

Appendix 2: Listed Species Evaluation

Listed Species Evaluation

INTRODUCTION

The following summarizes the process used to evaluate the potential impacts of the corridor alternatives on the key listed species identified in the Methodology Memorandum: the Audubon's crested caracara (*Polyborus plancus audubonii*), the bald eagle (*Haliaeetus leucocephalus*), the Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and the Florida grasshopper sparrow (*Ammodramus savannarum floridanus*). The evaluation was completed without the benefit of species-specific surveys and relies upon available GIS data; preliminary field reviews and habitat assessments by Inwood ecologists; available literature regarding the distribution, life histories, and habitat requirements of the key listed species; and the best scientific judgment of the authors. The results of the evaluation are included in the Alternative Corridor Evaluation Report.

Each of the four key species were given a degree of adverse effect based on a scale of 1 to 10 with 1 being little to no adverse effect and 10 being a potential take of the species. These effect determinations were made independently for each species and included the assessment of potential impacts to known nesting territories, nesting habitat, foraging habitat, direct observations by Inwood ecologists, and coordination with regulatory agencies. Details regarding the evaluation completed for each species is further detailed below.

AUDUBON'S CRESTED CARACARA

No current occurrence data is available for this species within the project study area. However, during preliminary field reviews within the project study area, Inwood ecologists documented caracara nesting and foraging. In determining the degree of effect for caracara within the project study area, two factors were considered: (1) acres of suitable habitat within the footprint of each corridor alternative, and (2) the potential number of 750- acre (0.6-mile radius of nest tree) nesting territories that could occur within the footprint of each corridor alternative.

Land use and land cover data obtained from the South Florida Water Management District, Osceola County, and the Florida Natural Areas Inventory was reviewed and compared to habitat types within the project study area where caracara had been directly observed by Inwood ecologists. Within the project study area, suitable caracara habitat was considered to be both improved and unimproved pasture areas on the south side of Lake Toho as well as pasture and citrus groves located in the northeast portion of the project study area along both sides of Kissimmee Park Road and Canoe Creek Road. In addition to meeting the habitat criteria defined by Morrison and Humphrey (2001) and the Species Conservation Guidelines for the Audubon's Crested Caracara in South Florida (USFWS 2004), caracara were directly observed in these areas by Inwood ecologists.

Table 1 below details the results of the caracara analysis conducted using the methods outlined above. Each rating in the table is based on the range of values encountered within each corridor

alternative. The Adjusted Rating is based upon the sum of the interim ratings that is then normalized to a 10-point scale.

Table 1: Caracara Analysis

Results of Caracara Analysis						
Alignment	Acres Suitable Habitat	Potential Number of Territories (based on 0.6-mile radius average)	Rating Based on Acres Habitat (see table below for adjusted ranking)	Rating Based on Potential # Territories	Sum of Ratings	Adjusted Rating (relative rating based on sum of scores)
1	265.0923	4	3	1	4	1
2	301.7713	6	4	6	10	3
3	206.4189	5	1	3	4	1
4	420.1047	8	9	10	19	7
5	504.4521	8	12	10	22	9
6	512.5094	9	12	13	25	10
7	512.4082	9	12	13	25	10
8	517.0281	8	13	10	23	9
9	517.6863	8	13	10	23	9
10	522.0704	8	13	10	23	9
11	486.9388	8	11	10	21	8
12	502.6876	8	12	10	22	9
13	539.7655	9	13	13	26	10

The following tables include the supporting information used to populate the table above. Each criteria was normalized to determine their rating relative to the each other. The normalization methodology used for the suitable habitat rating required the determination of the range between the highest (539.76) and lowest (206.41) values in the dataset. The range for these values is 333.35 (highest value – lowest value = range). The interval within the range was then determined by dividing the number of alternatives, 13, by the range. This resulted in an interval of 25.64, which is 333.35/13 and rounded to the nearest tenth.

Suitable Habitat Rating Normalization			
Max	Min	Range	Interval
539.76	206.41	333.35	25.6

The normalized data was entered into a table from highest to lowest followed by a second column indicating the acreage range based upon the interval from the previous table. Rankings

were applied on a scale of 10 to 1 with 10 being the highest and 1 being the lowest. The acres of suitable habitat for each corridor alternative are derived from the GIS analysis, and assuming uniformity of habitat quality, were located within the ranked ranges and entered into the table.

