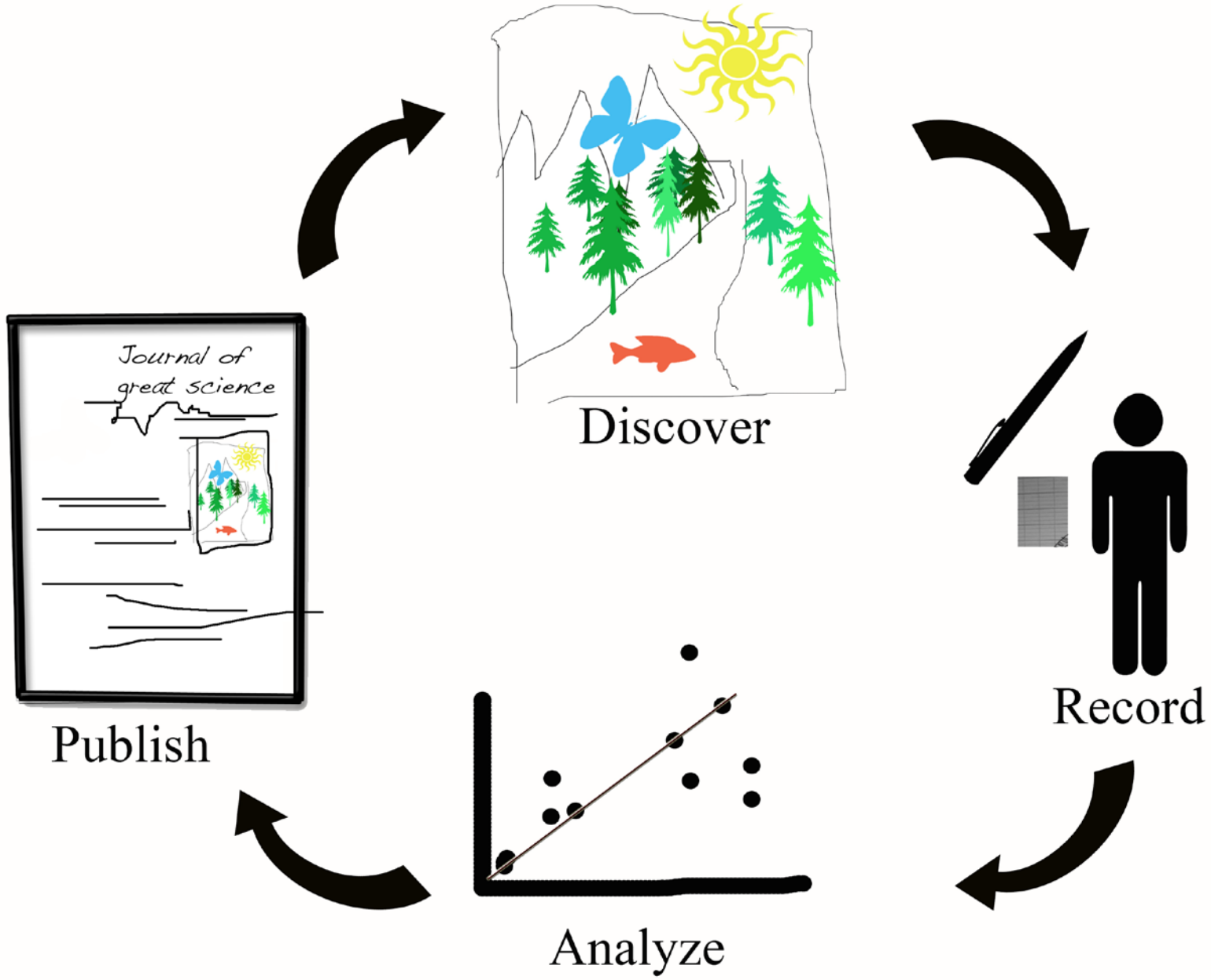
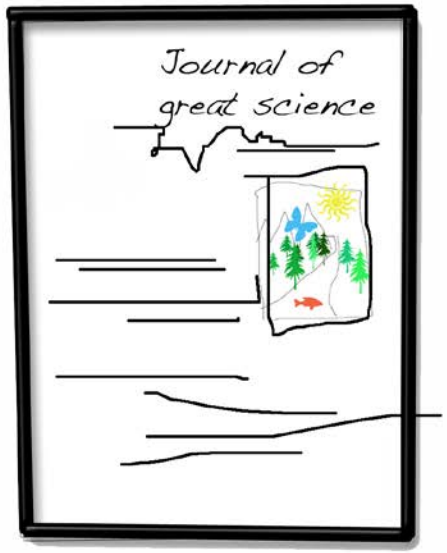
why a field to db workshop?

