

Identification of Critical Linkages Within the Florida Ecological Greenways Network

A report prepared by the
University of Florida, GeoPlan Center
for the
Florida Department of Environmental Protection, Office of Greenways & Trails
July, 2002



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Introduction

Since 1995, The University of Florida has been working with the Florida Department of Environmental Protection to assist in the development of the Florida Statewide Greenways Plan. The University of Florida was asked to develop a decision support model to help identify the best opportunities to protect ecological connectivity statewide. Geographic information systems (GIS) software was used to analyze all of the best available data on land use and significant ecological areas including important habitats for native species, important natural communities, wetlands, roadless areas, floodplains, and important aquatic ecosystems. All of this information was then integrated in a process that identified a statewide Ecological Greenways Network containing all of the largest areas of ecological and natural resource significance and the landscape linkages necessary to link these areas together in one functional statewide network. The process was collaborative and overseen by three separate state-appointed greenways councils. During the development of the model, technical input was obtained from the Florida Greenways Commission, Florida Greenways Coordinating Council, state, regional, and federal agencies, scientists, university personnel, conservation groups, planners and the general public in over 20 sessions. When the modeling was completed, the results were thoroughly reviewed in public meetings statewide as part of the development of the Greenways Implementation Plan completed in 1999. The results indicated that approximately 50 percent of the state is potentially suitable for inclusion within a statewide ecological greenways system (Carr et al. 1999; Hoctor et al. 2000). In order to focus protection efforts, the University of Florida was asked to develop and apply a process to assess the relative significance of features within the Ecological Network.

Ecological Greenways Prioritization Process

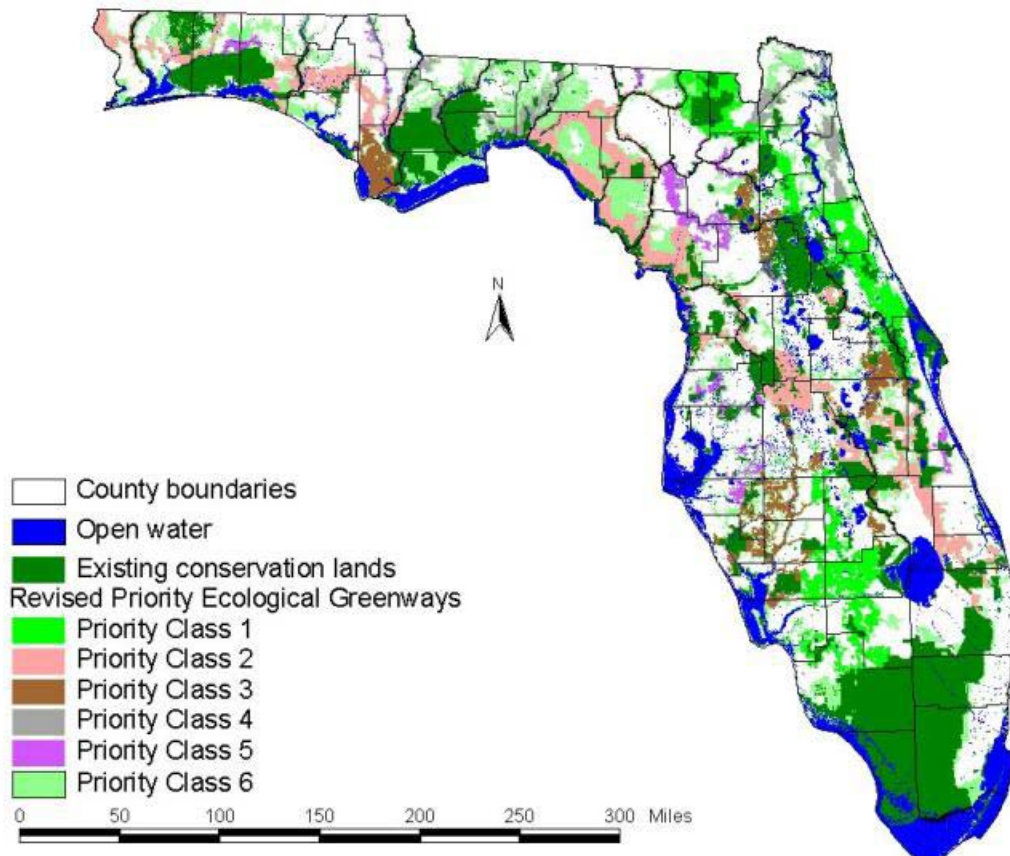
The ecological greenways were prioritized in a two-step process (Figure 1). First, two meetings with staff from the Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Florida Natural Areas Inventory, the Water Management Districts, and other agencies and groups were conducted to discuss criteria and data for selecting priorities. Based on these meetings, the University of Florida developed a GIS model that refined and modified the original ecological greenways model process to identify features within the results that were high, moderate, or lower priorities for protecting statewide connectivity.

The next step involved separating areas identified as high and moderate priorities into even more refined classes of priority using a general set of criteria. Though the original prioritization was used to support this effort, more refined priorities were needed to serve as a better planning tool both for the Florida Greenways Program implementation process and to support the prioritization of potential conservation areas for the Florida Forever Program (Florida Natural Areas Inventory 2001). The following criteria were used to place potential landscape linkage and corridor projects into more refined priority classes:

- 1) Potential importance for maintaining or restoring populations of wide-ranging species (e.g., Florida black bear and Florida panther)
- 2) Importance for maintaining a statewide, connected reserve network from south Florida through the panhandle.
- 3) Other important landscape linkages that provide additional opportunities to maintain statewide connectivity especially in support of higher priority linkages.
- 4) Importance as a riparian corridor to protect water resources, provide functional habitat gradients, and to possibly provide connectivity to areas within other states.

The application of these criteria resulted in the separation of the Ecological Network into 6 priority classes (Fig. 1). For more information on the prioritization process see the “Ecological Greenways Network Prioritization for the State of Florida” report (Hoctor et al. 2001).

Figure 1. Ecological Greenways Prioritization Results



Identification of Critical Linkages

The Florida Greenways Program implementation report (1998) included the identification of critical linkages as the next step following prioritization in the process of protecting an ecological greenways network across the state. Critical linkages serve as more defined project areas that are most important for protecting the Florida Ecological

Greenways Network. Such critical linkages are to be approved by the Florida Greenways and Trails Council on an iterative basis as linkages are protected or priorities change over time. Two primary data sets were used to delineate the first iteration of critical linkages. To define linkages that are most critical to the protection of the Florida Ecological Greenways Network, prioritization based on both ecological criteria and level of threat by conversion to development (development pressure) is needed. For ecological-based prioritization, the prioritization process described above that categorized the Florida Ecological Greenways Network into six priority levels was used (Fig. 1; Hctor et al. 2001). Development pressure was modeled by Jason Teisinger (2002) in a process summarized in the following section.

A. Development Pressure Model

The University of Florida's Geoplan Center has been developing a decision support model that indicates growth potential across the state of Florida. The basis of this work is a Master's degree project in the Department of Urban and Regional Planning being completed by Jason Teisinger. Its purpose is to identify areas most likely to be converted from non-urban to urban land use in order to inform land use decisions including agricultural and conservation land protection. A prototype of this model was recently used in the Division of Forestry report for the Rural and Family Lands Protection Act.

This analysis resulted in a Growth Potential map that displays the potential for parcels currently in non-urban land uses to be converted to residential or commercial land uses. The model has four components: Growth Potential based on Location, Historic Growth, Existing Vacant Residential and Projected Future Growth.

1. The Location Influence component is comprised of two analyses: Amenities and Urban Hub Influence. The Amenities analysis illustrates the effect of locational drivers on growth potential. A locational driver is an amenity that drives growth such as roads, proximity to the coast or inland water bodies and existing residential land uses. Areas were ranked based on distance from locational drivers. Ten bands of area radiating out from the amenity capturing 10% increments of residential development were delineated. These radiating bands were ranked 1-10 with the bands closer to the amenity having higher ranks. This was done for each amenity and results were combined to produce the Amenities analysis. The Urban Hub Influence analysis used Metropolitan Planning Organization boundaries to define hubs and the associated population as a measure of influence. The Urban Hub Influence analysis and Amenities analysis were combined to produce the Location Influence component.
2. The Historic Growth Potential component was derived through an analysis of the percent change in residential units and the direct change in residential units between 1992 and 1999 per section per county. This was done using the Public Land Survey System dataset that breaks the state up into townships, ranges and square mile sections and the Department of Revenue tax data tables.
3. The Existing Vacant Residential component was derived by an analysis of the total vacant residential units per section per county for 1999. Sections were ranked 1-10.

4. The Projected Future Growth component utilized the 1990 census growth projections. The analysis measured the projected change in density between 1990 and 2020.

Each of the four final data sets were weighted and combined. Lakes, wetlands, and existing conservation lands were removed resulting in the Final Growth Potential Analysis. The growth potential map is ranked with values of 1-10 with the value of 1 representing areas with lowest potential for conversion to urban land uses and the value of 10 representing areas with the greatest potential for conversion to urban land uses. For identifying critical linkages, the values of 1-10 were lumped into three categories of high, medium, and low growth potential using a statistical optimization procedure called natural breaks (Jenks 1967; Teisinger 2002). The results of this process for the entire state (outside of existing conservation lands and existing development) and within the Florida Ecological Network are contained in Figure 2 and Figure 3.

