LPEGDB Version 2 Summary Report

Supplement to the Longleaf Pine Ecosystem Geodatabase v.1 Final Report

October 2014

A cooperative project between Florida Natural Areas Inventory and the Florida Forest Service

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This report summarizes work conducted by Florida Natural Areas Inventory (FNAI) in cooperation with the Florida Forest Service (FFS) to produce Version 2 of the Longleaf Pine Ecosystem Geodatabase (LPEGDB). Version 2 addresses several next steps identified in the LPEGDB Version1 Final Report (June 2014) for filling remaining data gaps and working with longleaf partners to help guide future work on the project. The objectives for this phase of the LPEGDB were as follows: 1) Hold a meeting with longleaf partners to review the LPEGDB; 2) Evaluate statewide longleaf land cover data sources for compatibility and potential inclusion in the LPEGDB; and 3) Obtain data from partners to add or improve longleaf occurrence and condition information for a subset of managed conservation lands.

Longleaf Partners Meeting

On August 13, 2014 FNAI and FFS hosted a workshop with regional longleaf partners to review the status of the LPEGDB and make recommendations for future enhancements and improvements. The meeting was attended by 30 individuals representing state and federal agencies, private land managers/conservation organizations including The Nature Conservancy and Tall Timbers Research Station, and dedicated longleaf organizations including the Longleaf Partnership Council and Longleaf Alliance. See Appendix A for a complete list of participants.

In general there was broad support from longleaf partners for continuing the LPEGDB project. The group recommended that the LPEGDB be considered a dynamic database rather than a final product. Other key recommendations include the following:

- Coordinate criteria and definitions for reporting longleaf acres across the partnership, e.g. areas of longleaf dominance vs. longleaf presence. In addition, there were requests for various types of summaries and map products that could be easily used by individuals with limited GIS knowledge.
- Give priority consideration to ground cover in ecological condition assessments. Ecosystem components such as plant community, characteristic species, and native ground cover are important indicators of quality with the longleaf component being less so.
- Include assessment and distribution of longleaf pine planation in the database. The group recognized that planted longleaf areas represent some of the most significant gains in longleaf establishment and improvement.
- Consider several adjustments to the rapid assessment protocol including metrics for capturing overstory composition, old-growth characteristics, and occurrence of longleaf in strata other than the canopy.
- Continue working with longleaf partners to enhance the compatibility of LPEGDB with regional efforts and promote similar assessments rangewide.

See Appendix A for a detailed meeting summary. These recommendations are expected to guide future products and versions of the LPEGDB beyond version 2. Specific updates for LPEGDB v.2 are described in the following sections.

Evaluation of Statewide Longleaf Land Cover Data Sources

FNAI evaluated two forest cover/vegetation models for potential inclusion in the LPEGDB: the Comprehensive Statewide Forest Inventory Analysis Study (CSFIAS) and the Florida Fire Risk Assessment Canopy Inventory Project (FRACIP). LandFire data initially was also considered but ultimately not evaluated because FFS staff with knowledge of these resources expressed higher confidence in the FRACIP and CSFIAS.

Evaluation Methods

The basis for comparison with the LPEGDB was the LPE Occurrence Confidence Tiers which classify polygons based on the strength of evidence for occurrence of longleaf pine. The basis for comparison with the CSFIAS was the Forest Land Cover Biomass Classification. This classification was primarily derived from 2011 Landsat satellite data combined with NOAA Coastal Change Analysis Program (CCAP; 2011 Landsat derived), FRACIP (2007 Landsat-derived), and Florida Land Use and Cover Classification System (FLUCCS) data. The basis for comparison with the FRACIP was the Canopy Species Class derived from 2007 Landsat. The FRACIP classification was based primarily on fire behavior rather than purely vegetation characteristics.

The LPE Confidence Tiers were converted to 30 m raster and areas of overlap with the CSFIAS and FRACIP were calculated in ArcGIS 10.2 Spatial Analyst using Tabulate Area Zonal Statistics (Table 1). Conflicting class pairs were extracted and 10 random locations per conflict pair were generated for aerial photo inspection by FNAI scientists (Table 2). All polygons inspected were greater than 40 acres and farther than 3 km from one another. In addition to aerial photography, field verified data were also used to re-confirm LPEs if appropriate.

Finally, the overlap between CSFIAS/ FRACIP longleaf classes and classes of the Cooperative Land Cover (CLC) v2.3 were also compared. Comparison with CLC was conducted only for areas of CSFIAS/FRACIP that were at least 5 acres and within the range of longleaf, but outside of areas already included in the LPEGDB.

Evaluation Results

The primary disagreement between LPEGDB and CSFIAS/FRACIP data sources is with LPEGDB areas that were field verified as longleaf sites but classified as non-longleaf types by the CSFIAS or FRACIP (72% and 78% of total field verified longleaf, respectively; Table 1). Potential explanations include the following: 1) the CSFIAS and FRACIP classifications are designed to identify longleaf-dominated classes; the LPEGDB includes confirmed longleaf sites of varying condition, for example where longleaf is co-dominant or rarer in the canopy and/or where other indicators that would be detected by remote sensing are missing. Many of the LPE sites are classified as Loblolly/North Florida Slash or Mixed by CSFIAS, and as Non-Canopy or Other Upland Pine by FRACIP; and 2) remote-sensing techniques tend to under-estimate longleaf sites. This was acknowledged for the initial Landsat classification for the CSFIAS; additional steps were taken to improve identification of longleaf in the CSFIAS, but it is possible that longleaf sites are still under-represented. Both CSFIAS and FRACIP relied on FLUCCS to some degree which has been documented to under-represent longleaf forests (FNAI 2010).