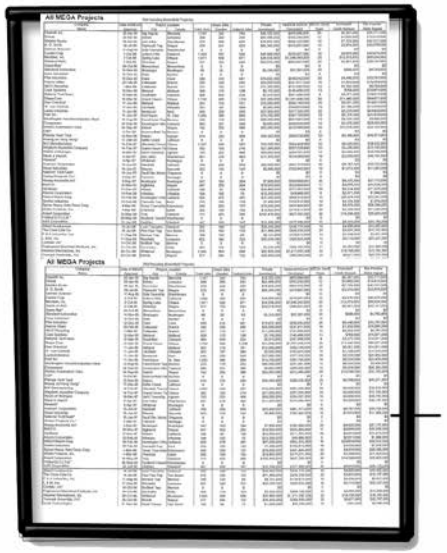
lifecycle of field biology data



publishing today



Journal Articles



Raw Data

Reproducible Research

iDigBio

Integrated Digitized Biocollections

What do we do with all of the data?

Charlotte Germain-Aubrey – cgermain@ufl.edu

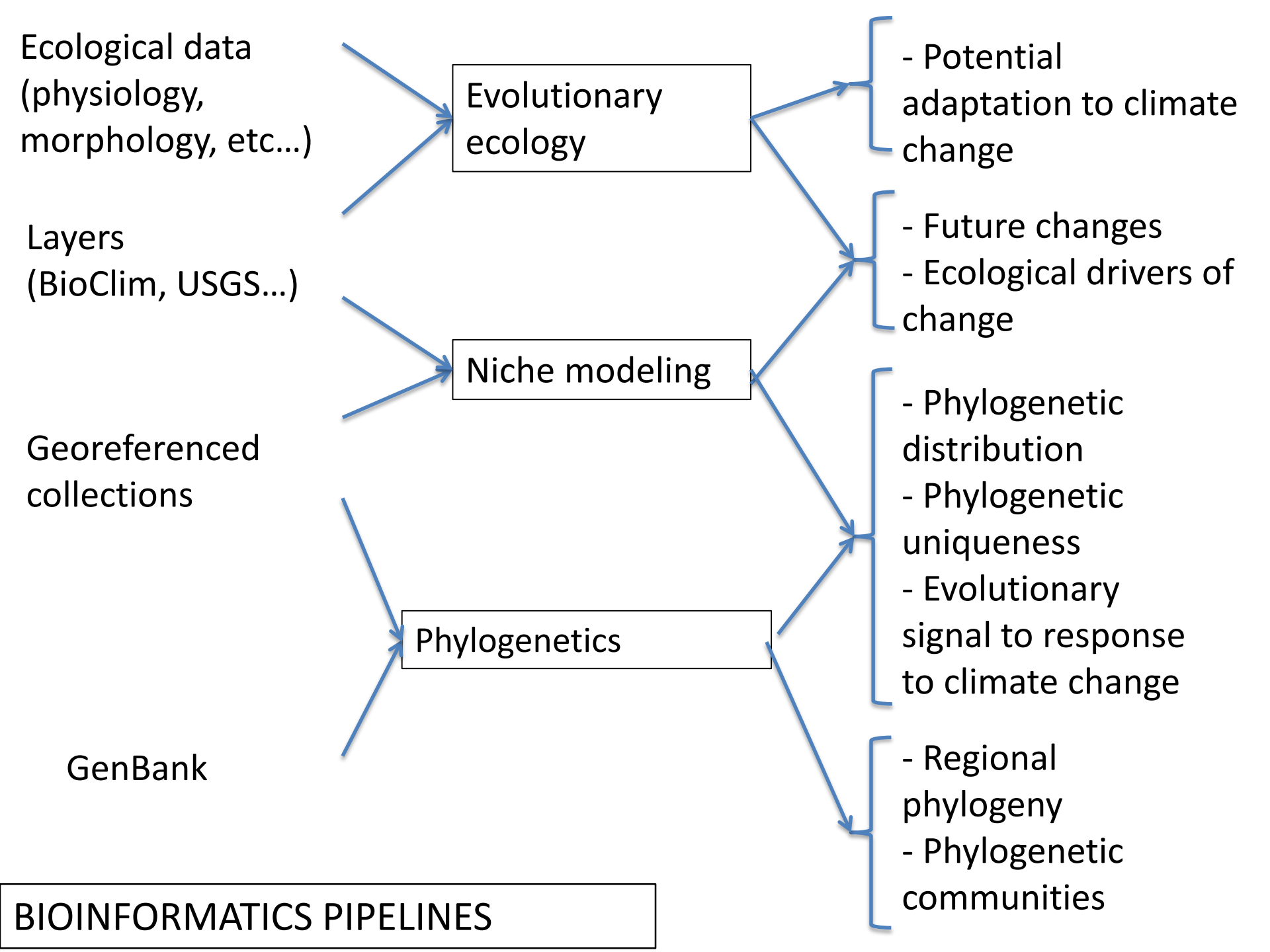
March 9, 2015

Using big data for big questions

- Distribution of biodiversity over landscape?
- Distribution of characteristics over landscape?
  - (trees, herbs, endemics, xeric-adapted, etc…)
- How will climate change impact this distribution?
- Will the impact be the same for all species/communities?
- Has it started already?

….. etc, etc…..

- Combine with other sources of big data


Ecological data (physiology, morphology, etc…)
Layers (BioClim, USGS…)
Georeferenced collections
GenBank
Evolutionary ecology
Niche modeling
Phylogenetics
- Potential adaptation to climate change
- Future changes
- Ecological drivers of change
- Phylogenetic distribution
- Phylogenetic uniqueness
- Evolutionary signal to response to climate change
- Regional phylogeny
- Phylogenetic communities
BIOINFORMATICS PIPELINES

Research applications of museum data: The past, present and future of Florida plants

Julie Allen, Charlotte Germain-Aubrey, Douglas Soltis, Robert Guralnick, Jose Miguel Ponciano, Lucas Majure, Kurt Neubig, Pamela Soltis