Figure 2. Statewide Growth Pressure Model Used to Identify Critical Linkages

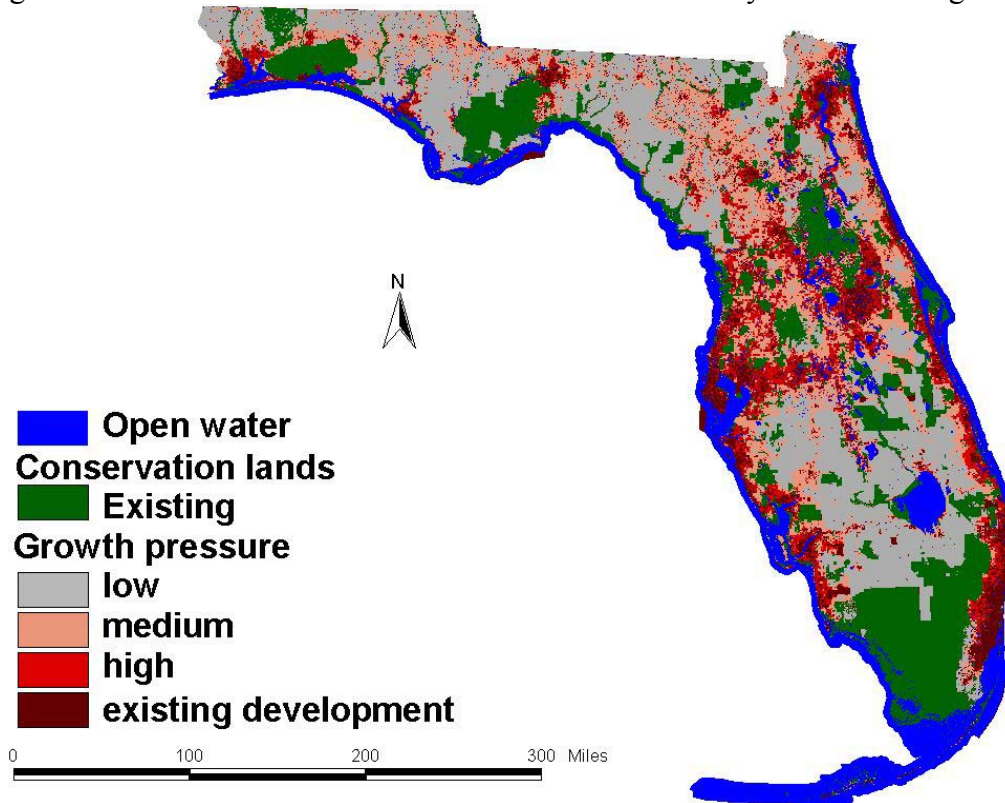
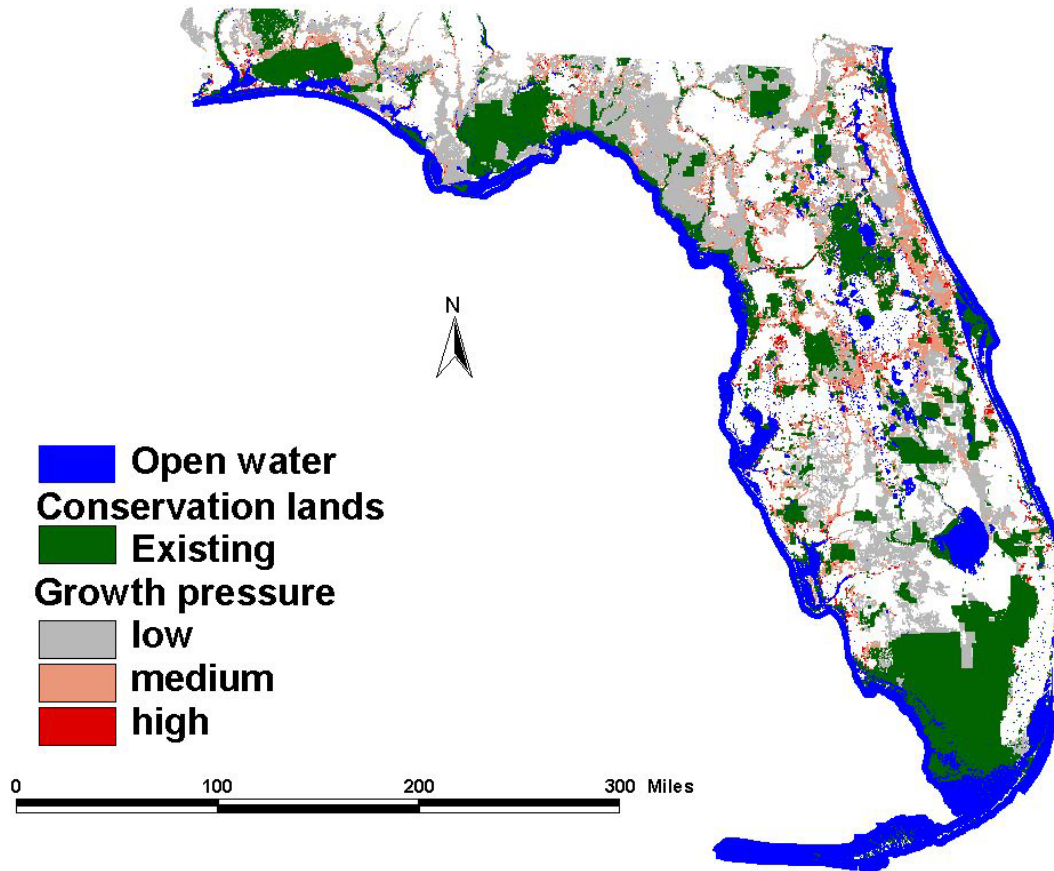


Figure 3. Growth Pressure Model within the Florida Ecological Greenways Network



B. Combination of Ecological Greenways Priorities and Growth Pressure Model

The Ecological Greenways priorities and the growth pressure model results were combined using a matrix. The matrix contains boxes that represent all possible combinations of greenway priorities and growth pressure. When combined, the tendency should be to give higher priority to areas that are part of high priority greenways AND have high growth pressure (for example, see Figure 4). The rationale is that the focus of protection efforts should first be on areas containing the highest priority resources that are most in danger of being lost in the near future. This approach for identifying critical linkages was approved by the Florida Greenways and Trails Council in November, 2001.

The final matrix used in the critical linkage process paired all potential combinations of the six priority levels of ecological greenway priorities and the three levels of growth pressure, which resulted in eighteen unique combinations. Then values of high, medium, or low priority were given to combinations to identify areas with the most significant ecological greenways linkages statewide (Fig. 5). Values were assigned by first selecting the most obvious combinations of high greenway priorities and high to moderate development pressure as having high priority (Priority Class 1 and Class 2 Ecological Greenways with high or moderate growth pressure and Priority Class 3 Ecological Greenways with high growth pressure). It was also decided that all Priority Class 1 Ecological Greenways should receive a high priority rank regardless of development pressure. Two other combinations were added in the high priority group

(Priority Class 4 Ecological Greenways with high growth pressure and Class 3 Ecological Greenways with moderate growth pressure) based on an assessment to determine what additional candidate areas might be added if they were included. To fill out the matrix, all remaining combinations of Priority Class 2 through Class 4 Ecological Greenways and moderate or low growth pressure were assigned medium priority. Priority Class 5 and Class 6 Ecological Greenways were also ranked as moderate priority, and the remaining Priority Class 5 and Class 6 Ecological Greenways were all ranked as low priority.
Tom:

Figure 4. Example of Matrix Combining Ecological Priorities and Vulnerability

Ecological-based Prioritization

		Low	Medium	High
Vulnerability	Low	Low	Low	Medium
	Medium	Low	Medium	High
	High	Medium	High	High

Figure 5. Matrix Used to Rank Combinations of Ecological Greenways Priorities and Growth Pressure

Ecological-based Prioritization

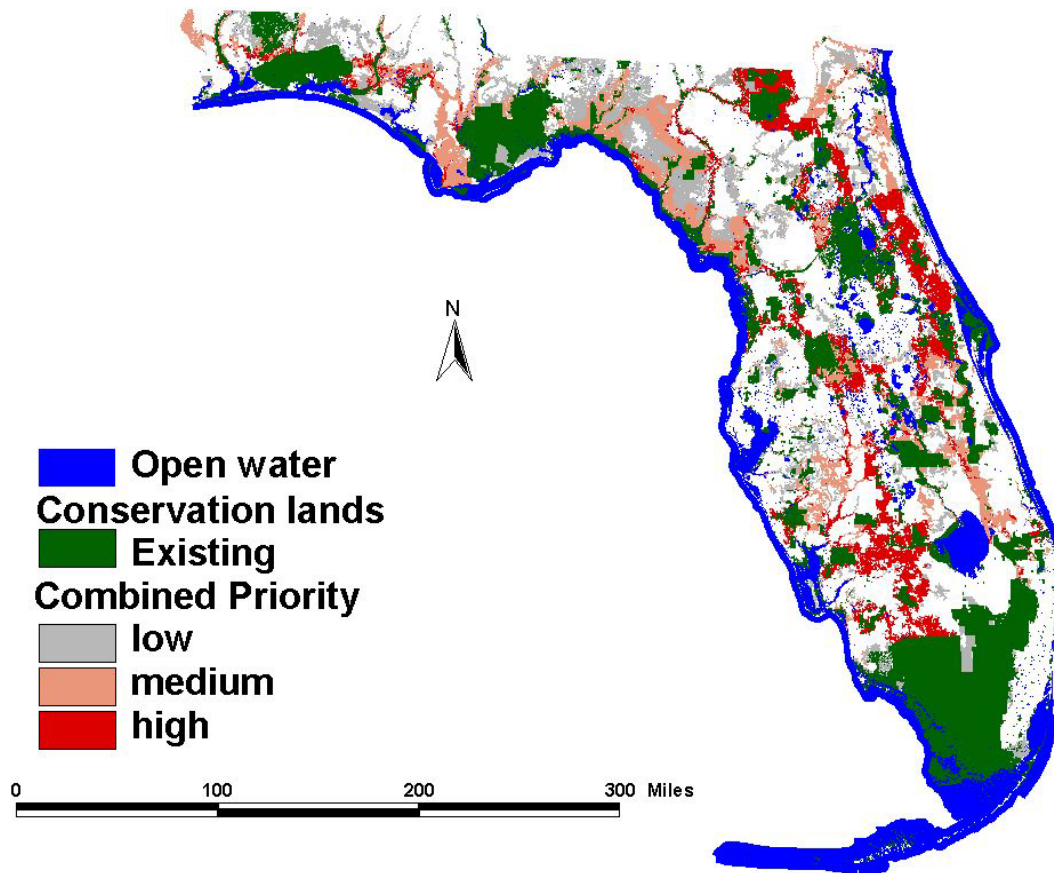
		Class 6	Class 5	Class 4	Class 3	Class 2	Class 1
Growth Pressure	Low	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
	Med.	LOW	LOW	MEDIUM	HIGH	HIGH	HIGH
	High	MEDIUM	MEDIUM	HIGH	HIGH	HIGH	HIGH

C. Identification of Candidate Areas for Critical Linkage Delineation

Using the values in the matrix, a new map data layer was created that combined the Ecological Greenways Priorities and the Growth Pressure Model results into a new

combined prioritization of the Florida Ecological Greenways Network into high, medium, and low priority areas (Fig. 6).

