferous
  - 442 Hardwood
  - 443 Forest Regeneration Area
  - 444 Experimental Tree Plots
  - 445 Seed Plantation

500 WATER

- 510 Streams and Waterways
- 520 Lakes
- 530 Reservoirs
- 540 Bays and Estuaries
- 550 Major Springs
- 560 Sloughs

600 WETLANDS

- 610 Wetland Hardwood Forests
  - 611 Bay Swamps
  - 612 Mangrove Swamps
    - 6121 Red Mangrove
    - 6122 Black Mangrove
    - 6123 White Mangrove
    - 6124 Buttonwood
  - 613 Gum Swamps
  - 614 Titi Swamps
  - 615 Stream and Lake Swamps (Bottomland)
- 620 Wetland Coniferous Forests
  - 621 Cypress
  - 622 Pond Pine
  - 623 Atlantic White Cedar
  - 624 Cypress - Pine - Cabbage Palm (Hydric Pine Flatwoods)
- 630 Wetland Forested Mixed
- 640 Vegetated Non-Forested Wetlands
  - 641 Freshwater Marshes
    - 6411 Sawgrass
    - 6412 Cattail
    - 6413 Spike Rush
    - 6414 Maidencane
    - 6415 Dog fennel and low marsh grasses
    - 6416 Arrowroot
  - 642 Saltwater Marshes
    - 6421 Cordgrass
    - 6442 Needlerush
    - 6443 High Marsh - Saltgrass, Salicornia, etc.
  - 643 Wet Prairies
  - 644 Aquatic Vegetation
  - 645 Submergent Aquatic Vegetation
- 650 Non-Vegetated
  - 651 Tidal Flats
  - 652 Shorelines
  - 653 Intermittent Ponds
  - 654 Oyster Bars

700 BARREN LAND

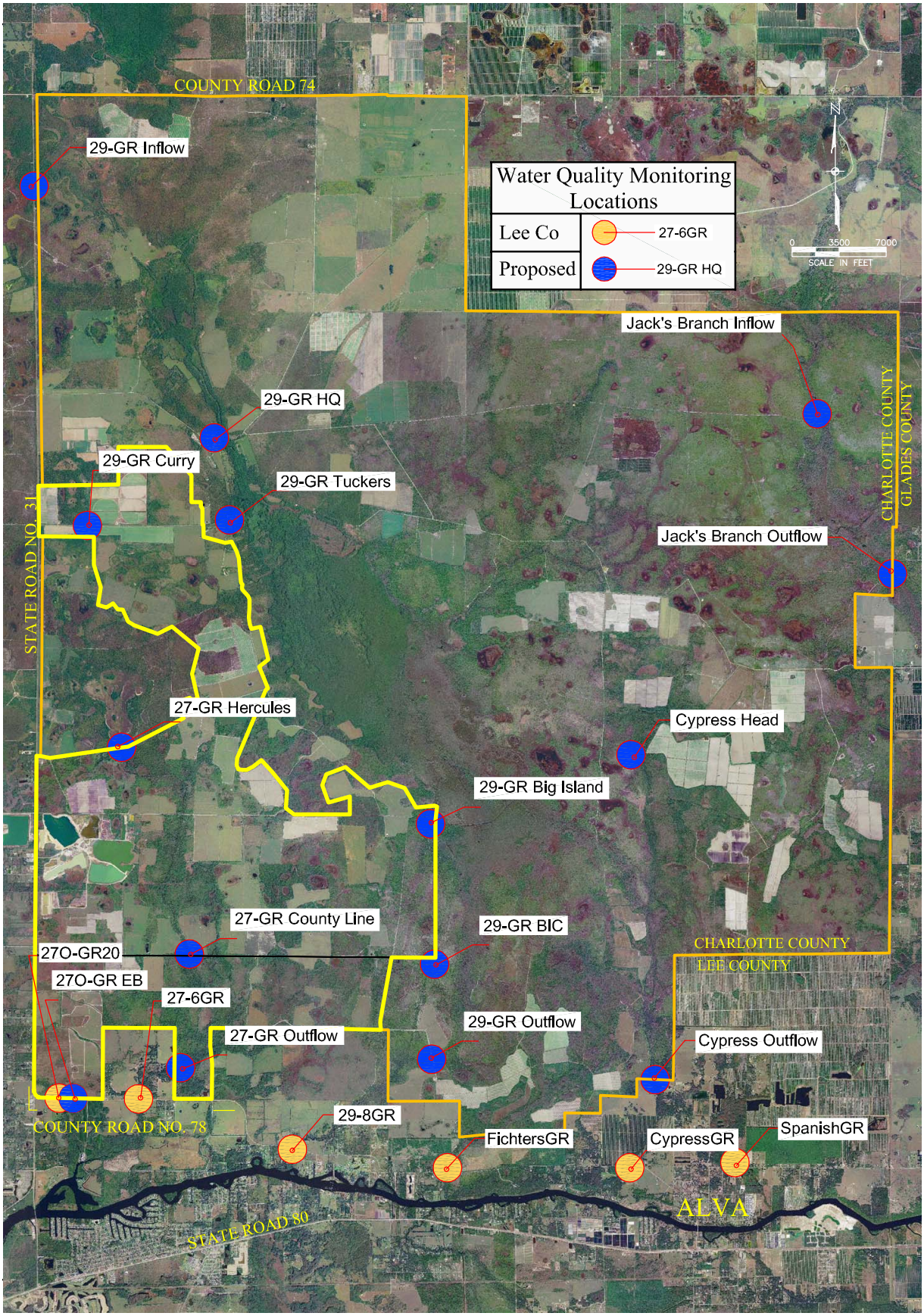
- 710 Beaches Other Than Swimming Beaches
- 720 Sand Other Than Beaches

730 Exposed Rock
740 Disturbed Lands
- 741 Rural Land in Transition Without Positive Indicators of Intended Activity
- 742 Borrow Areas
- 743 Spoil Areas
- 744 Fill Areas (Highways - Railways)
- 745 Burned Areas

910 SPECIAL CLASSIFICATIONS

910 Vegetation
- 911 Sea Grass

Attachment 3



Note: Aerial Shown is USGS DOQQ dated 2004

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Babcock Ranch
A SHARED VISION. A SHARED COMMITMENT.

THE BABCOCK RANCH COMMUNITY
WQ SAMPLING LOCATION MAP
ATTACHMENT 3

Kitson&Partners
JOHNSON ENGINEERING