The aerial photo review of LPEGDB/CSFIAS conflict pairs showed occasional potential overestimation of field verified longleaf areas associated with CSFIAS grasslands (Table 2). This occurred primarily where some treeless patches were included within flatwoods polygons with naturally low tree density in central Florida. This is an acceptable representation in the LPEGDB because it is intended to represent ecosystems rather than strict vegetation or land cover.

The conflict review also highlighted some errors in the assignment of sandhill in the LPEGDB (Table 2). The LPEGDB Confidence Tiers 3 (sandhill, upland pine) and 4 (flatwoods, pine plantation) were assigned according to CLC natural community type early in the development of the database. The natural communities will be refreshed in LPEGDB v.2 based on the CLC v2.3, which was also inspected during the conflict review and determined to be accurate for the areas in question.

A potentially informative disagreement among data sources is with LPEGDB areas where evidence indicates that longleaf does not occur but that CSFIAS classifies as Longleaf or FRACIP classifies as Long Needle Pine or Long Needle Pine-Oak (Table 1). Although stand data or other field verification showed that most of the areas in question were dominated by other pine species (Table 2), these areas may retain components of longleaf pine ecosystems and merit further assessment. They will be designated in the LPEGDB v.2 as Confidence Tier 3, along with sandhill and upland pine land cover.

The comparison of CSFIAS/FRACIP longleaf types with CLC v2.3 included approximately 183,500 acres that were not already included in the LPEGDB. The highest percentage of overlap (52% of total) was with the following CLC types: Mixed-Hardwood Coniferous (11%); Other Wetland Forested Mixed (7%); Wet Flatwoods (7%); Mixed Wetland Hardwoods (6%); Scrub (6%); Shrub and Brushland (6%); Rural Open (5%); and Low Structure Density (4%). Areas of overlap with Wet Flatwoods will be included as potential but unknown LPE occurrence in the LPEGDB v.2. The largest areas of Mixed-Hardwood Coniferous and Shrub and Brushland were aerial photo inspected for longleaf potential and determined to be very low. New additions to the LPEGDB based on the CSFIAS/FRACIP will be limited to areas of overlap with CLC pineland types.

Evaluation Conclusions

The overall purpose and design of the LPEGDB is fundamentally different from that of the CSFIAS which has a timber inventory focus, and the FRACIP which has a fire behavior focus. For this reason these sources cannot be integrated directly into the LPEGDB. The conflict review clearly indicated that non-longleaf classes of these sources could not be used to accurately identify absence of LPEs. The CSFIAS and FRACIP longleaf classes, however, were integrated in LPEGDB v.2 in a limited way. Approximately 120,000 acres identified as longleaf by the CSFIAS or long needle pine and long needle pine-oak by the FRACIP and previously designated as 'Unknown' or 'Not LPE' were designated as 'Assumed LPEs' (Confidence Tier 3) in LPEGDB v.2. An additional 1,700 acres were added to the LPEGDB v2 and assigned as Confidence Tier 3 based on overlap of CSFIAS/FRACIP longleaf with CLC pine types described above. Errors in sandhill identification were also corrected by updating the LPEGDB with natural community assignment based on CLC v. 2.3.

Table 1. Acreage of overlapping categories of Longleaf Pine Ecosystem (LPE) Occurrence versus the (a) Comprehensive Statewide Forest Inventory Analysis Study (CSFIAS) and (b) Florida Fire Risk Assessment Canopy Inventory Project (FRACIP). Agreement between the LPEGDB and other sources is highlighted in green; conflicts with significant acreage are highlighted in red.

(a)	LPEGDB LPE Occurrence Confidence Categories					
CSFIAS Land Cover	Evidence not LPE	Field verified LPE	Other evidence of LPE	Sandhill or Upland Pine from CLC	Flatwoods or Plantation from CLC	Total
Urban	54,917	**122,427**	11,460	16,158	161,094	366,056
Row Crops	2,450	7,969	1,467	3,530	12,991	28,408
Pasture/Grassland	79,981	**148,446**	32,161	8,964	139,578	409,130
Water	2,885	3,514	545	461	8,306	15,712
Cypress	11,129	6,715	1,556	1,112	11,729	32,240
Mangroves	822	289	255	24	1,823	3,213
Other Forested Wetlands	209,193	**105,837**	26,567	11,495	229,817	582,908
Non-Forested Wetlands	60,928	31,796	11,621	4,117	124,982	233,445
Young Pine	70,553	62,959	33,667	11,499	643,007	821,685
Sand Pine	203,771	43,859	28,457	6,626	128,740	411,453
Loblolly/North Florida Slash Pine	620,596	**417,363**	**116,086**	**49,978**	3,120,885	4,324,908
Longleaf	**94,734**	**381,931**	**75,674**	**24,365**	68,131	644,834
Longleaf Pine/South Florida Slash Pine	**89,065**	**105,896**	**19,172**	**1,221**	151,989	367,344
Hardwood	27,265	82,470	8,497	10,230	29,683	158,146
Mixed	55,822	**232,136**	**52,437**	19,658	54,603	414,655
Forest Seed Production	749	523	317	-	2	1,591
Fruit Production Orchards	495	468	104	91	1,896	3,053
Other	849	1,592	243	232	6,920	9,836
Total	1,586,205	1,756,190	420,285	169,762	4,896,173	8,828,615