Figure 6. Combined Ecological Greenways Priorities



The Combined Priorities data layer was then used as the base for determining the boundaries of potential project areas that contained areas of high priority and served as linkages between major hubs of existing conservation lands. The intent was to be fairly inclusive so that all potential linkages that contained at least fairly large blocks of high priority, which often represent key areas within a linkage that could be fragmented by development in the near future, were identified as candidates. The result of this process was the delineation of twenty-four critical linkage candidate areas (Fig. 7 and Fig. 8). Due primarily to higher overall development pressure, most candidate areas are in north-central to south Florida, but several are found from the Big Bend west to Pensacola.

Figure 7. Outline of Critical Linkage Candidate Areas

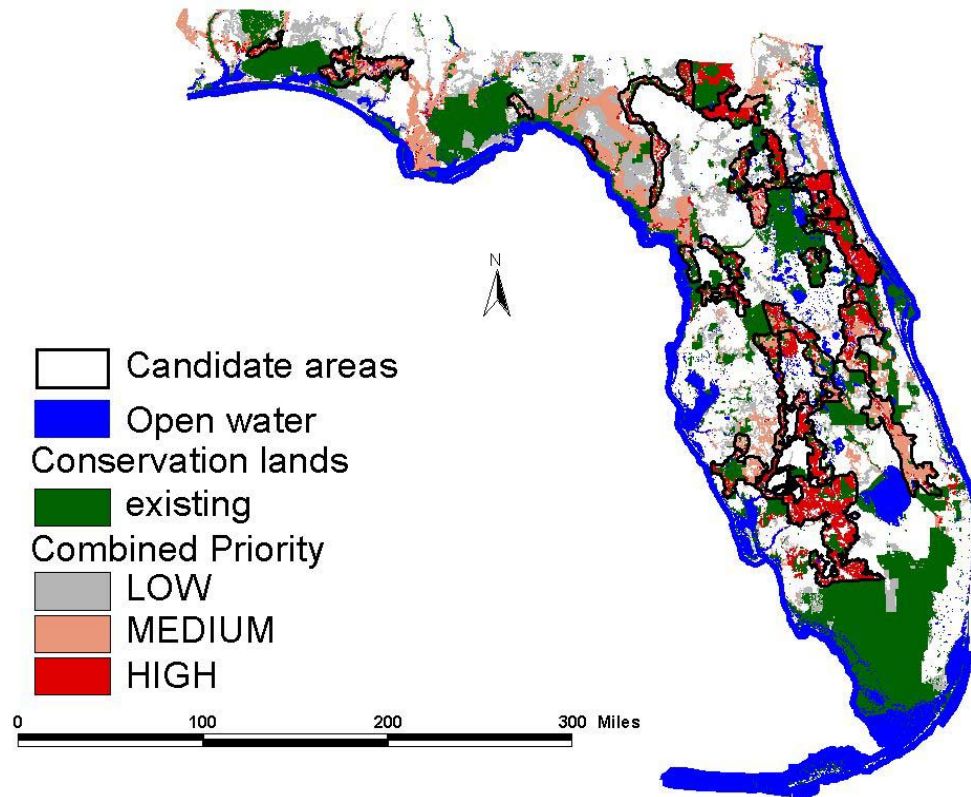
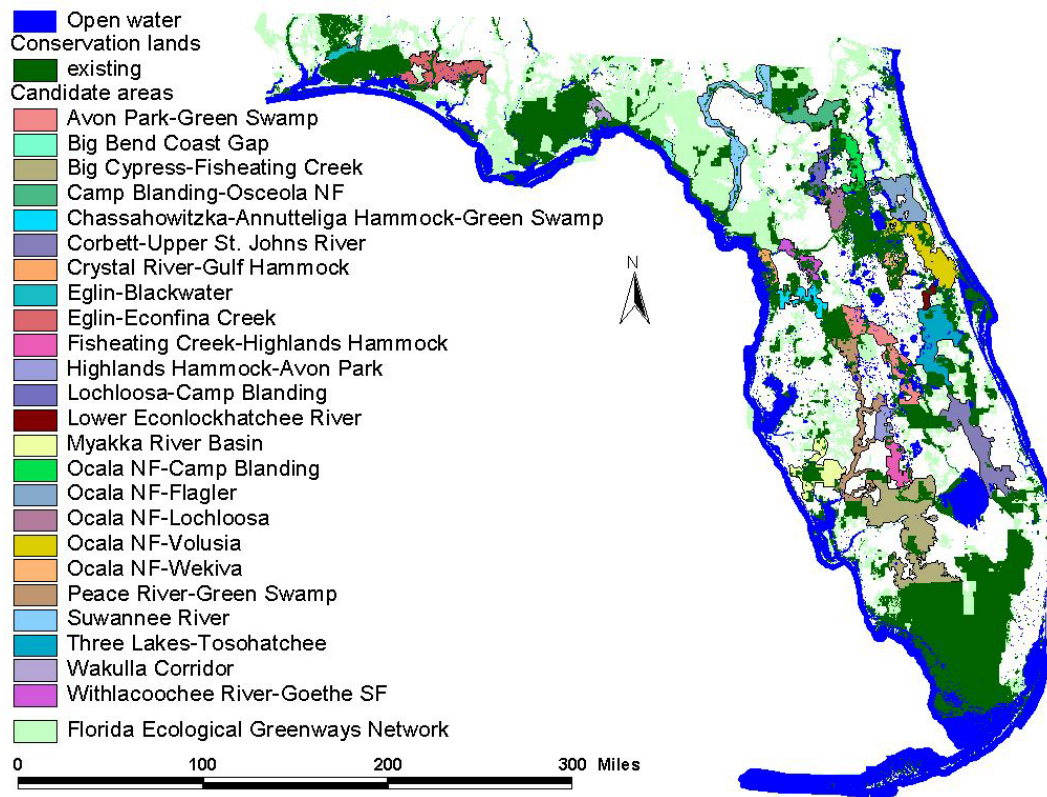


Figure 8. Names of All Critical Linkage Candidate Areas



D. Selection of Critical Linkages from Candidate Areas Pool

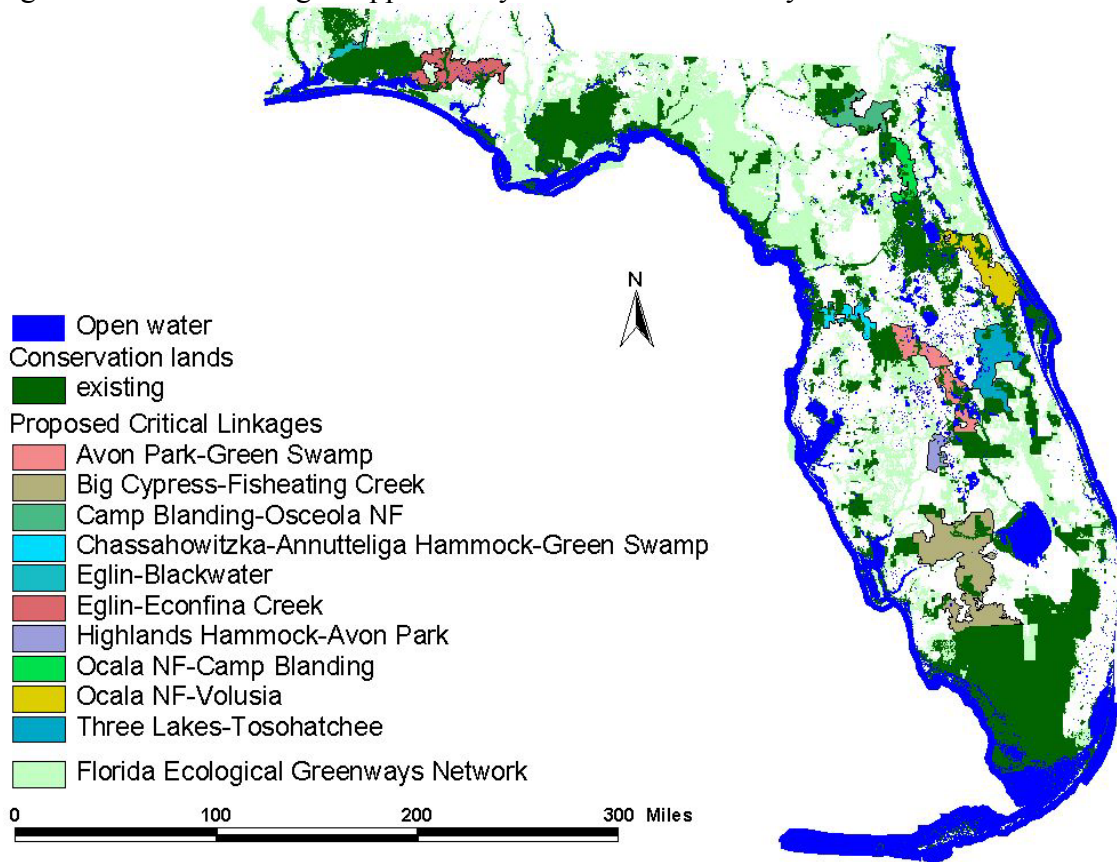
Critical linkages were selected from the pool of candidate areas using three general criteria applied to all of the candidate areas. Staff at the University of Florida went through an initial process of selection and then developed a final list of potential critical linkages working with the protection staff from the Florida Chapter of The Nature Conservancy. The criteria used in the selection process included:

- a. How critical is a particular candidate area to completing the Florida Ecological Greenways Network and how important is the linkage between existing conservation lands represented by each candidate area?
- b. What is the likelihood that much of or a key segment of the candidate area could be converted to incompatible uses in the near future?
- c. Do land ownership patterns appear to provide a suitable opportunity to protect a feasible linkage within the candidate area? Although we do not have a statewide land parcel database, a data set indicating the number of landowners per section (square miles areas statewide) was used to make this assessment.