Suitable Habitat Adjusted Rating			
Acreage	Acreage Range	Rank	Corridor
539.76	513.61 – 539.76	13	7, 8, 9, 10, 13
513.61	488.01 – 513.61	12	5, 6, 12
488.01	462.41 – 488.01	11	11
462.41	436.81 – 462.41	10	
436.81	411.21 – 436.81	9	4
411.21	385.61 – 411.21	8	
385.61	360.01 – 385.61	7	
360.01	334.41 – 360.01	6	
334.41	308.81 – 334.41	5	
308.81	283.21 – 308.81	4	2
238.21	257.61 – 283.21	3	1
257.61	232.01 – 257.61	2	
232.01	206.41 – 232.01	1	3

The normalization methodology used for the potential nesting territories rating required the determination of the range between the highest (9) and lowest (4) values in the dataset. The range for these values is 5 (highest value – lowest value = range). The interval within the range was then determined by dividing the number of alternatives, 13, by the range. This resulted in an interval of 0.38, which is 5/13 and rounded to the nearest tenth.

Potential Nesting Territories Rating Normalization			
Max	Min	Range	Interval
9	4	5	0.4

The range was entered into a table from highest to lowest based upon the interval from the previous table. Ranking was applied on a scale of 10 to 1 with 10 being the highest and 1 being the lowest. The number of potential nesting territories for each corridor alternative are derived from the GIS analysis and, assuming uniform distribution of nesting territories within all suitable habitat, were located within the ranked ranges and entered into the table.

Potential Nesting Territories Adjusted Rating		
Range	Corridor	Rating
8.8 – 9.0	6, 13	13
8.4 – 8.8		12
8.0 – 8.4		11
7.6 – 8.0	4, 5, 7, 8, 9, 10, 11, 12	10

7.2 – 7.6		9
6.8 – 7.2		8
6.4 – 6.8		7
6.0 – 6.4	2	6
5.6 – 6.0		5
5.2 – 5.6		4
4.8 – 5.2	3	3
4.4 – 4.8		2
4.0 – 4.4	1	1

BALD EAGLE

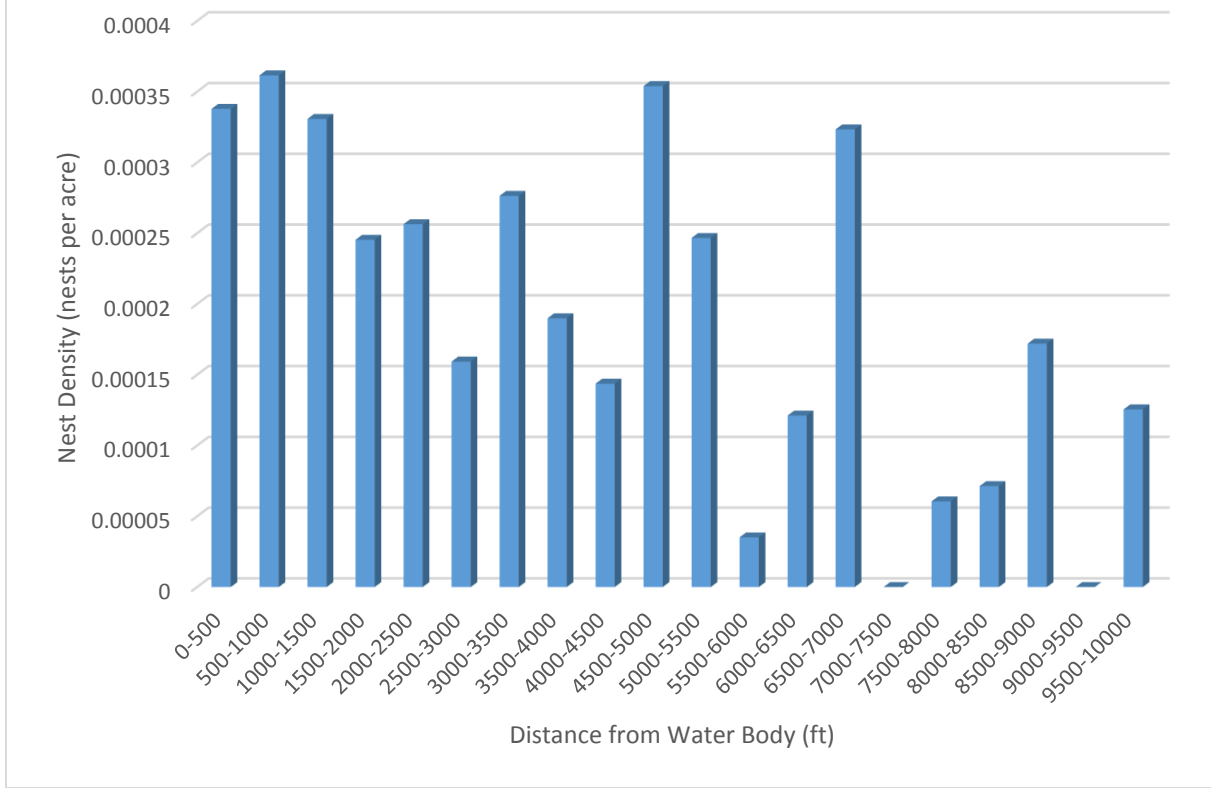
Although the bald eagle was removed from the federal and state endangered species list in 2007 and 2008, respectively, it is still afforded protection under the federal Bald and Golden Eagle Protection Act (1940) and the Migratory Bird Treaty Act (1918). These federal protections prohibit the take of eagles, their nests, or trees containing their nests. The bald eagle is also afforded protections by the state’s eagle rule adopted by the FWC.