Florida

Road Map

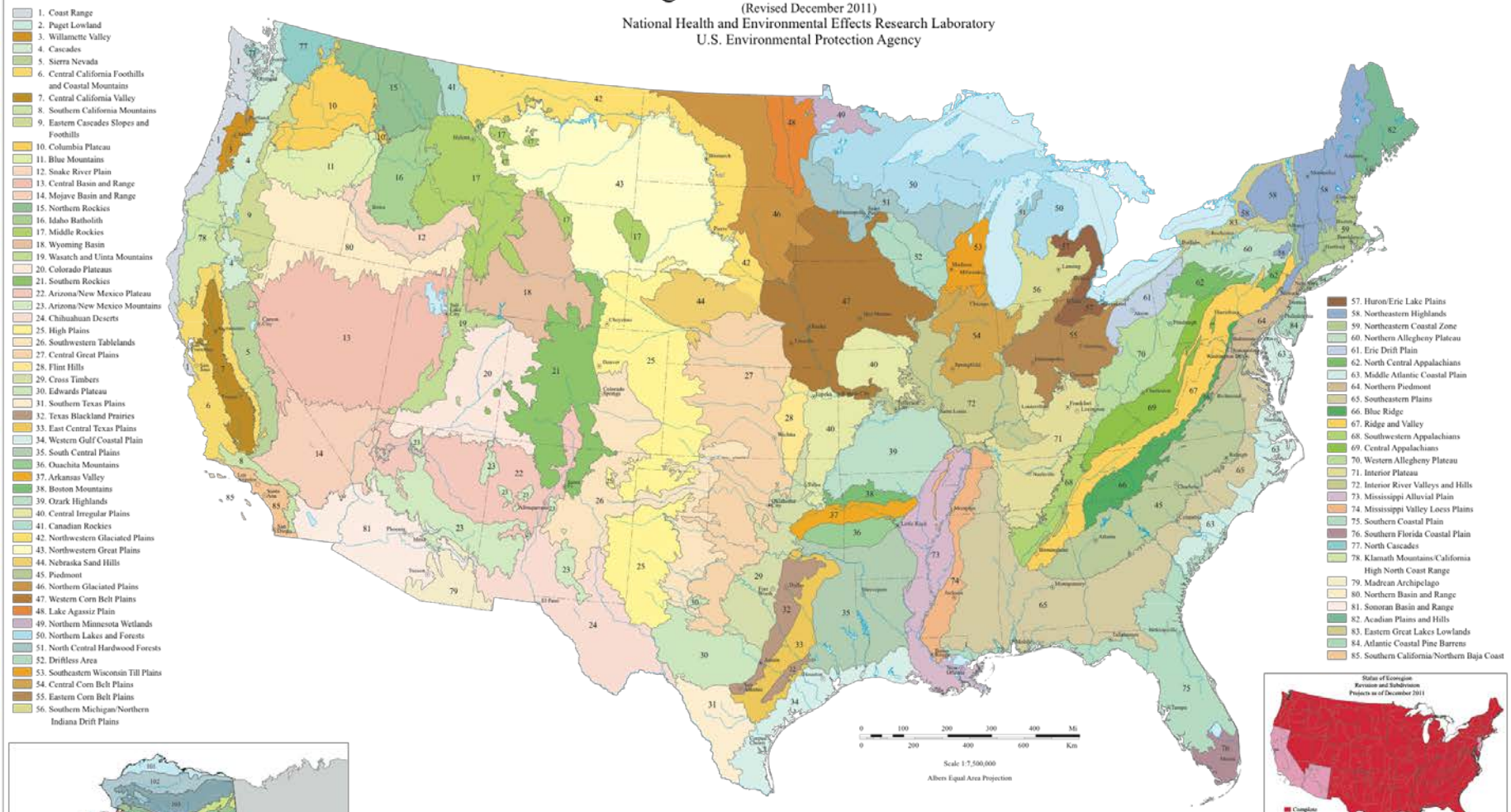
- Collect museum data
- Ecological niche models for each species
  - understand diversity of Florida
    - Past, Present, Future
- Phylogenetic Tree of these same species
  - explore the phylogenetic diversity of Florida

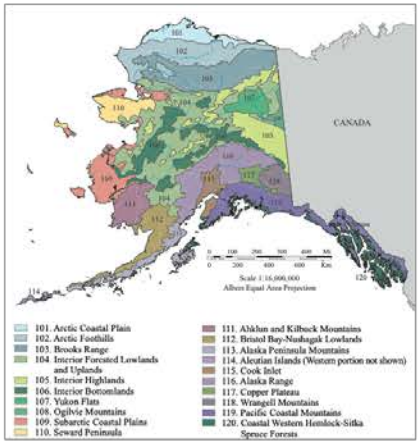
Level III Ecoregions of the Continental United States

(Revised December 2011)

National Health and Environmental Effects Research Laboratory

U.S. Environmental Protection Agency





The ecoregions shown here have been derived from Omernik (1987) and from refinements of Omernik's framework that have been made for other projects. These ongoing or recently completed projects, conducted in collaboration with the U.S. EPA regional offices, state resource management agencies, and with other federal agencies, involve refining ecoregions, defining subregions, and locating sets of reference sites. Designed to serve as a spatial framework for environmental resource management, ecoregions denote areas within which ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. The most immediate needs are to develop regional biological criteria and water quality standards and to set management goals for nonpoint source pollution.