Selection of critical linkages within each Water Management District was another criterion that was considered during the selection process. Since the Water Management Districts are one of the primary agencies involved in protected conservation lands throughout the state, inclusion of at least one critical linkage in each district to promote protection of key linkages within the Florida Ecological Greenways Network consistent with water resource conservation objectives was considered vital. However, based on the three criteria listed above, critical linkages were selected that are relevant to each Water Management District, and no candidate area was added to the list of proposed critical linkages specifically to meet this fourth criterion.

Ten of the twenty-four candidate areas were selected as proposed critical linkages. There was no numerical goal for the number of critical linkages selected and therefore a number of ten proposed critical linkages was based solely applying the criteria consistently to all twenty-four candidate areas to determine linkages most suitable for concentrating protection activities in the near future. The proposed critical linkages and the selection process were presented to the Florida Greenways and Trails Council in April, 2002 and were approved as the first iteration of Critical Linkages for the Florida Ecological Greenways Network. The ten Critical Linkages are, from north Florida to south: 1) Eglin-Blackwater River; 2) Eglin-Econfina Creek; 3) Camp Blanding-Osceola National Forest; 4) Ocala National Forest-Camp Blanding; 5) Ocala National Forest-Volusia; 6) Chassahowitzka-Annutteliga Hammock-Green Swamp; 7) Avon Park-Green Swamp; 8) Three Lakes-Tosohatchee; 9) Highlands Hammock-Avon Park; and 10) Big Cypress-Fisheating Creek (Fig. 9). Of the ten Critical Linkages, two are within the Northwest Florida Water Management District, one is partially within the Suwannee River Water Management District, two are completely within and two others are partially within the St. Johns Water Management District, one is completely within and three others are partially within the Southwest Florida Water Management District, and four are partially within the South Florida Water Management District.

Figure 9. Critical Linkages Approved by the Florida Greenways and Trails Council



There are approximately 2.7 million acres within Critical Linkages with 17 percent within existing conservation lands, 30 percent in proposed conservation lands (Florida Forever projects, Save Our Rivers projects, and Water Management District study areas), and 2 percent in open water (Table 1). Following below is a section briefly describing each Critical Linkage.

Table 1. Critical Linkage Land Category Statistics

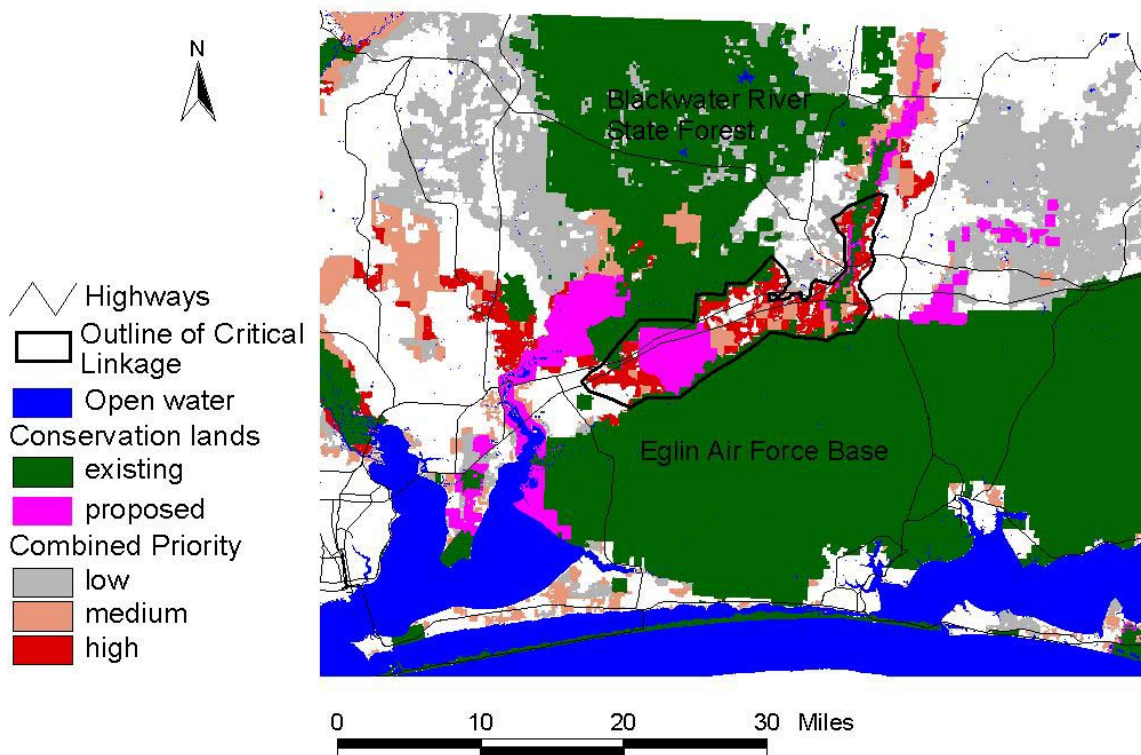
Category	Acres	Percent of Critical Linkages
Existing Conservation Lands	465351	16.97
Proposed Conservation Lands	809257	29.51
Open Water	46053	1.68
Other Private Lands	1421726	51.84
Total	2742387	100.00

Critical Linkage Descriptions

Eglin-Blackwater River

This Critical Linkage connects Eglin Air Force Base to the Blackwater River State Forest (Fig. 10). Both conservation areas have very significant longleaf pine sandhill and flatwood communities. The linkage is approximately 53,000 acres with 24 percent in existing conservation lands and 23 percent in proposed conservation lands and a total of approximately 40,000 acres of private land. There is an important Florida black bear population found within and around Eglin Air Force Base that may benefit significantly from the permanent protection of the linkage between these two large conservation areas. A significant portion of the Yellow River is also within the Critical Linkages including portions of the Yellow River Water Management Area. Eglin-Blackwater River was originally part of a Priority Class 2 Ecological Greenway and contains large areas with moderate to high growth pressure (See Table 2 for growth pressure statistics).

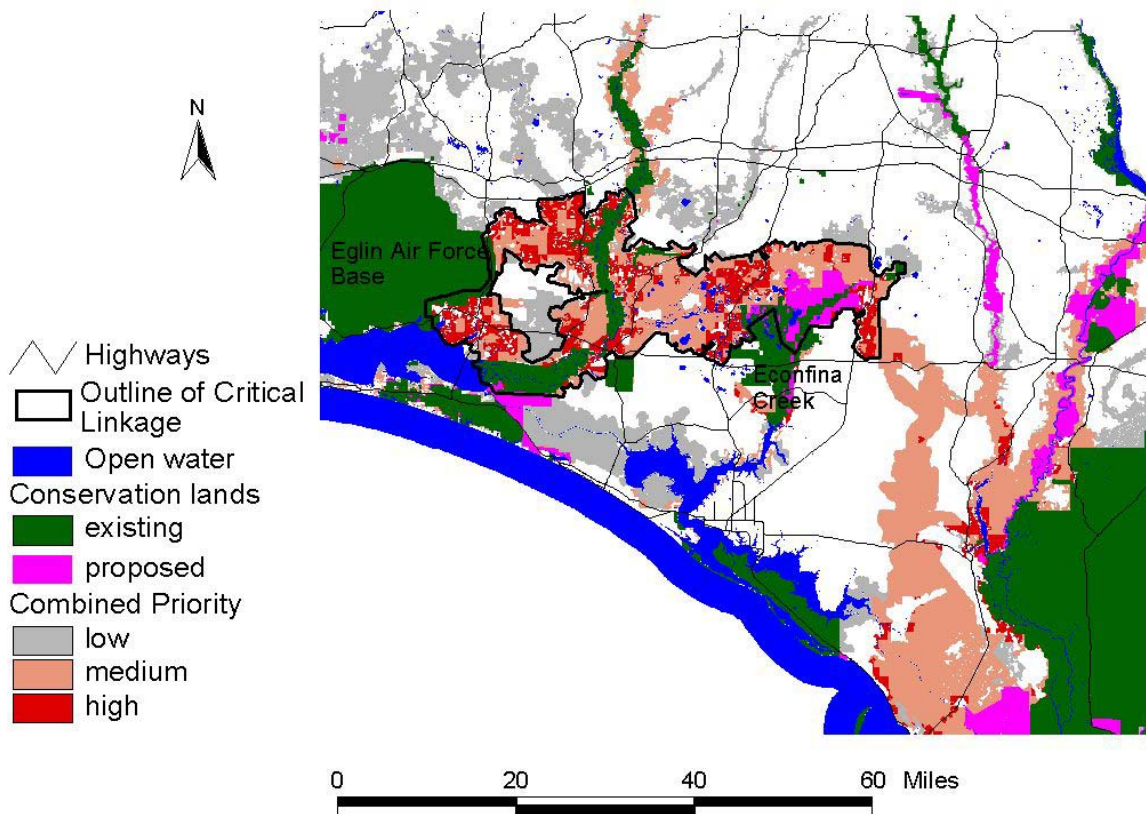
Figure 10. The Eglin-Blackwater River Critical Linkage



Eglin-Econfina Creek

This Critical Linkage runs from Eglin Air Force Base to the headwaters of Econfina Creek north of Panama City (Fig. 11). It connects Eglin Air Force Base to the Econfina Creek Water Management Area and also includes most of the lower Choctawhatchee River and significant portions of the Choctawhatchee Water Management Area. The Sand Mountain Florida Forever project is also an essential part of this Critical Linkage. The linkage is approximately 330,000 acres with 20 percent in existing conservation lands, 6 percent in proposed conservation lands, 2 percent open water, and a total of approximately 258,000 acres of private land. The linkage represents an essential part of the ecological connection between Eglin Air Force Base and the Apalachicola National Forest. Both conservation areas harbor significant Florida black bear populations whose security will be enhanced through protection of a functional linkage and large areas of additional habitat. Eglin-Econfina Creek was originally part of a Priority Class 2 Ecological Greenway and contains large areas with moderate to high growth pressure.