The FWC completes nesting season surveys for Osceola County every three years, and up-to-date nesting data for the Osceola County population is readily available. As such, potential impacts to this species and their nests could be accurately assessed based on the available nesting data. Several criteria were developed to determine the relative potential of each corridor to impact bald eagle nests, and/or nesting habitat, and are described below.

The FWC defines two protection zones that surround active, and alternate bald eagle nests (FWC, 2008). The primary zone extends 330 feet from the nest, and the secondary zone extends 660 feet from the nest. Both the 330 foot and 660 foot protection zones were generated in GIS utilizing the FWC’s bald eagle nest data. Each corridor was given a relative rating based on the number of primary and secondary zone encroachments.

The second factor that was utilized in the bald eagle rating analysis is proximity to water. The bald eagle is a piscivorous raptor that is dependent on water for its primary food. Information provided by FWC states that nearly all bald eagle nests in Florida occur within 1.8 miles of water. Based on this relationship between nesting eagles and water, a GIS-based analysis was conducted to determine the likelihood of encountering nesting eagles based on the proximity of each corridor to water. Information utilized in this analysis included the FFWCC bald eagle nest data for Osceola County (1981-2012), and St. Johns River Water Management District (SJRWMD) and South Florida Water Management District (SFWMD) Land Use GIS layers. Bald eagle nest densities were calculated in 500’ increments, from 0-10,000’ from the edge of all water bodies (FLUCFCS category 5000). The following Figure 1 depicts the results of the density calculations.

Exhibit 1 - Historic Bald Eagle Nest Densities Relative to Distance from Water (Osceola County)



The acreage of suitable nesting habitat within each corridor was quantified and categorized based on the distance from water. The water bodies themselves were not included in the acreage calculations, as they are not considered suitable nesting habitat. The results of this analysis outlines the relative probability of each corridor to encounter bald eagle nests, based on their proximity to water bodies.

The final factor that was included in the overall analysis of potential bald eagle impacts is the acreage of nesting habitat within each corridor. As long as suitable nesting trees are present, bald eagles will nest in a variety of habitat types, including both forested, and non-forested uplands and wetlands, as well as agricultural and residential land uses. For the purposes of this analysis, only the water bodies themselves were excluded from those areas considered to be suitable nesting habitat. The ten corridors were then rated based on their overall impacts to suitable bald eagle nesting habitat.

The values obtained in each of the three scoring categories were adjusted relative to each of the 13 corridors. The result was a relative rating of each corridor for each of the three categories. The overall rating for each corridor was made by combining the ratings from the three scoring

categories, above, and rating them on a 10 point scale. The results of the Bald Eagle Analysis are summarized in Table 2 below.