Table 1. continued

(b)						
FRACIP Canopy Species						
Non Flammable	92,114	**126,988**	24,215	17,404	257,533	518,255
Non Canopy	227,620	**396,387**	**96,117**	33,925	801,770	1,555,820
Water	1,697	1,395	177	152	3,118	6,539
Cabbage Palm	733	495	63	21	882	2,195
Eucalyptus	1,369	-	-	-	2	1,370
Long Needle Pine	**131,474**	**278,316**	**62,676**	12,358	139,571	624,396
Sand Pine	215,034	**72,356**	**40,145**	10,873	172,847	511,255
Other Upland Pine	515,402	**550,517**	**124,734**	**66,938**	2,790,212	4,047,803
Palm Mix	2,981	1,492	262	5	11,066	15,805
Titi Mix	1,339	616	49	3	561	2,568
Long Needle Pine - Oak	**18,651**	**116,251**	**24,749**	10,727	19,665	190,044
Sand Pine - Oak	12,893	8,437	2,167	730	8,254	32,481
Other Pine - Oak	7,904	42,562	10,095	2,912	29,931	93,404
Melaleuca	1,694	54	3	0	551	2,303
Wet Flatwoods	285,599	**132,898**	26,414	9,504	554,363	1,008,779
Melaleuca-Pine	934	44	2	-	322	1,301
Other Lowland Forest	4,739	2,427	1,050	279	4,847	13,343
Melaleuca Mixed	792	-	-	-	6	799
Mixed Wet Flatwoods	60,272	23,796	6,979	3,739	97,438	192,224
Lowland Mixed Forest	3,090	1,211	371	263	4,326	9,262
Total	1,586,332	1,756,244	420,268	169,835	4,897,266	8,829,945

Table 2. Conflict pairs identified for review by acreage overlap analysis, and results based on aerial photo inspection and existing field data for 10 random locations per conflict pair.

LPEGDB and CSFIAS/FRACIP Conflict Pairs		
LPE Confidence Class	**CSFIAS Land Cover**	**Percentage in which LPE Class was determined accurate**
Evidence Not LPE	Longleaf Pine/ S. FL Slash Pine	100
Evidence Not LPE	Longleaf	70
Field verified LPE	Loblolly/N. FL Slash Pine	80
Field verified LPE	Mixed	100
Field verified LPE	Other Forested Wetlands	100
Field verified LPE	Pasture/Grassland	80
Field verified LPE	Urban	100
Other Evidence LPE	Loblolly/N. FL Slash Pine	80
Other Evidence LPE	Mixed	80
Sandhill, Upland Pine CLC	Loblolly/N. FL Slash Pine	0
	FRACIP Canopy Species	
Evidence Not LPE	Long Needle Pine	80
Evidence Not LPE	Long Needle Pine - Oak	90
Field verified LPE	Non Canopy	100
Field verified LPE	Non Flammable	100
Field verified LPE	Other Upland Pine	100
Field verified LPE	Sand Pine	90
Field verified LPE	Wet Flatwoods	70
Other Evidence LPE	Non Canopy	70
Other Evidence LPE	Other Upland Pine	90
Other Evidence LPE	Sand Pine	70
Sandhill, Upland Pine CLC	Other Upland Pine	20

Data Sources Added to LPEGDB v.2

The LPEGDB Version1 Final Report (June 2014) identified several known remaining data gaps on managed conservation lands, especially gaps in ecological condition of longleaf pine ecosystems. These gaps included lands managed by Northwest Florida Water Management District (NWFWMD) that were not well-represented in LPEGDB v.1, and lands managed by Eglin Air Force Base, U. S. Forest Service, and Florida Forest Service for which more up-to-date longleaf distribution and condition information is now available. Additional existing data sources for longleaf pine were also identified at the August 2014 longleaf partners meeting (Appendix A).

Table 3 lists the agencies contacted by FNAI and the status of longleaf data sources in LPEGDB v.2. All of the groups participating in the Apalachicola Regional Stewardship Alliance (ARSA) are included in the list. Data sources are described in more detail under Methods and Sources below.

Table 3. Status of potential longleaf pine data sources solicited for inclusion in LPEGDB v.2

Source	**Dataset**	**Included in LPEGDB v.2**	**Longleaf Occurrence Status***		
			LPE Yes	**LPE Unknown**	**Evidence not LPE**
Florida Forest Service	State Forest Stands Database 2014	Yes	356,516	12,334	689,858
U. S. Forest Service	Ecological Condition Model for 3 National Forests	Yes	231,086	20,915	521,686
Eglin AFB	Forest Stands and Inventory Plot Data	Yes	324,424	32,787	107,567
St. Johns River WMD	Forest Stands, Inventory Plot Data and Fire Management Unit data	Yes	26,598	28,887	66,927
Florida Park Service	Natural Community Data	Yes		7,483 (likely)	
FWC – Wildlife and Habitat Management Section	Longleaf Plantings on Wildlife Management Areas	Yes - partial	670		
FWC – Landowner Assistance Program (LAP)	Non-NRCS Longleaf Plantings on LAP Management Units; Non-NRCS Sandhill Management Units	Yes	3,272		
The Nature Conservancy NWF Program	Longleaf Areas on Apalachicola Bluffs and Ravines Preserve and Rock Hill Preserve	Yes	33 (new areas only)		
St. Marks National Wildlife Refuge	No additional data available	No - not available			
Northwest Florida WMD	Land Management and Timber Inventory Database	No - not yet available: most areas expected spring 2015			

*Acreages do not necessarily represent new information about the occurrence of LPEs in LPEGDB v.2. Some data sources represent updates of existing information, especially updates of ecological condition information (see Results).