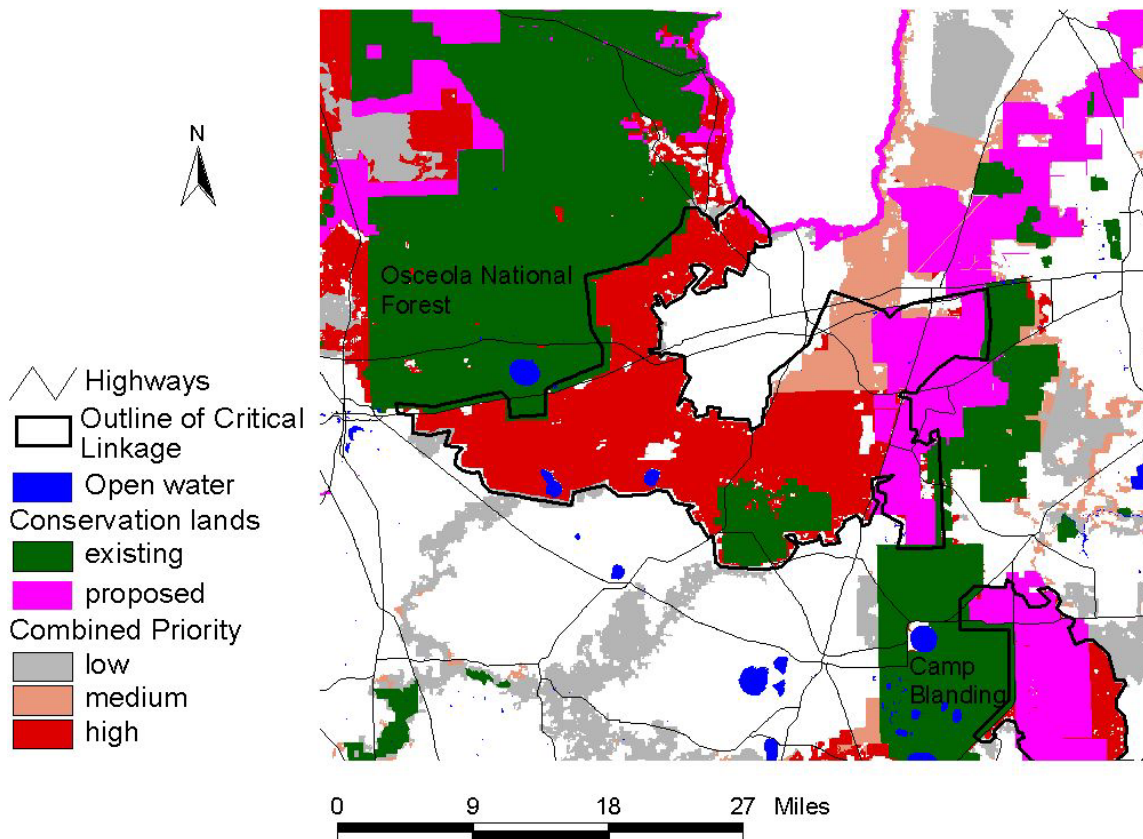
Figure 11. The Eglin-Econfina Creek Critical Linkage



Camp Blanding-Osceola National Forest

This Critical Linkage connects the Osceola National Forest and the Camp Blanding Military Reservation (Fig. 12). The linkage runs from Camp Blanding Military Site, the Jennings State Forest and Cecil Field Conservation Area east to the Osceola National Forest through the New River headwaters and Raiford Wildlife Management Area. The linkage is approximately 230,000 acres with 12 percent in existing conservation lands, 14 percent in proposed conservation lands, 1 percent open water, and a total of approximately 200,000 acres of private land. This linkage was originally a Priority Class 1 Ecological Greenway and is therefore one of the three most important ecological linkages in the state. It represents the northern half of the linkage needed to connect the Ocala National Forest to the Osceola National Forest/Okefenokee National Wildlife Refuge conservation complex. These conservation areas both support important Florida black bear populations that appear to be connected by dispersal through this Critical Linkage. The area most threatened by development within this Critical Linkage occurs directly around US 301, and securing a protected crossing area across US 301 before further encroachment by development occurs is essential. The best potential crossing areas around US 301 are primarily within the Northeast Florida Timberlands Florida Forever project, which is essential to protect in order to complete this Critical Linkage.

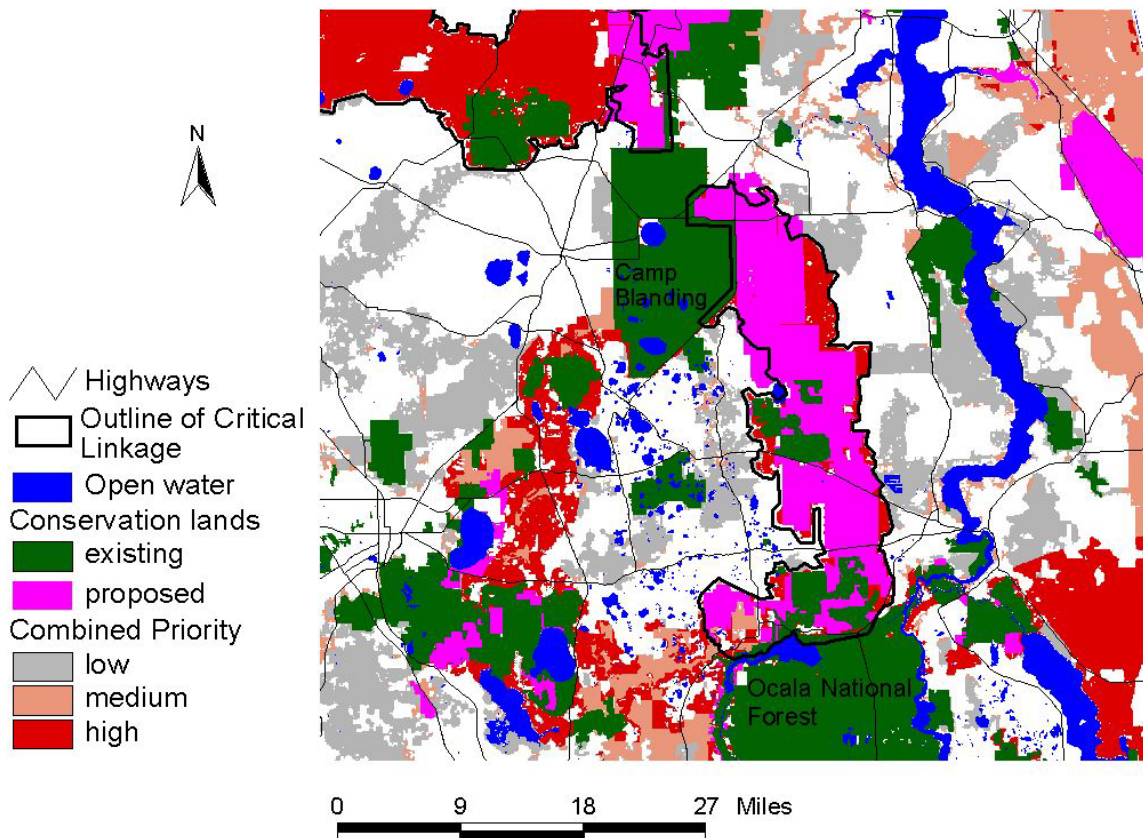
Figure 12. The Camp Blanding-Osceola National Forest Critical Linkage



Ocala National Forest-Camp Blanding

This Critical Linkage connects the Ocala National Forest and the Camp Blanding Military Reservation (Fig. 13). The linkage is approximately 150,000 acres with 17 percent in existing conservation lands, 65 percent in proposed conservation lands, and a total of approximately 124,000 acres of private land. This is the only Critical Linkage where a complete connection could be completed if currently proposed conservation lands are protected. The Etoniah/Cross Florida Greenway and the southern half of the Northeast Florida Timberlands Florida Forever Projects functionally connect the Ocala National Forest and Camp Blanding Military Reservation and therefore should be very high priorities within the Florida Forever program. This linkage was originally a Priority Class 1 Ecological Greenway and therefore one of the three most important ecological linkages in the state. It represents the southern half of the linkage needed to connect the Ocala National Forest to the Osceola National Forest/Okefenokee National Wildlife Refuge conservation complex. These conservation areas both support important Florida black bear populations that appear to be connected by dispersal through this Critical Linkage. An important priority is to work with the Florida Department of Transportation to construct functional bridge crossings for wildlife under SR 20 (planned to be widened in the near future) and SR 100 where they cross this Critical Linkage.