Table 2: Bald Eagle Analysis

Bald Eagle Analysis								
Corridor	Acres Potential Nesting Habitat	Number of Primary Zones	Number of Secondary Zones	Rating Based on Number of Protection Zones	Rating Based on Acres Suitable Nesting Habitat	Rating Based on Corridor Proximity to Water	Sum of Ratings	Overall Rating (Adjusted to 10-Point Scale)
1	496.68	0	0	1	2	5	8	2
2	591.82	0	1	2	6	9	17	6
3	474.38	0	1	2	1	1	4	1
4	693.93	0	4	5	10	13	28	10
5	729.99	0	3	4	12	13	29	10
6	738.07	0	2	3	12	10	25	9
7	742.87	1	1	3	13	4	20	7
8	743.63	0	2	3	13	5	21	7
9	744.29	0	1	2	13	4	19	6
10	748.67	0	2	3	13	5	21	7
11	713.54	0	1	2	11	6	19	6
12	729.13	0	1	2	12	8	22	8
13	766.21	0	1	2	13	6	21	7

The following tables include the supporting information used to populate the table above. The normalization methodology used for the suitable nesting habitat rating required the determination of the range between the highest (766) and lowest (474) values in the dataset. The range for these values is 291 (highest value – lowest value = range). The interval within the range was then determined by dividing the number of alternatives, 13, by the range. This resulted in an interval of 22.4, which is 291/13 and rounded to the nearest tenth.

Suitable Nesting Habitat Rating Normalization			
Max	Min	Differential	Interval
766.21	474.38	291.83	22.4

The range was entered into a table from highest to lowest based upon the interval from the previous table. Ranking was applied on a scale of 10 to 1 with 10 being the highest and 1 being

the lowest. The acreage of potential nesting habitat with each corridor alternative are derived from the GIS analyses, and assuming uniform quality of nesting territories within all suitable habitat, were located within the ranked ranges and entered into the table.

Potential Nesting Habitat Adjusted Rating		
Range	Corridor	Rating
742.8 – 766.2	7, 8, 9, 10, 13	13
720.4 – 742.8	5, 6, 12	12
698.0 – 720.4	11	11
675.6 – 698.0	4	10
653.2 – 675.6		9
630.8 – 653.2		8
608.4 – 630.8		7
586.0 – 608.4	2	6
563.6 – 586.0		5
541.2 – 563.6		4
518.8 – 541.2		3
496.4 – 518.8	1	2
474.4 – 496.4	3	1

The potential number of primary (330 feet from the nest tree) and secondary (660 feet from the nest tree) protection zones were determined for each corridor alternative and were calculated based upon available nesting data obtained from the FWC. The rating assigned, based on the number of protection zones, was calculated as number of primary zones + number of secondary zones + 1. The 1 was added to the calculation to account for the fact that, while bald eagles have a high site fidelity, some existing nests are lost and new or alternate nests are built every year. Therefore, a factor of 1 was added to the rating category to account for this fluctuation.

The final rating was based on each of the corridor alternatives' proximity to water. The analysis included the average distance to open water for each corridor. The distance for each corridor was normalized using the same parameters as above. The ratings following the normalization were then included in the table to be used to calculate the overall rating of each corridor alternative relative to bald eagle nests. The table below outlines the data utilized to obtain the ratings based on the proximity to water utilizing historic nesting data.

Bald Eagle Nesting Density Based Upon Distance to Open Water				
Buffer (Distance from Waterbody)	Number of Nests	Total Acreage within Buffer Area	Adjusted Acreage within Buffer Area (Previous Buffer Removed)	Nest Density per Acre
Open Water	N/A	93733.39	93733.39	N/A

0 – 500	28	176609.82	82876.43	0.000337852
500 – 1000	32	265123.67	88513.85	0.000361525
1000 – 1500	28	349777.93	84654.26	0.000330757
1500 – 2000	19	427224.87	77446.93	0.000245329
2000 – 2500	18	497439.75	70214.88	0.000256356
2500 – 3000	10	560210.09	62770.34	0.000159311
3000 – 3500	15	614486.77	54276.68	0.000276362
3500 – 4000	9	661888.03	47401.25	0.000189868
4000 – 4500	6	703649.21	41761.19	0.000143674
4500 – 5000	13	740376.31	36727.09	0.000353962
5000 – 5500	8	772813.22	32436.92	0.000246633
5500 – 6000	1	801311.14	28497.92	0.000035090
6000 – 6500	3	826068.49	24757.35	0.000121176
6500 – 7000	7	847717.38	21648.89	0.000323342
7000 – 7500	0	866671.78	19854.40	0
7500 – 8000	1	883186.71	16514.94	0.000060551
8000 – 8500	1	897204.74	14018.03	0.000071337
8500 – 9000	2	908832.36	11627.61	0.000172004
9000 – 9500	0	918370.44	9538.08	0
9500 - 10000	1	926338.14	7967.71	0.000125507