Methods and Sources

All datasets were processed in GIS to conform to LPEGDB standards for coordinate system, topology, and minimum mapping unit. In LPEGDB v.2 the criterion for assigning confidence tier '1A', i.e. LPEs with ecological condition data, was adjusted. Previously a site was credited with condition data if at least 2 of 13 condition attributes were complete (see Table 4 of LPEGDB Final Report June 2014 for a list of attributes). In the LPEGDB

v.2 the threshold was raised so at least 3 condition attributes must be complete in order to qualify as '1A'. The rationale is that much of the data on conservation lands (and especially the data updates for LPEGDB v.2) is stand-based and the two commonly available attributes - longleaf dominance in the canopy and basal area – are insufficient by themselves to represent ecological condition. All datasets were crosswalked into the LPE_Occurrence and Condition_by_Management_Class feature classes. All updated sources are identified in the Data Source field of LPE_Occurrence with a "v2" prefix.

Florida Forest Service

FFS provided updated GIS data layers associated with their Forestry Data Model.

Extent: All Florida State Forests

Polygon Source Boundaries: Forest Stands

Attribute Sources: Forest Stands polygons, Prescribed Burns polygons, Stand statistics table

Attributes Represented in LPEGDB v.2:

FFS Attribute	Crosswalk to LPEGDB v.2 Attributes	
Forest Type	LPE Occurrence	LLP Canopy Dominance
Age Structure	LLP Age	
Longleaf Basal Area	LLP BA	
Burn Year	Fire Evidence	

Summary: FFS Forest Type was used to make assumptions about the dominance of longleaf pine in the canopy that may not hold true in all cases. If Forest Type was exclusively Longleaf, or if Longleaf was listed first followed by Scrub Oak, Turkey Oak, or Southern Red Oak, then Longleaf was assumed dominant. For any other Forest Type combinations that included Longleaf (e.g. Longleaf/Slash Pine or Slash Pine/Longleaf), Longleaf was assumed co-dominant. Age Structure was crosswalked into LLP Age only for stands where longleaf was assumed dominant in the canopy. Burn Year was available only for a subset of forests.

U. S. Forest Service

USFS provided GIS data layers associated with Stands and Ecological Condition Models (ECM).

Extent: All National Forests in Florida

Polygon Source Boundaries: Forest Stands

Attribute Sources: Forest Stands polygons, ECM polygons, ECM plot data*

Attributes Represented in LPEGDB v.2:

USFS Attribute	Crosswalk to LPEGDB v.2 Attributes	
Forest Type	LPE Occurrence	LLP Canopy Dominance
ECM Tier	Condition Rank	

Summary: As with FFS data, Forest Type was used to make assumptions about the dominance of longleaf pine in the canopy that may not hold true in all cases. The Ecological Condition Model uses data about canopy, midstory, shrub and ground layers to assign overall quality tiers of excellent, good, fair, poor, and very poor relative to desired future condition. Because the tiers are modeled based on a summary of multiple condition attributes all

longleaf stands with ECM tiers are represented as having ecological condition data (Confidence Tier '1A') in the LPEGDB v.2.

*ECM plot data were collected by FNAI and included in the FNAI ecological condition data which were included in LPEGDB v.1 and re-associated with updated polygons in LPEGDB v.2. The ECM plot data inform most condition attributes, but only for a subset of stands.

Eglin Air Force Base

Eglin Air Force Base (AFB) provided GIS and tabular data layers associated with Stands, Timber Inventory Plots, and Trees.

Extent: Eglin AFB

Polygon Source Boundaries: Stands

Attribute Sources: Stands polygons, RCW Stands polygons, RCW Plots summary table, Tree table (linked to plots)

Attributes Represented in LPEGDB v.2:

Eglin AFB Attribute	Crosswalk to LPEGDB v.2 Attributes	
Forest Type (PType)	LPE Occurrence	LLP Canopy Dominance
Broad Type (BTYpe)	LPE Occurrence (with PType)	
Longleaf BA (LLBA)	LLP BA	
Longleaf Pine Trees Per Acre (LLPTPA)	LLP Canopy Dominance	
Cover Midstory (CvrMS)	Midstory Cover	
Herbaceous_GRDCV	Herbaceous Cover	
Tree - Species Name	LPE Occurrence	

Summary: PType was used to make assumptions about the dominance of longleaf pine in the canopy that may not hold true in all cases. For example, there were cases where PTYPE was 'Longleaf' but longleaf may have been recently planted and in the seedling or sapling stage. Additional information such as percentage of Longleaf TPA versus other pine TPA was used to refine the crosswalk where possible. Much of the data derives from timber inventory plot data which is not yet complete for the entire AFB. Herbaceous ground cover was available for RCW stands inventoried in 2009-2010 only.

St. Johns River Water Management District

SJRWMD provided GIS and tabular data layers associated with Forest Stands, Timber Inventory Plots, and Fire Management Units (FMU).