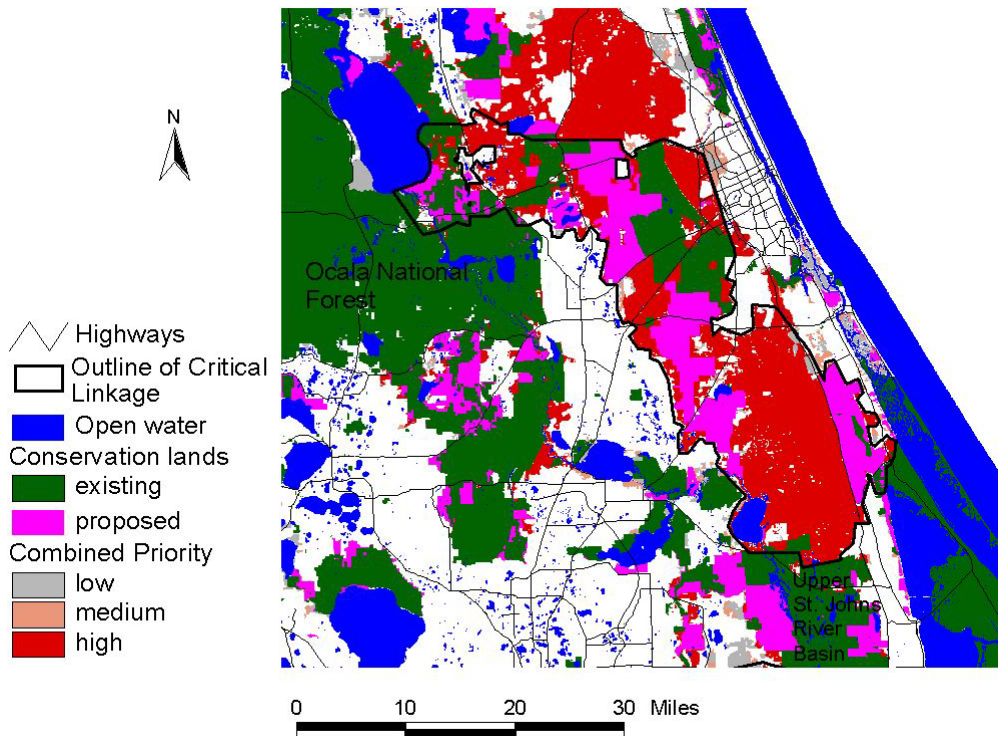
Figure 13. The Ocala National Forest-Camp Blanding Critical Linkage



Ocala National Forest-Volusia

This Critical Linkage connects the Ocala National Forest to the conservation lands complex of the upper St. Johns River basin via the conservation corridor through the heart of Volusia County (Fig. 14). The linkage is approximately 360,000 acres with 15 percent in existing conservation lands, 25 percent in proposed conservation lands, 3 percent in open water, and a total of approximately 297,000 acres of private land. The Volusia Conservation Corridor Florida Forever project is an essential part of this Critical Linkage and it needs to be a high priority for protection due to intense development pressure. Tiger Bay State Forest and adjacent conservation lands are also an essential part of this linkage, and efforts to expand protection in this area need to continue. The Critical Linkage is the most important part of the Priority Class 1 Ecological Greenway covering a broad area east of the Ocala National Forest. It also supports an increasing Florida black bear population and is essential for securing the Ocala black bear population as part of a Florida Fish and Wildlife Conservation Commission Strategic Habitat Conservation Area. The Critical Linkage is one of the most threatened by development with growth pressure encroaching from Orlando, Daytona, Deland, and Deltona. In addition, Interstate 4 is in the process of being widened, the widening of County Road 415 is being studied, and the possibility of building a toll highway from Orlando to Daytona is also being studied. It is essential that functional underpasses be built as I-4 is widened and the impacts of the two other proposed road projects need to be carefully analyzed. Overall, this Critical Linkage is imminently threatened by development and all efforts necessary to protect it in the very near future need to commence immediately.

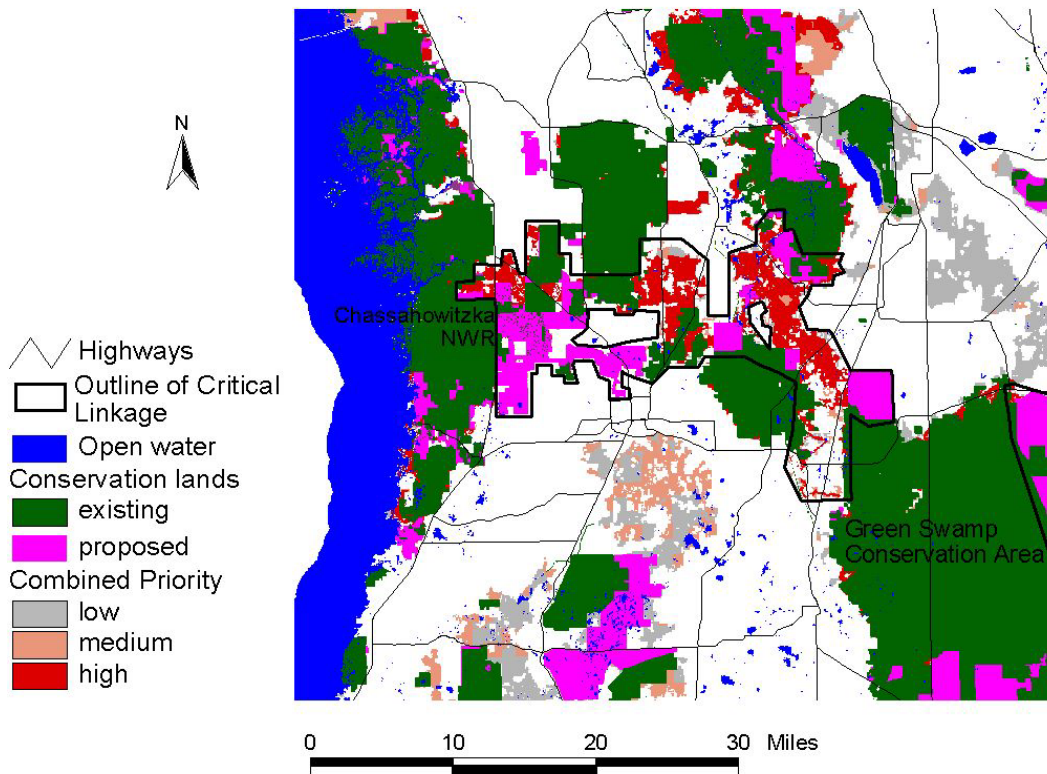
Figure 14. The Ocala National Forest-Volusia Critical Linkage.



Chassahowitzka-Annutteliga Hammock-Green Swamp

This Critical Linkage connects the Chassahowitzka National Wildlife Refuge and lands adjacent to the Green Swamp Conservation Area via the Annutteliga Hammock Florida Forever project, Withlacoochee State Forest, and the Withlacoochee River (Fig. 15). The linkage is approximately 108,000 acres with 27 percent in existing conservation lands, 30 percent in proposed conservation lands, 1 percent in open water, and a total of approximately 77,000 acres of private land. The Annutteliga Hammock Florida Forever project is an essential part of this Critical Linkage and it needs to be a high priority for protection due to intense development pressure. Protection of currently unprotected lands around US 41 within this Critical Linkage is also a high priority. Most of these private lands are already in small ownerships that may require protection through easements or other conservation agreements that are compatible with the maintenance of a wildlife corridor between Annutteliga Hammock and the Withlacoochee River. The Chassahowitzka conservation lands complex is home to the smallest Florida black bear population in the state, and the maintenance of a functional connection to the Green Swamp Conservation Area may provide greatly enhanced security for this population (especially if female bears are reintroduced to the Green Swamp). This Critical Linkage was originally part of a Priority Class 2 Ecological Greenway, and the entire linkage is threatened by high to moderate growth pressure. The inclusion of wildlife underpasses across US 19 and US 41 needs to be considered in the near future. In addition, expansion of the existing underpass on the Suncoast Parkway needs to be studied, and the further impact of the proposed Phase 2 of the Suncoast Parkway on the integrity of this Critical Linkage must be carefully examined.

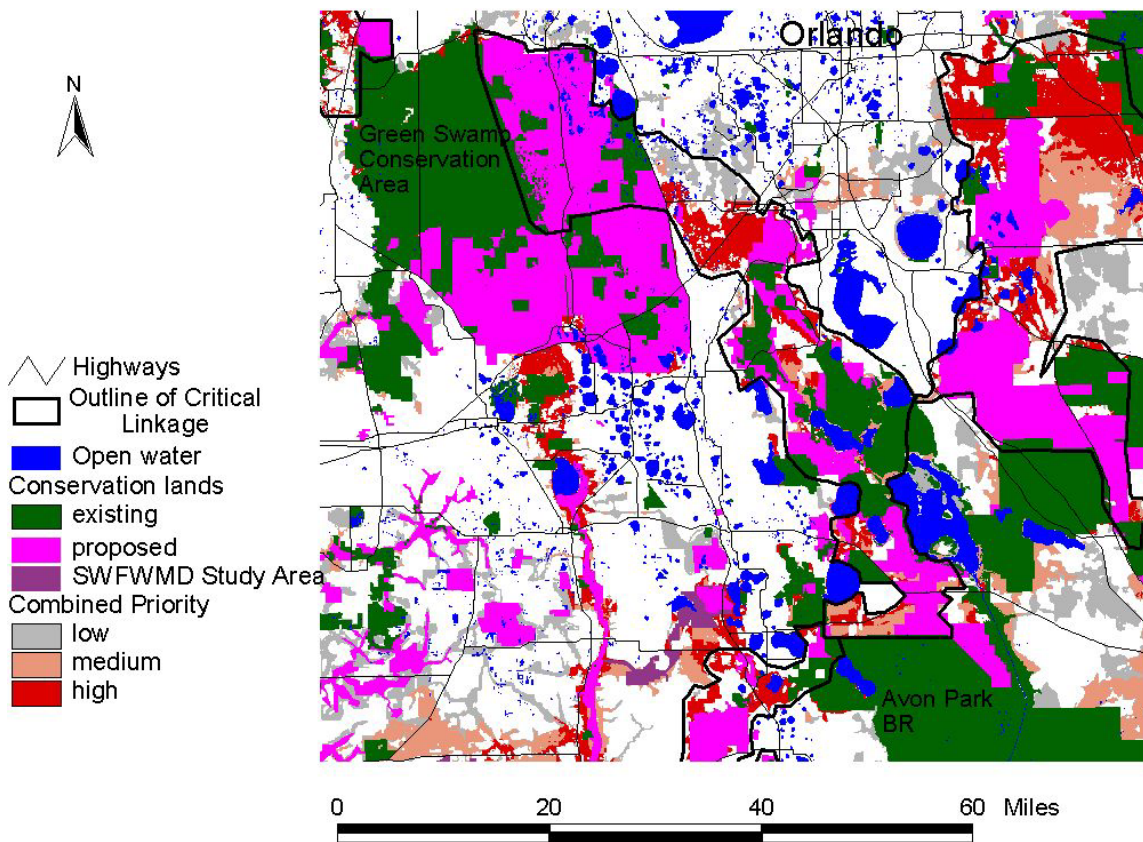
Figure 15. The Chassahowitzka-Annutteliga Hammock-Green Swamp Critical Linkage