The approach used to compile this map is based on the premise that ecological regions can be identified through the analysis of the patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Wiken 1986; Omernik 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. Because of possible confusion with other meanings of terms for different levels of ecological regions, a Roman numeral classification scheme has been adopted for this effort. Level I is the coarsest level, dividing North America into 15 ecological regions, whereas at Level III the continent is subdivided into 50 classes (CEC 1997). Level III is the hierarchical level shown on this map. For portions of the United States (see map inset) the ecoregions have been further subdivided to Level IV. The applications of the ecoregions are explained in reports and publications from the state and regional projects (e.g., Bryce et al., 1998, 2003; Chapman et al., 2001, 2006; Daigle et al., 2006; Gallant et al., 1989, 1995; Griffith et al., 1998, 2002, 2004; McGrath et al., 2002; Omernik et al., 2000, 2004; Thorson et al., 2003; and Woods et al., 1996, 2002, 2004). For additional information, contact James M. Omernik, U.S. EPA National Health and Environmental Effects Laboratory (NHEERL), 200 SW 35th Street, Corvallis, OR 97333; phone: (541) 754-4455, email: omernik.james@epa.gov.

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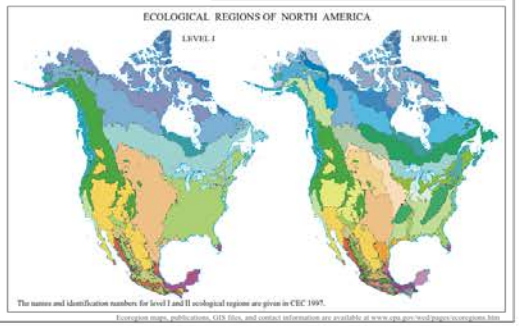
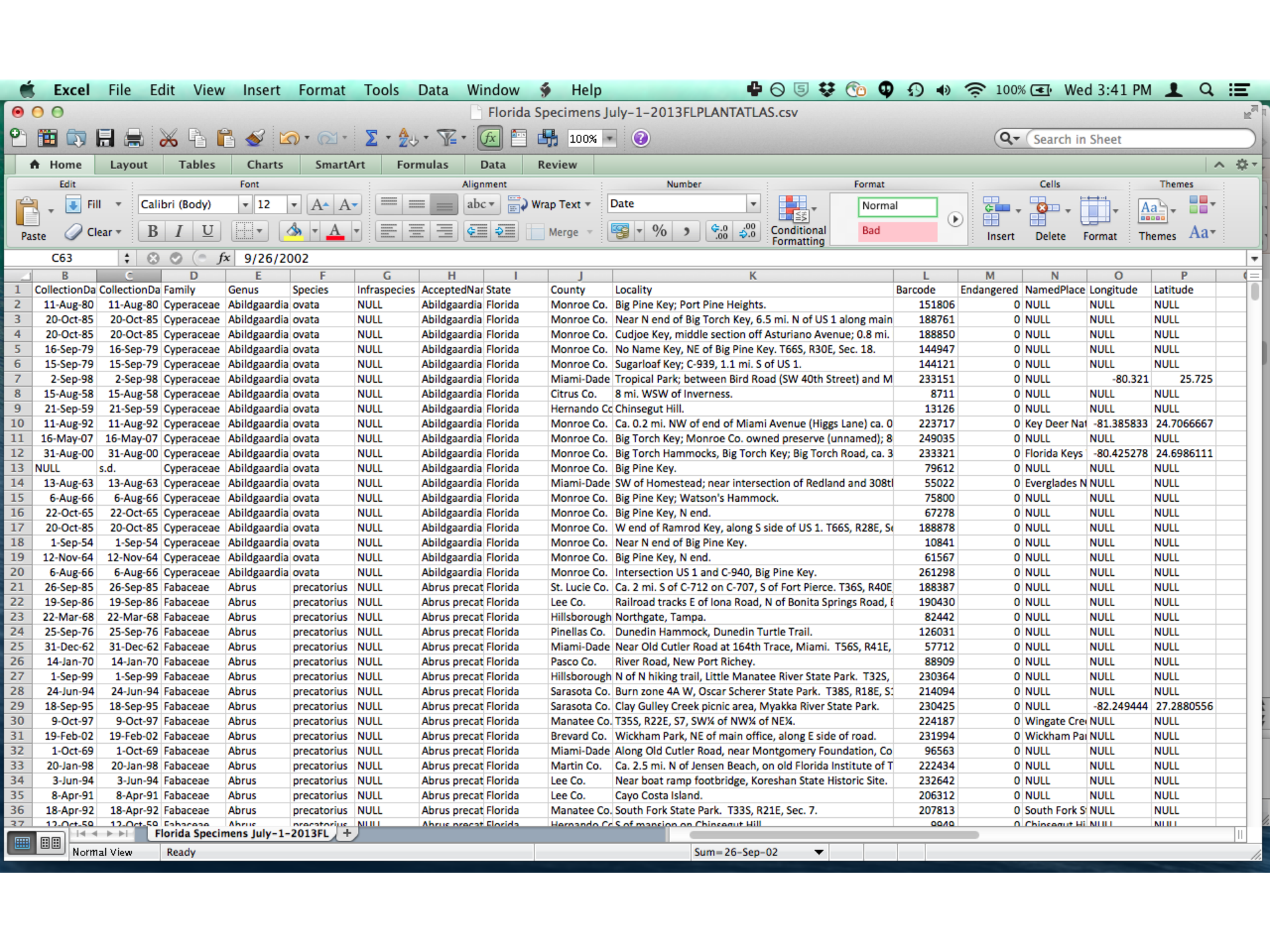