EVERGLADE SNAIL KITE

The Everglade snail kite is a federally-listed, endangered raptor whose nesting habitat is restricted to lakeshore emergent vegetation (USFWS 1999). Within the project corridor, snail kite nesting is limited to the Lake Tohopekaliga (Toho) shoreline, and the presence of this species has been confirmed through visual observation by Inwood biologists during preliminary field reviews. Historic snail kite nesting location data for Lake Toho from 1991-2013 was obtained from the USFWS. This data contains point locations for yearly snail kite nests and is collected by USFWS and the FWC. The USFWS defines two areas surrounding snail kite nests that are important to consider when determining potential impacts (USFWS 2006). An inner protective zone of 500 feet is recommended to reduce disturbance to nesting birds. This is based on known flushing distances that have been observed for this species. The second protective zone is a 1,640 feet area that should be protected from habitat disturbances such as anthropogenic water level changes and vegetative alternations during the breeding season, which occurs from January to May. This additional zone of protection is intended to protect foraging habitat for nesting birds, who typically have a restricted foraging range when compared to non-nesting individuals such as juveniles.

The corridors were rated based on the number of snail kite nests and the number of “no entry” (1,640 ft) buffer zones that would be impacted by each corridor, as well as the acreage of potential nesting habitat (i.e., lakeshore wetlands with emergent vegetation) that would be

impacted as well. Additionally, weight was given to the likelihood of each corridor impacting snail kites due to their proximity to known nests and/or nesting habitat. The results of the Everglade snail kite analysis is summarized in Table 3, below.

Table 3: Everglade Snail Kite Analysis

Everglade Snail Kite Habitat Analysis						
Corridor	Acres Potential Nesting Habitat	Number of Nests & Buffer Zones Impacted	Rating Based on Acres of Habitat	Rating Based on Number of Nests/Buffer Zones	Sum of Ratings	Overall Rating (Adjusted to 10-Point Scale)*
1	12.0	25	6	7	13	5
2	9.3	17	5	9	14	6
3	26.8	7	13	13	26	10
4	0.0	0	0	0	0	0
5	0.0	0	0	0	0	0
6	0.0	0	0	0	0	0
7	0.0	0	0	0	0	0
8	0.0	0	0	0	0	0
9	0.0	0	0	0	0	0
10	0.0	0	0	0	0	0
11	0.0	0	0	0	0	0
12	0.0	0	0	0	0	0
13	0.0	0	0	0	0	0

*Coordination with the USFWS has indicated that, while habitat impact rankings are appropriate for comparison purposes, impacts to snail kite nests or habitat on Lake Toho are not likely to be approved.

The following tables include the supporting information used to populate the table above. The normalization methodology used for the suitable nesting habitat rating required the determination of the range between the highest (26.8) and lowest (0.0) values in the dataset. The range for these values is 26.8 (highest value – lowest value = range). The interval within the range was then determined by dividing the number of alternatives, 13, by the range. This resulted in an interval of 2.06, which is 26.8/13.

Nesting Habitat Rating Normalization			
Max	Min	Differential	Interval
26.8	0	26.8	2.1

The range was entered into a table from highest to lowest based upon the interval from the previous table. Ranking was applied on a scale of 10-1 with 10 being the highest and 1 being the lowest. The acreage of potential nesting habitat with each corridor alternative were derived from the GIS analysis and, assuming uniform quality of nesting territories within all suitable habitat, were located within the ranked ranges and entered into the table.

Nesting Habitat Adjusted Rating		
Range	Corridor	Rating
25.2 – 26.8	3	13
23.1 – 25.2		12
21.0 – 23.1		11
18.9 – 21.0		10
16.8 – 18.9		9
14.7 – 16.8		8
12.6 – 14.7		7
10.5 – 12.6	1	6
8.4 – 10.5	2	5
6.3 – 8.4		4
4.2 – 6.3		3
2.1 – 4.2		2
0.0 – 2.1		1

FLORIDA GRASSHOPPER SPARROW

The Florida grasshopper sparrow (FGS) is a federally-listed, endangered passerine species whose nesting habitat is restricted to dry prairie that is relatively open and low, and has a history of frequent fires (USFWS 2004). According to the SLOPES, suitable habitat for FGS is dry prairie including improved pasture, palmetto prairie, and unimproved pasture. Additional habitat characteristics include:

- Open, dry habitats within less than 1 tree per acre
- Minimum of 20% cover of bare ground
- Large, contiguous areas of suitable habitat (240-1348 ha)

Much of the project corridor has been converted over time from dry prairie to pasture used for cattle grazing, which usually results in the decline or extirpation of breeding populations (USFWS 2004). There are currently six known populations for Florida grasshopper sparrows. Three populations exist on Avon Park Air Force Range, one on Kissimmee Prairie State Preserve, one on Three Lakes Wildlife Management Area, and one on private property (USFWS 2004).