Extent: Most lands owned and managed by SJRWMD

Polygon Source Boundaries: Stands and FMUs

Attribute Sources: Stands polygons, FMU polygons, Reforestation table (linked to stands), Tree table (linked to plots)

Attributes Represented in LPEGDB v.2:

SJRWMD Attribute	Crosswalk to LPEGDB v.2 Attributes	
Primary Stand Species	LPE Occurrence	LLP Canopy Dominance
Secondary Stand Species	LPE Occurrence (with Primary)	LLP Canopy Dominance

Density (BA Range)	LLP BA	
Size	LLP Canopy Dominance	
Broad Type (BType)		
Tree - Species Name	LPE Occurrence	
Reforestation - Species	LPE Occurrence	
FMU – Land Type	Confidence Tier	
FMU – Last Burn Date	Fire Evidence	
FMU - Land Type Comment	LPE Occurrence	
FMU – Condition Class	Condition Rank	

Summary: Primary and Secondary Species fields in conjunction with Size, which is a DBH range for the stand, were used to make assumptions about the dominance of longleaf pine in the canopy. The overall extent of stand polygons and FMU polygons overlapped to a large degree but the polygon features within each were different. These were combined in GIS with a union function that splits polygons into non-overlapping features so that attributes from both Stands and FMUs could be integrated into the LPEGDB. The FMU Land Type described the broad natural community type; the sandhill Land Type was used to assign LPE potential (Confidence Tier 3) to areas with no other LPE evidence.

Florida Park Service

FPS provided a GIS data layer of updated Natural Communities polygons.

Extent: Florida State Parks

Polygon Source Boundaries: Natural communities as delineated by FPS staff.

Attributes Represented in LPEGDB v.2: Existing Condition Type (EC_Type) is based on the FNAI natural community classification and was used to add several new polygons for potential LPE EC_Types.

Summary: Most of the FPS areas were already represented in LPEGDB v.1. New polygons were included for some parks with recent natural community map updates. This dataset does not currently include any longleaf occurrence or condition information but future versions may include a category for natural community health.

Florida Fish and Wildlife Conservation Commission – Land-owner Assistance Program (FWC-LAP)

FWC provided a GIS data layer of LAP areas planted in longleaf pine that were not funded by NRCS.

Summary: All longleaf plantings not already included in LPEGDB v.1 were added as confirmed longleaf occurrences. No other condition information was available.

Florida Fish and Wildlife Conservation Commission – Wildlife Management Areas (FWC-WMA)

FWC provided a list of longleaf planting on WMAs and a GIS data layer that represented a subset of those areas. All longleaf plantings not already included in LPEGDB v.1 that were provided in GIS were added as confirmed longleaf occurrences. No other condition information was available. FNAI plans to work with FWC to delineate all WMA longleaf planting in GIS for future versions of the LPEGDB.

The Nature Conservancy- Northwest Florida Program

FNAI consulted with TNC staff by phone about longleaf areas on Apalachicola Bluffs and Ravines Preserve and Rock Hill Preserve. Several areas were updated based on this personal communication.

Other

FNAI contacted St. Marks NWR (SMNWR) and NWFWMD about potential data. No additional data are available for SMNWR at this time. NWFWMD has partially completed their Land Management and Timber Inventory Database but data are not yet available; Econfina Creek Water Management Areas is currently under review and most areas are expected to be complete by spring 2015.

Results

The total acreage of confirmed longleaf in version 2 of the LPEGDB is 2,199,612, an increase of 22,802 acres from version 1 (Table 4; Fig. 1). This relatively small change was expected because the distribution of longleaf stands on state and national forests, Eglin AFB and within SJRWMD had largely been incorporated in version1. Incorporation of new data for these areas, however, resulted in a substantial increase in the subset of LPE sites with ecological condition information. The total acreage with condition data is now 1,674,209, an increase of 538,163 acres from version 1, largely on managed conservation lands. The acreage with condition data on private lands actually decreased slightly from version 1 because a stricter rule requiring at least 3 condition attributes (versus 2 attributes in version 1) was applied for sites to qualify as having ecological condition data. The acreage of sites in Confidence Tier 3, primarily sites identified as sandhill or upland pine, increased by 126,319 acres as a result of new datasets and land cover updates. The retention of all stand polygons from the new datasets in the LPEGDB v.2 also resulted in a significant increase of 472,700 acres that are not currently LPEs.

Table 4. Status of LPE occurrence on managed conservation lands and private lands as determined by Rapid Assessment and other data sources in the LPEGDB. The sum of yellow-highlighted values in the Total Acres column equals the rounded 2.2 million acres of LPEs confirmed by this project.

LPE Occurrence	Managed Conservation Lands	Permanent Conservation Easements	Other Private Lands	Total Acres
LPE Confirmed: ecological data available	987,589	27,767	658,853	1,674,209
LPE Confirmed: ecological condition undetermined	338,892	38,111	148,400	525,403
LPE Assumed: sandhill, upland pine, upland mixed woodland	106,656	8,186	181,403	296,246
LPE Unknown: pine flatwoods, plantation, and other classes	370,786	148,949	4,323,856	4,843,591
LPE Does Not Occur	1,618,869	15,014	425,277	2,059,160
Total	3,422,792	238,027	5,737,789	9,398,608

Other Changes in LPEGDB v.2

Within the LPE_Occurrence dataset, the field “UNK_Type”, which was incomplete and a remnant of data processing from version 1, has been removed from version 2. The Draft Protection Priorities data layer has been updated to Example Protection Priorities v.2 based on the new condition information in LPEGDB v.2. This layer was developed as an example of how LPE occurrence and condition information might be applied to identify the highest quality longleaf sites for protection efforts and was not intended as a final prioritization. A recommendation from the Longleaf Partners meeting was for alternative data summaries that will be developed for future versions of the database. Another recommendation from the meeting was to track natural vs. planted longleaf. Several of the new sources included in LPEGDB v.2 include this information as a stand attribute. It currently cannot systematically be determined for the entire database but could potentially be included as an attribute in future versions.