The names and identification numbers for level I and II ecological regions are given in CEC 1997.

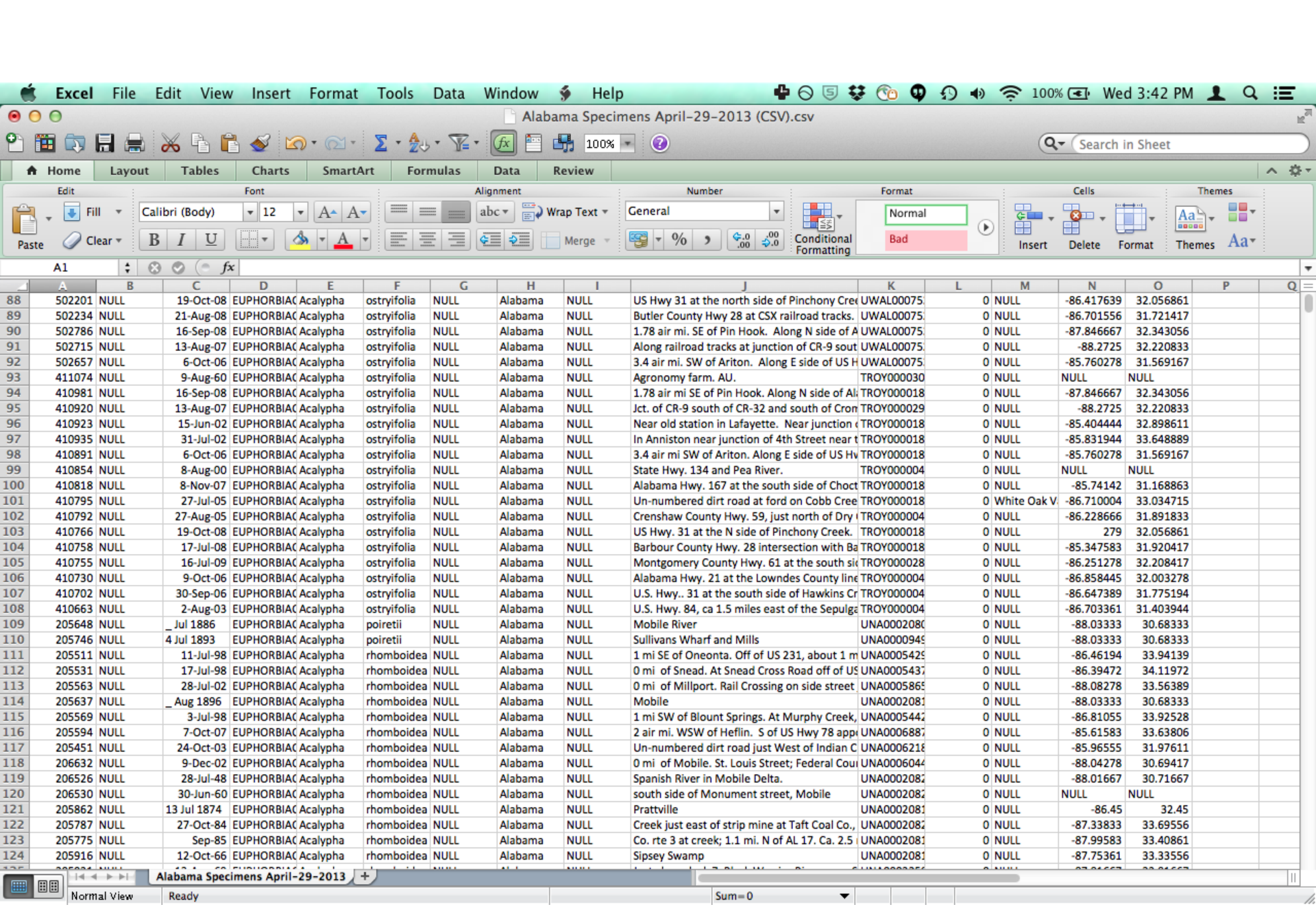
Ecoregion maps, publications, GIS files, and contact information are available at www.epa.gov/wed/pages/ecoregions.htm