Known populations of FGS are located approximately 12 miles south-southeast of the project corridor. However, potential FGS habitat, based on the *Species Conservation Guidelines for the Florida Grasshopper Sparrow* (USFWS 2004), was identified by Inwood Biologists north of Lake Cypress Road and south of Friar’s Cove Road just outside the project study. Due to their high site fidelity, FGS surveys should include all potential habitat and include a 100-meter (328-ft) buffer surrounding it (USFWS 2004). As no available occurrence data is available within the various corridor corridors, a GIS-based analysis of potential FGS habitats was completed. The following land uses and cover types were included in the analysis:

- Improved Pastures (FLUCFCS #1100)
- Unimproved Pastures (FLUCFCS #1120)
- Herbaceous (Dry Prairie) (FLUCFCS #3100)

The acreages of each of these habitat types was calculated using GIS, and the corridors were rated (on a 10-point scale) based on the relative occurrence of the above habitat types. It should be noted that this analysis focused only on the type of habitat, as defined by FLUCFCS and the SLOPES, and did not take into account specific features like tree density, frequency of fire, grazing practices, and percent bare ground. These characteristics are crucial when determining habitat suitability for grasshopper sparrows, but were beyond the scope of the desktop analysis. Table 4 below summarizes the results and ratings of the Florida grasshopper sparrow habitat analysis.

Table 4: Florida Grasshopper Sparrow Analysis

Florida Grasshopper Sparrow Habitat Analysis		
Corridor	Acres Potential Habitat	Rating (adjusted to 10-Point Scale)
1	97.9	1
2	187.0	3
3	166.2	2
4	319.0	7
5	427.3	10
6	439.3	10
7	407.3	10
8	437.4	10
9	399.0	9
10	427.9	10
11	276.1	6
12	297.7	6
13	442.1	10

The following tables include the supporting information used to populate the table above. The normalization methodology used for the suitable nesting habitat rating required the determination of the range between the highest (442.4) and lowest (97.9) values in the dataset. The range for these values is 344.5 (highest value – lowest value = range). The interval within the range was then determined by dividing the number of alternatives, 10, by the range. This resulted in an interval of 34.45, which is 344.5/10.

Habitat Rating Normalization			
Max	Min	Differential	Interval
442.4	97.9	344.5	34.4

The range was entered into a table from highest to lowest based upon the interval from the previous table. Ranking was applied on a scale of 10 to 1 with 10 being the highest and 1 being the lowest. The acreage of potential habitat with each corridor alternative are derived from the GIS analysis and, assuming uniform quality of suitable habitat, were located within the ranked ranges and entered into the table.

Habitat Adjusted Rating		
Range	Corridor	Rating
407.5 – 441.9	5, 6, 7, 8, 10, 13	10
373.1 – 407.5	9	9
338.7 – 373.1		8
304.3 – 338.7	4	7
269.9 – 304.3	11, 12	6
235.5 – 269.9		5
201.1 – 235.5		4
166.7 – 201.1	2	3
132.3 – 166.7	3	2
97.9 – 132.3	1	1

ADDITIONAL SCORING CONSIDERATIONS

Additional criteria were considered to rate each corridor’s overall impact to the four key listed species. Whereas the above analyses allow for the corridors to be rated relative to a single species, the overall goal was to develop a system that rated each corridor relative to all of the above assessed species. As an example, based on preliminary feedback from the USFWS, and recent recovery efforts specifically directed at grasshopper sparrows (i.e., captive breeding program, FWC surveys and research), it is anticipated that avoidance of impacts to occupied habitat will be the only option available for addressing the presence of grasshopper sparrows. In contrast, although a “take” of bald eagle nests will not be considered viable, there are established conservation guidelines and a permitting program in-place that will allow construction activities to occur within the designated protection zones (FWC 2008). Similarly, conservation guidelines are available to avoid or minimize impacts to caracara (USFWS 2004). As such, greater weight was given to potential impacts to grasshopper sparrows than to bald eagles or caracara. This weighting of one species relative to another was based on several factors, including but not limited to:

- Whether permitting protocols exist;

- Availability of avoidance, minimization, and mitigation measures;
- Sensitivity of species to habitat alteration;
- Effect of proposed activity to ongoing species recovery efforts;

The result of the overall listed species analysis provided a recommended alternative that both minimizes adverse environmental impacts, and is also technically feasible and permissible.