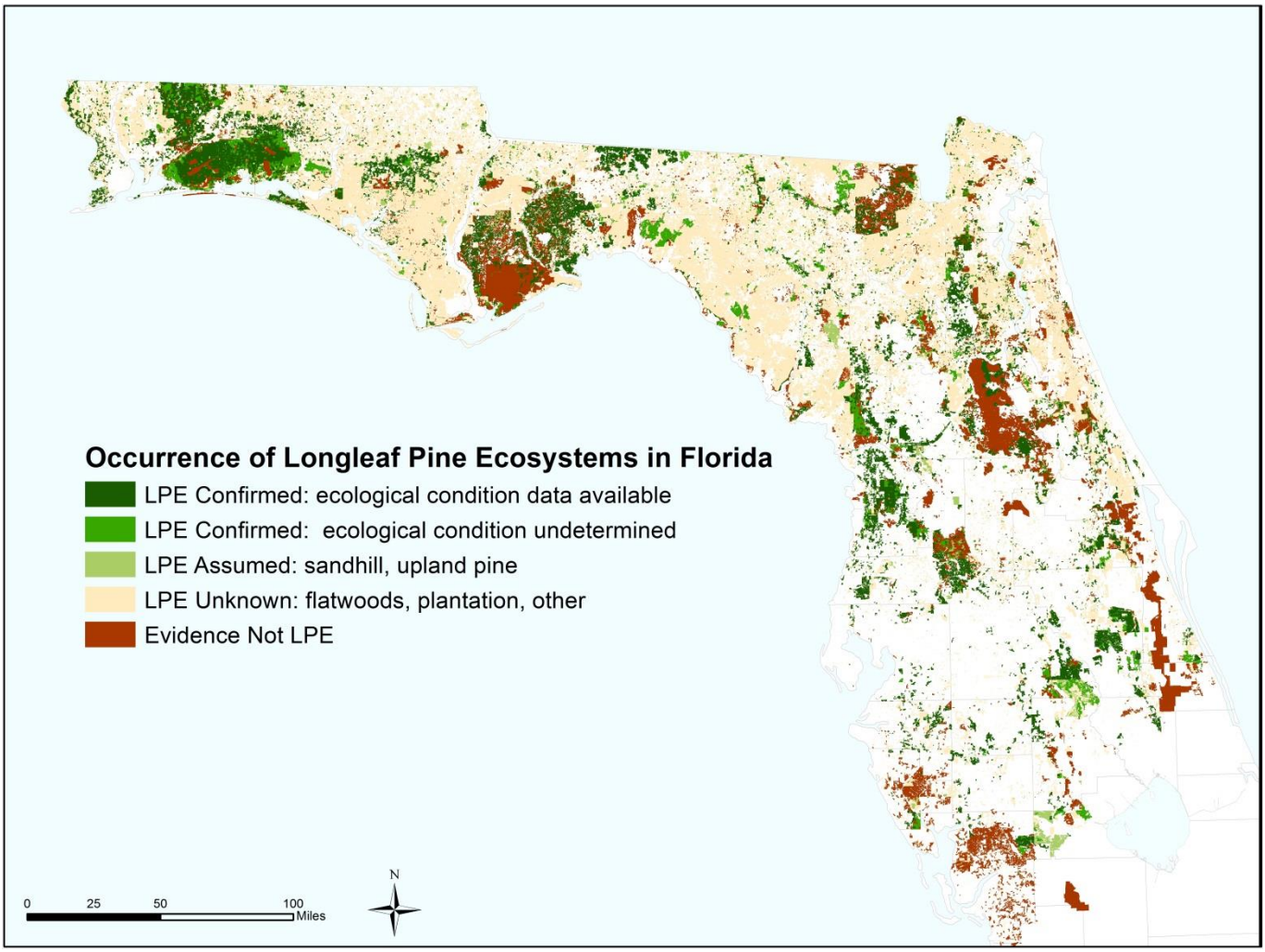

Figure 1. Occurrence status of potential longleaf pine ecosystem sites in the LPEGDB v.2.

References

Florida Natural Areas Inventory. 2010. Development of a Cooperative Land Cover Map: Final Report. Florida Natural Areas Inventory, Tallahassee, Florida.