Avon Park-Green Swamp

This Critical Linkage connects the Avon Park Bombing Range to the Green Swamp Conservation Area through the upper Kissimmee River basin and across the Lake Wales Ridge (Fig.16). The linkage is approximately 335,000 acres with 16 percent in existing conservation lands, 36 percent in proposed conservation lands, 3 percent in open water, and a total of approximately 271,000 acres of private land. The linkage represents one of only two potentially feasible opportunities to functionally link southwest Florida with west-central Florida and the Big Bend. The Critical Linkage was originally part of a Priority Class 2 Ecological Greenway, and it is imminently threatened by rapid development along the Interstate 4 and US 27 corridors as well as development in the Kissimmee area. The Green Swamp, Bombing Range Ridge, and Catfish Creek Florida Forever projects are all essential components of the linkage and need to be high priorities. Priority should also be given to determining whether is a feasible linkage opportunities between Interstate 4 and the Green Swamp across the Lake Wales Ridge. Existing and planned development may already preclude the possibility of protecting this Critical Linkage across the ridge. If successful, future consideration will also need to be given to maintaining adequate crossings under Interstate 4, US 27, US 192, and possibly the Western Beltway. Habitat within this linkage might also help support panther re-establishment in south-central Florida in the future.

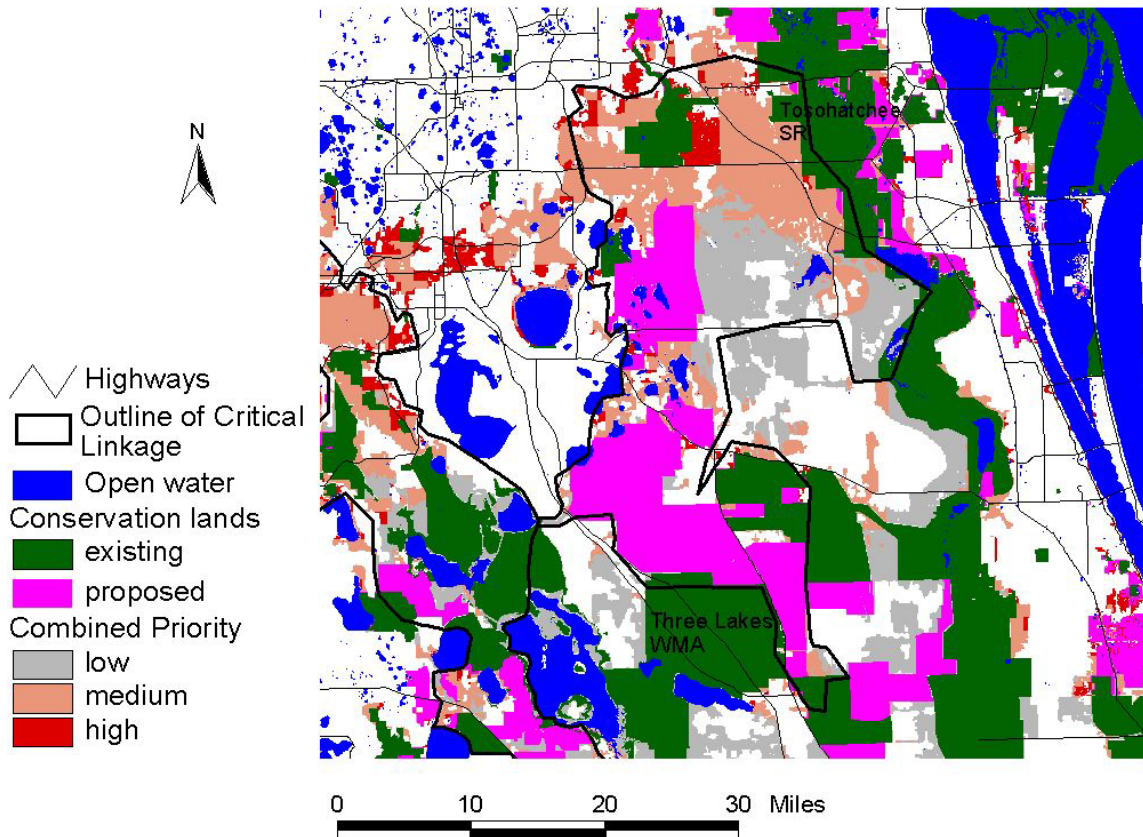
Figure 16. The Avon Park-Green Swamp Critical Linkage



Three Lakes-Tosohatchee

This Critical Linkage connects Three Lakes Wildlife Management Area to Tosohatchee State Reserve (Fig. 17). The linkage is approximately 325,000 acres with 23 percent in existing conservation lands, 48 percent in proposed conservation lands, 4 percent in open water, and a total of approximately 238,000 acres of private land. Although this linkage was originally part of a Priority Class 3 Ecological Greenway, it probably represents the best ecological connection between the Kissimmee River and St. Johns River basins due to its inclusion of broad forested uplands and wetlands compared with following the marshes of the St. Johns River corridor. The connections between the Kissimmee River and St. Johns River basins are also the most significant opportunity to functionally link conservation lands in south Florida to the rest of the state. The Upper Econ Mosaic and Big Bend Swamp/Holopaw Ranch Florida Forever projects are essential for completion of this linkage, and the Osceola Pine Savannas and Ranch Reserve Florida Forever projects are important as well. This Critical linkage is imminently threatened by development pressure from the Orlando metropolitan area. The construction of functional wildlife underpasses across SR 520 and SR 528 also needs to be considered. Habitat within this linkage might also help support panther re-establishment in south-central Florida in the future.

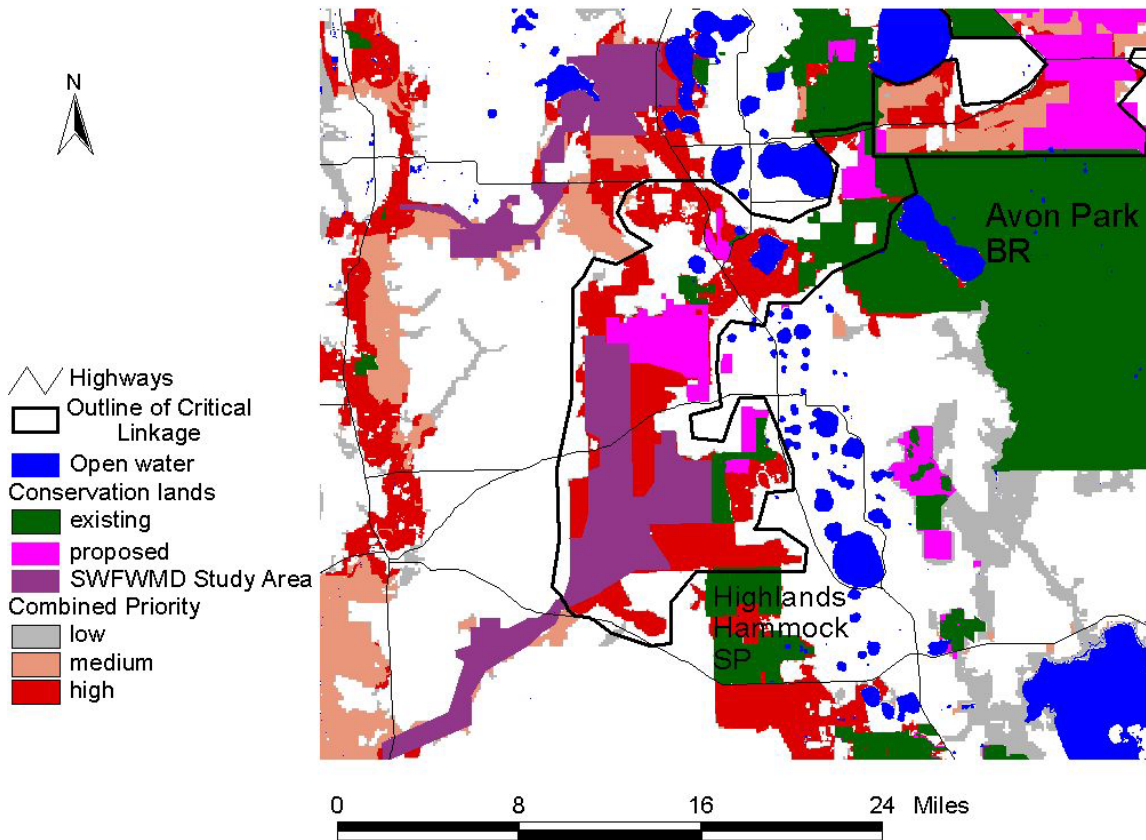
Figure 17. The Three Lakes-Tosohatchee Critical Linkage



Highlands Hammock-Avon Park

This Critical Linkage connects Highlands Hammock State Park to the Avon Park Bombing Range (Fig. 18). The linkage is approximately 77,000 acres with 13 percent in existing conservation lands, 59 percent in proposed conservation lands, 4 percent in open water, and a total of approximately 65,000 acres of private land. The linkage represents the portion of a Priority Class 1 Ecological Greenway from Fisheating Creek to Avon Park Bombing Range that is most threatened by development. The US 27 corridor crosses the linkage and is developing rapidly to the north and south of the crossing area. The Oldtown Creek Watershed Florida Forever project is an essential part of this critical linkage, and its protection would be greatly enhanced if the boundaries of Oldtown Creek Watershed was expanded to encompass more of the Charlie Creek basin to connect to Highlands Hammock State Park and across US 27 to connect to the Lake Wales Ridge State Forest adjacent to Avon Park Bombing Range. If the area crossing US 27 is effectively protected, a wildlife underpass will need to be considered. Habitat within this linkage could help support panther re-establishment in south-central Florida in the future.