CONCLUSIONS

Upon completion of the preliminary GIS analyses for the four key species, additional scoring considerations were applied in order to determine the overall degree of effect for each corridor on each of the key species. Table 5 below includes the final degree of effect determinations made for each of the key species.

Table 5: Degree of Effect Determinations for Key Listed Species

Key Species Degree of Effect													
Species	Corridor												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Caracara	5	5	3	10	10	9	8	7	7	7	6	7	9
Bald Eagle	2	2	1	5	5	4	6	3	3	3	3	3	3
Snail Kite	10	10	10	1	1	1	1	1	1	1	1	1	1
Grasshopper Sparrow	1	1	1	3	3	3	3	3	3	3	2	2	2

A synopsis of the factors applied to each species in order to determine the degree of effect is included below.

Audubon’s Crested Caracara

Based on the GIS analysis, Corridors 6 and 13 initially received the highest overall ranking in terms of potential impacts to suitable caracara habitat. This result is due to the following factors: both of these corridors crosses Lake Toho; these corridors are located south of Lake Toho, where the vast majority of suitable caracara habitat is found; and, they bisect the most numbers of potential primary or secondary caracara nesting territories. Inwood ecologists have observed caracara perched and foraging on suitable habitat on the south side of Lake Toho as well as pastures on the north and south sides of Kissimmee Park Road.

However, Corridors 4 and 5 received the highest overall ranking because these corridors would directly impact a caracara nest, identified by Inwood ecologists in February 2013. The nest is located just south of Southport Road, approximately 1.6 miles west of the Southport Marina. This previously unidentified nest was active in 2014 and 2015. It is located approximately 1.2 miles east of active caracara nests identified by Joan Morrison, FWC, in 1995 and 1998.

Audubon's crested caracara exhibit high site fidelity and are known to return to the same area, and even the same tree, over the course of multiple nesting seasons (Morrison 1999). It should also be noted that Corridor 7 is located just outside of the USFWS primary nest protection zone for the caracara nest identified by Morrison.

The USFWS is unlikely to support the direct take of a caracara nest. However, the current guidance included in the Species Conservation Guidelines for the Audubon's Crested Caracara in South Florida (USFWS 2004) includes conservation measures to avoid or minimize the potential impacts to caracara and their habitat that, when applied, will result in the avoidance or minimization of impacts to caracara and its habitat. Depending on the nature of the work being proposed, some USFWS conservation measures can include impact minimization actions and/or habitat enhancement, muffling of equipment, monitoring of nest sites, or conducting work outside of the nesting season.

The final ratings are provided in Table 5. These ratings are based upon:

- A review of the GIS analysis including the relative location and acreage of impacts to potential caracara habitat
- Field reviews and observations conducted by Inwood ecologists
- A review of the conservation guidelines provided by the USFWS and FWC
- Availability and practicability of impact minimization actions

Based on the conclusions of the preliminary GIS analysis coupled with the additional scoring considerations and guidance from the conservation guidelines, it is recommended that caracara nesting surveys be conducted for all corridors selected for continued evaluation following the completion of the Alternative Corridor Analysis.

Bald Eagle

Based on the GIS analysis, Corridor 7 received the highest overall ranking in terms of potential impacts to suitable bald eagle habitat. This is the only corridor that intersects a primary bald eagle nest protection zone, which comes with certain development restrictions. Corridors 4 and 5 received high rankings because these corridors intersect the greatest number of eagle nest buffer zones, and support the highest potential density of eagle nests among the corridors. In addition, Corridors 4 and 5 have relatively high impacts to potential nesting habitat.

Bald eagles are sensitive to a variety of human activities. However, not all bald eagles react to human activities the same way when it comes to nesting. Bald eagles have been documented to nest within yards of human activity without noticeable adverse effect. Factors thought to influence bald eagle tolerance of human activities include visibility, duration, noise level, extent of the area affected by human activity, prior experiences with humans, and tolerance of the individual nesting pair (USFWS 2007).