Appendix A. Longleaf Partners Meeting

Longleaf Pine Ecosystem Geodatabase - Longleaf Partners Review Meeting August 13, 2014
Meeting Summary

Attendees: Glen Gaines (USFS), Carl Petrick (USFS), Clay Ware (USFWS), David Printiss (TNC), Troy Ettel (TNC), Cheryl Millett (TNC), Jill Fidrych (TNC), Brian Pelc (TNC), Kevin McIntyre (Jones Center), Kevin Robertson (TTRS), Chris Oman (SJRWMD), Paul Hudson (SJRWMD), Bill Cleckley (NWFWMD), Maddy Lessirard (NWFWMD), Dan Sullivan (FWC), Alan Dozier (Osceola/Okefenokee LIT), Greg Kaufmann (FPS), Amy Knight (FNAI), Dan Hipes (FNAI), Dennis Hardin, Jim Karels (FFS), Brad Ellis (FFS), Todd Knapp (FFS), Tony Grossman (FFS), Brian Camposano (FFS)
Phone/WebEx: Vernon Compton (Longleaf Alliance), Carl Nordman (NatureServe), Jon Scott (NFWF), Amy Roller (USDA-FSA), Wendy Mathews (TNC)

After opening remarks by Mr. Jim Karels, the Florida Natural Areas Inventory and Dennis Hardin co-presented an overview of the Longleaf Pine Ecosystem Geodatabase (LPEGDB).

Clay Ware discussed a new project funded through the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO-LCC) to develop and apply desired forest condition metrics within southern 'open pine' ecosystems. The project team, which includes the East Gulf Coastal Plan Joint Venture (EGCPJV), USFWS, USFS, and NatureServe, plans to combine existing metrics into a single region-wide set of metrics to address wildlife habitat and ecological integrity and to develop protocols to facilitate on-the-ground assessments. There is interest in establishing coordination between this project and the LPEGDB.

General Discussion of the LPEGDB

One of the challenges among rangewide partners is the use of language/definitions. We should explicitly define what is meant by Longleaf Pine Ecosystem (LPE) for the purposes of the LPEGDB and use caution when comparing acreages with other efforts. For example, the confirmed longleaf acreage reported for the LPEGDB includes sites where longleaf is not currently the dominant canopy tree, which may not be directly comparable to the acreage of longleaf dominant forests reported by America's Longleaf 2013 Rangewide Accomplishment Report. We should also coordinate criteria for reporting acres of longleaf across the broad partnership.

It would be helpful to report acreage by forest type, e.g. sandhill vs. flatwoods.

There is a need to identify historical LPEs for comparison with current condition.

The LPEGDB rapid assessment collected information to assess both stand-level and biodiversity components. There was general agreement that the ecosystem components such as plant community, characteristic species, native ground cover, etc. were challenging to restore and therefore important indicators of quality, with the longleaf component being less so. However, obtaining multi-age longleaf across a landscape is also a long-term process and more information is needed about the impacts of various canopies on ground cover. The usefulness of basal area for assessing quality was debated. In some systems basal area is important for fire management where needle-cast provides essential fuel.

Data Uses, Products, Priorities

Consider evaluation of threats to longleaf sites. This is something the Florida Peninsula LCC has interest in. Threats to LPEs would include loss through changing land use/development and loss of integrity through lack of burning (restoration feasibility issues). Loss of longleaf is also under greater threat in areas lacking dedicated partnerships for protection and management.

Although there are examples of successful large-scale restoration, it is a challenge for land managers just to 'keep the good stuff good'. It was suggested that any prioritization scheme should give higher weight to ground cover; it was also suggested that weight be given to multi-age stands.

Prioritization would be useful in categories for different users determined by strategies for management and conservation rather than a single view of quality. Consider how to identify 'low-hanging fruit' in terms of restoration need for maximum return on restoration funding.

For end users of the database it would be useful to have primary layers in GIS that are easy to toggle on and off, to help answer specific questions, e.g. requirements of the conservation action plans developed by the Longleaf Implementation Teams. Summaries by land managing agencies and public vs. private would also be helpful. A clear statement of best uses and limitations of the data should be provided with products to avoid mis-interpretations.

There was general agreement that the ability to track restoration is important but currently no central database exists for this. The DEP, FWC, FFS and NWFWMD all have their own fire databases but information is tracked in different formats. The ability to obtain fire data associated with permits (e.g. burn area dominant tree species, size, purpose and date of burn) would be a useful tool.

Data Gaps

There are known gaps in the current LPEGDB v.1, including ecological condition information on some conservation lands and LPE occurrence for a lot of pine plantation. USFS has developed ecosystem condition tiers for all the national forests in Florida. NWFWMD has a Land Management Database with timber inventory data that will be 98% complete by next May; some data is available now (Econfina WMA). SJRWMD has previously provided stand data but may also be able to provide additional condition information based on fire return intervals. They also are willing to collect LPEGDB assessment attributes as part of future inventories. The water management districts are also monitoring their conservation easements but it is not known if this is a feasible source of longleaf information. FWC's Land-owner Assistance Program may track longleaf activities. FNAI will follow-up with individuals from these agencies to obtain relevant datasets to include in the LPEGDB.

The Florida Park Service may be able to provide some in-house support, such as facilitating on-site assessments by others, but probably does not have capacity to take the lead in collecting LPE-specific data.

FNAI should explore whether any LPE-related information can be derived from the Land Management Uniform Accounting Council (LMUAC) reporting.

Ground-truthed data collected for the Wildfire Risk Assessment should be mined as a source for the LPEGDB.

Significant funding is being provided for establishing longleaf plantation on private lands (e.g. NRCS through Farm Bill program) and it is important to have this represented in the LPEGDB. Those funding sources may have spatial information, although privacy policies may be prohibitive. Florida Forestry Association may be able to help obtain information. Overall longleaf is trending upward- about 17,000 ac/year for last several years in Florida and the vast majority is not done through a cost share program.