Figure 18. The Highlands Hammock-Avon Park Critical Linkage



Big Cypress-Fisheating Creek

This Critical Linkage connects Big Cypress National Preserve (and Everglades National Park) to the Fisheating Creek conservation lands complex, Bright Hour Watershed conservation area, and Cecil Webb Wildlife Management Area. The linkage is approximately 775,000 acres with 14 percent in existing conservation lands, 27 percent in proposed conservation lands, and a total of approximately 660,000 acres of private land. This linkage was originally a Priority Class 1 Ecological Greenway and therefore one of the three most important ecological linkages in the state. It incorporates most of the Florida Fish and Wildlife Conservation Commission's Strategic Habitat Conservation Area for the Florida panther and is essential for protecting a viable panther population. The Critical Linkage also incorporates lands that have been used by several panthers to disperse across the Caloosahatchee River and is essential to maintaining the opportunity for re-establishment of a breeding population north of the river. This linkage will also support the maintenance of a viable population of Florida black bear in the region. The Panther Glades, Twelve Mile Slough, Caloosahatchee Ecoscape, and Fisheating Creek Ecosystem Florida Forever projects are all essential to complete this linkage and they should all be high conservation priorities. The southwestern portion of the linkage and the areas adjacent to the Caloosahatchee River are threatened by high to moderate growth pressure. In addition, much of the linkage is threatened by conversion to intensive agriculture. Wildlife underpasses across US 27, State Road 29, State Road 78, and State Road 80 may need consideration especially if any of these segments through the Critical Linkage are proposed for widening.

Figure 19. The Big Cypress-Fisheating Creek Critical Linkage

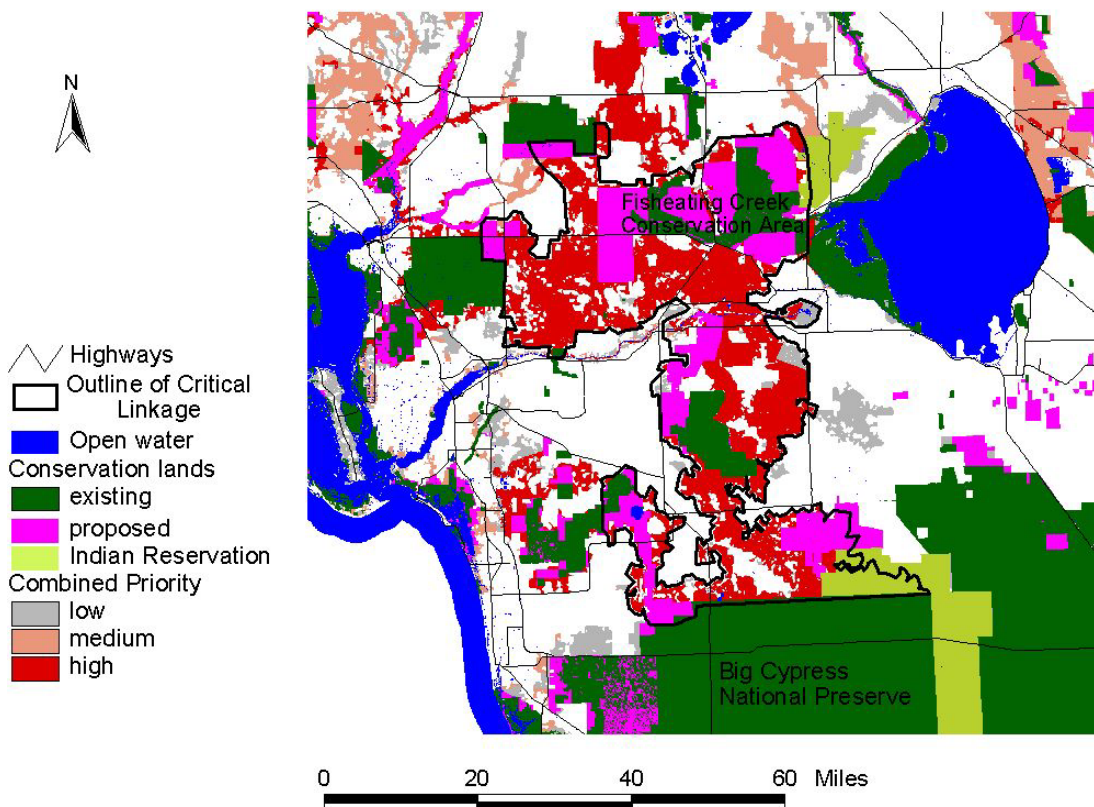


Table 2. Critical Linkages in Growth Pressure Categories

Critical Linkage	Growth Pressure	Acres
Eglin-Blackwater River	None*	14081
	Low	11674
	Moderate	24852
	High	2253
Eglin-Econfina Creek	None	76666
	Low	147060
	Moderate	102196
	High	3320
Camp Blanding-Osceola National Forest	None	31239
	Low	153821
	Moderate	43322
	High	1061
Ocala National Forest-Camp Blanding	None	27494
	Low	96342
	Moderate	26219
	High	446
Ocala National Forest-Volusia	None	67970
	Low	55866
	Moderate	211655
	High	25622
Chassahowitzka-Annutteliga Hammock-Green Swamp	None	34030
	Low	259
	Moderate	54411
	High	19337
Avon Park-Green Swamp	None	63722
	Low	94376
	Moderate	161332
	High	15688
Three Lakes-Tosohatchee	None	88333
	Low	90589
	Moderate	123328
	High	22624
Highlands Hammock-Avon Park	None	12925
	Low	48586
	Moderate	11062
	High	4085
Big Cypress-Fisheating Creek	None	116328
	Low	629081
	Moderate	27821
	High	1309

*None signifies areas within Critical Linkages that have no growth pressure because they are either within existing conservation lands or open water bodies.

Discussion and Conclusions

Critical Linkages for the Florida Ecological Greenways Network are the most important areas for protecting ecological connectivity statewide. If these key areas are not protected, we will fail to achieve the goal of protecting a connected network of

conservation lands from the Everglades in South Florida to the western tip of the panhandle. Such a connected network will greatly enhance efforts to protect our state's natural heritage. Wide-ranging species such as the Florida panther and the Florida black bear need large connected landscapes to support viable populations. Large connected landscapes are also more likely to support the biodiversity as a whole and important ecosystem services (such as hydrological processes) that support both wildlife and humans.

The protection of large landscapes and landscape linkages are also core goals of the Florida Forever land protection program. Critical Linkages should be used in addition to the existing prioritization of the Florida Ecological Greenways Network to prioritize existing Florida Forever project areas, to assess candidate areas for addition to the Florida Forever program, and to develop new Florida Forever projects that will lead to their protection.

The protection of Critical Linkages will also require the coordination of various agencies (including state, regional, local, and federal), private landowners, and NGOs. One step in this direction would be to create a working group (possibly as part of the Florida Greenways and Trails Council) including all relevant agencies involved in land acquisition efforts and conservation incentives programs. This group could coordinate to develop new Florida Forever and Save Our River projects that protect Critical Linkages. The working group could also develop additional conservation strategies to work with willing landowners to protect private lands within Critical Linkages. Coordination should also include minimizing the impact of any proposed road projects within Critical Linkages and maximizing the ability of mitigation efforts to contribute to the protection of Critical Linkages.

Not all areas important for protecting ecological connectivity within the Florida Ecological Greenways Network were included within this first iteration of Critical Linkages. Specific areas that are also important include parts of Priority Class 1 Ecological Greenways north of Fisheating Creek in southwest Florida (the Fisheating Creek-Highlands Hammock candidate area) and northeast of the Ocala National Forest in central Florida (the Ocala National Forest-Flagler candidate area) (See Fig. 8). These areas are very significant and are considered to be only slightly less important than the approved Critical Linkages. The Fisheating Creek-Highlands Hammock candidate area was not selected as a Critical Linkage due primarily to lower development pressure than the Priority Class 1 Ecological Greenways surrounding it that were elevated to Critical Linkage status. The Ocala National Forest-Flagler candidate area was not selected as a Critical Linkage primarily because it is not considered as essential for connecting the Ocala National Forest to the upper St. Johns River basin as the Ocala National Forest-Volusia Critical Linkage adjacent to it. Both of these areas are very important and may likely be added as Critical Linkages in the near future. Various Priority Class 2 Ecological Greenways were delineated as candidates for Critical Linkages but were not selected including: the Big Bend Coast Gap (considered probably not feasible for protection due to land ownership fragmentation); the Suwannee River (considered to be primarily handled through existing efforts by the Suwannee River Water Management District); Crystal River-Gulf Hammock (represents small gaps in existing conservation lands network that need protection but do not necessarily warrant Critical Linkage status at this time); Withlacoochee River-Goethe State Forest (not considered to be as viable an option as the Chassahowitzka-Annutteliga Hammock-Green Swamp Critical Linkage); Ocala National Forest-Wekiva (although very significant it is not considered as important for protecting statewide connectivity); and Corbett-Upper St. Johns River (not considered

to be as important for statewide connectivity and overall lower growth pressure). However, all of these Priority Class 2 Ecological Greenways are very important for protecting ecological connectivity and good opportunities to protect lands within them should be pursued.

Finally, the Florida Ecological Greenways Network will soon be modified (likely by July 2003) to reflect changes in land use that have occurred since 1995 and to incorporate new and updated information on areas of ecological significance. Although there may be some significant changes to the boundaries of the Florida Ecological Greenways Network through this process, it is expected that the areas supporting Critical Linkages identified in this report will not be substantially affected. Though boundaries of the existing Critical Linkages could change to some extent, the current boundaries are meant only to serve as general project area boundaries that should be modified as more specific information on land ownership patterns, land uses, and natural resources are obtained during the process of developing land conservation proposals.

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