The USFWS is unlikely to support the direct take of a bald eagle nest. However, the National Bald Eagle Management Guidelines (USFWS 2007) and Bald Eagle Management Plan (FWC 2008) include activity-specific recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of their nests. Category A in the management guidelines includes the construction of roads, trails, canals, power lines, and other linear utilities. These activities are considered some of the least disruptive to eagles as they generally include only a minimal amount of vertical construction. Recommendation for these categories include maintaining landscaped buffers at least 660 feet away from active nests are based primarily on maintaining a visual buffer between the work being done and the nest tree.

The final ratings are provided in Table 5. These ratings are based upon:

- A review of the GIS analysis including the relative location and acreage of impacts to potential nesting habitat
- A review of the density and location of bald eagle nests in Osceola County and their proximity to open water
- Clear guidance from the USFWS and FWC outlining nesting disturbance minimization techniques for roads
- Availability and practicability of impact minimization actions

Based on the conclusions of the preliminary GIS analysis coupled with the additional scoring considerations and guidance from the conservation guidelines, it is recommended that bald eagle nesting surveys be conducted for all corridors selected for continued evaluation, if current data from FWC is unavailable, following the completion of the Alternative Corridor Analysis.

Everglade Snail Kite

Based on the GIS analysis, the highest ranking for impacts to suitable snail kite nesting habitat are associated within Corridors 1, 2, and 3. These results are attributed to the fact that snail kite nesting is restricted to woody vegetation such as willows, cypress, pond apple, and even some exotics that is located over open water. Foraging generally takes place within relatively shallow wetland vegetation, either within extensive marsh systems or in lake littoral zones. Within the project study area, snail kite nesting and foraging habitat is limited to the shoreline and islands of Lake Toho.

The snail kite is afforded two levels of buffer zones that are established around every active nest. In addition, portions of their habitat, including portions of Lake Toho, have been designated by the USFWS as Priority Management Zones. The Priority Management Zones are based on the frequency and density of snail kite nests within each area and are highly variable. The zones are designated to represent the 90 percent probability function for kite nests over a 10-year period. The zones are also intended to identify the likelihood of future kite nesting and approximately 90 percent of the kite nesting, on average, will occur within these polygons if patterns of nest selection continue as in the past (USFWS Snail Kite Management Guidelines, 2006).

Inwood analyzed snail kite nesting data from 1991-2013 provided by the USFWS. The analysis showed that, unlike many terrestrial-nesting raptors such as bald eagles, caracara, and ospreys, snail kite nesting locations were dynamic with nest locations varying on a yearly basis. Lake Toho water levels are managed by the SFWMD and the US Army Corps of Engineers to maximize available nesting and foraging habitat for snail kites, which helps maintain consistent nesting habitat and established the Priority Management Zones.

The USFWS is unlikely to support the direct take of a snail kite nest or any work within either of the nest protection zones or the Priority Management Zones. Inwood's experience on other projects as well as informal coordination with USFWS staff regarding work within snail kite habitat indicates that the USFWS will not support issuing a Biological Opinion that includes an Incidental Take Statement for snail kite habitat.

The final ratings are provided in Table 5. These ratings are based upon:

- A review of the GIS analysis including the relative location and acreage of impacts to potential nesting and foraging habitat
- A review of the snail kite Priority Management Zones in and around Lake Toho
- Informal coordination with USFWS staff regarding impacts to snail kite habitat on this and other transportation projects under the jurisdiction of the USFWS Vero Beach office
- Availability and practicability of corridor alternatives that avoid impacts to snail kites and their habitat

Based on the conclusions of the preliminary GIS analysis coupled with the additional scoring considerations and guidance from the conservation guidelines, it is recommended that coordination with USFWS and FWC snail kite management staff be conducted for all corridors selected for continued evaluation following the completion of the Alternative Corridor Analysis.

Florida Grasshopper Sparrow

Based on the GIS analysis, Corridors 5, 6, 7, 8, 10 and 13 received the highest overall ranking in terms of potential impacts to suitable Florida grasshopper sparrow habitat. These results are due to the fact that grasshopper sparrows are endemic to dry prairie habitat. The majority of the project's study area is comprised of pastures, a land use that is thought to be incompatible with grasshopper sparrow habitat requirements (Pranty and Tucker 2006). Moreover, the grasshopper sparrow consultation area was recently updated by the USDA Natural Resources Conservation Service. According to the information provided by the USDA, the project's study is outside the Florida grasshopper sparrow consultation area. The USFWS recently indicated that grasshopper sparrow surveys would not be necessary for the project. As a result, the project is not likely to adversely affect Florida grasshopper sparrows.