For a lot of pine plantation it may be difficult to get a full condition assessment but it would at least be good to know if it is post-agricultural land, or if intensive site-prep has occurred, which would indicate lack of LPE components. Consider distinguishing 'pine plantation' from 'planted pine' which implies different management. One challenge is how to determine management intent, especially on private lands. Use caution in assumptions about planted pine. Some programs (e.g. FSA-CRP) require establishment of understory to participate.

Rapid Assessment Protocol

There is tremendous variation within the Basal Area (BA) 0 – 30 range. Consider adjusting the protocol to accommodate this; some suggested that assessors could estimate an actual BA, rather than a range.

Consider a 'tree' format where assessor first chooses the ecosystem type (e.g. sandhill or flatwoods) then is presented with a custom set of attributes for assessment that differ depending on that choice.

With the current protocol we do not know if longleaf is present in any layer other than the canopy. Suggestions to remedy this include: 1) an additional attribute that captures presence of longleaf in different strata or combinations, e.g. canopy + midstory, canopy + midstory + ground, etc; 2) a 'presence/absence' attribute for each strata, e.g. Longleaf in Midstory; 3) allow the current age class attribute to represent all strata, not just within the canopy. FNAI/FFS will evaluate these and other options for adjusting the protocol.

The Turkey Oak-Sand Post Oak attribute is specific to sandhill. Consider modifying the attributes related to hardwoods to more generally capture off-site vs. onsite.

Consider lumping the cover classes. Several people commented that the current classes were too specific to be evaluated accurately. The rationale for the current system is that it is consistent with other assessment protocols used by FNAI and it allows for flexibility in subsequent crosswalks of the data.

Consider adjusting the canopy height threshold. The 16-foot minimum height for canopy is problematic; for example, there are cases where 20-foot oaks should be considered mid-story.

Consider adding an attribute to capture old-growth characteristics. It may be sufficient to ask for presence/absence of evidence of old-growth characteristics or flat-top trees. For roadside assessments, the extent of flat-top trees may be obscured by other vegetation, e.g. hardwoods, and difficult to evaluate.

There was agreement that a field estimate of overall condition rank is too subjective and lacking in specific justification to be an adequate measure of condition by itself. Retaining it in the protocol, however, was generally supported as a way to gage values and provide a way for assessors to give their opinions.

Consider adding an attribute for forest cover type to capture overstory composition. The Society of American Foresters Forest Types Cover Classification provides a standard for this.

Clarifying the most important questions should help guide the assessment protocol. The purpose of the LPEGDB is more diagnostic than prescriptive. The purpose of the project is to frame the questions of what is needed and where, rather than a single purpose like identifying sites for acquisition or reforestation. The analogy several gave was that we have a universe of patients and we are trying to figure out which ones we can help, how we can help the most of them, etc.; in order to do that we need to know where they are and in what general condition they are in.

Some in the group suggested that plantations should be assessed separately, e.g. take fewer or different attributes, and judged differently because of different management goals. For example, evidence of intensive site prep is important. Others suggested that some differences among pine plantation would follow ecological conditions like soils just as natural sites do; and that the assessment should allow plantation to emerge relative to the full range of LPE conditions. The expectation is that most gains in enhancement and restoration of longleaf forests will occur in pine plantations.

Management Class Crosswalk

FNAI discussed challenges of merging ecological condition data from various data sources and explained that each each attribute was crosswalked into management classes of 'maintain, improve or restore' following desired condition criteria drafted by various groups; attributes have not been 'rolled-up' or combined into an overall evaluation of condition.

There was discussion of 'desired future condition' semantics, with discomfort by some in its use because it places subjective value judgments on management goals and intent. Some suggested using an objective standard such as progress toward reference condition. Use of terms 'maintain, improve or restore' imply guidance for management and may be misleading if the goal is a statewide picture of condition. Consider audience and how best to convey overall condition.

Currently the 'Codominant' value for longleaf pine canopy falls in the 'improve' management class. Some suggested that codominance of longleaf with other species represented maintenance condition in some cases, e.g. in upland mixed woodland or because of landscape heterogeneity in flatwoods. There was not consensus on this. The threshold edges are 'fuzzy' for many attributes except for fire evidence.

One suggestion of the group was that thresholds may need to be adjusted per ecosystem type (e.g. maintenance level for some attributes would differ between a flatwoods vs. sandhill). As a generic snapshot the current classes are reasonable. If attributes are combined for an overall condition rank, consider customizing combinations for different ecosystem/natural community types.

Wrap Up

What are the critical pieces that other states need in order to do this, assuming they have staffing resources for field work? FNAI suggested good land cover was a key component. FNAI is comparing the LPEGDB v.1 with other potential data sources such as the Florida Wildfire Risk Assessment and Comprehensive Statewide Forest Inventory and Assessment and can report back on consistency of remotely-sensed cover with field assessment from this project. Heritage Program data is also a good primary source. Several people mentioned the power of LiDAR data and its increasing accessibility as a potential source of future data; the same is true for other remote-

sensed data sources, e.g. satellite imagery. Some limitations with these may be in processing requirements for statewide data and ability to assess species composition.

This work fits the goals of American's Longleaf Plan and perhaps an additional piece of the plan should be to work with agencies to build capacity for this type of inventory and assessment.

There was general support for continuation of the LPEGDB. It should be considered a dynamic database, not a final product. The LPEGDB team was encouraged to present this work at relevant meetings, including the Longleaf Partnership Council meeting in October.