Data collecting

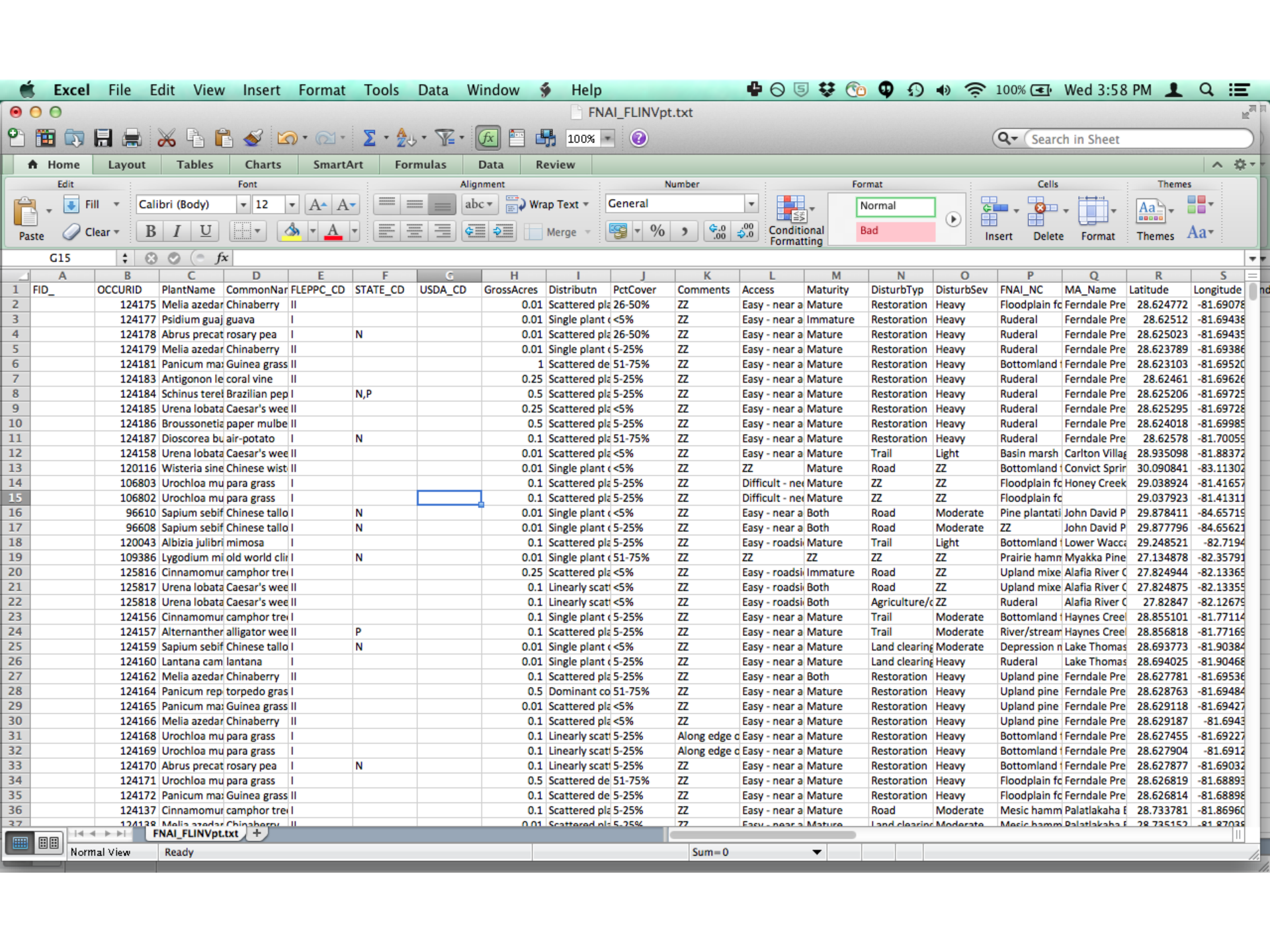
- Florida Plant Atlas
- Florida Native Area Inventory
- Global Information Facility
- Florida State University Herbarium
- Louisana State University Herbarium
- University of North Carolina Herbarium
- Alabama Plant Atlas
- Mississippi State University Herbarium
- Florida Museum of Natural History Herbarium
    - >500,000 georeferenced points



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	CollectionDa	CollectionDa	Family	Genus	Species	Infraspecies	AcceptedNar	State	County	Locality	Barcode	Endangered	NamedPlace	Longitude	Latitude
2	11-Aug-80	11-Aug-80	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Pine Key; Port Pine Heights.	151806	0	NULL	NULL	NULL
3	20-Oct-85	20-Oct-85	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Near N end of Big Torch Key, 6.5 mi. N of US 1 along main	188761	0	NULL	NULL	NULL
4	20-Oct-85	20-Oct-85	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Cudjoe Key, middle section off Asturiano Avenue; 0.8 mi.	188850	0	NULL	NULL	NULL
5	16-Sep-79	16-Sep-79	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	No Name Key, NE of Big Pine Key. T66S, R30E, Sec. 18.	144947	0	NULL	NULL	NULL
6	15-Sep-79	15-Sep-79	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Sugarloaf Key; C-939, 1.1 mi. S of US 1.	144121	0	NULL	NULL	NULL
7	2-Sep-98	2-Sep-98	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Miami-Dade	Tropical Park; between Bird Road (SW 40th Street) and M	233151	0	NULL	-80.321	25.725
8	15-Aug-58	15-Aug-58	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Citrus Co.	8 mi. WSW of Inverness.	8711	0	NULL	NULL	NULL
9	21-Sep-59	21-Sep-59	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Hernando Cc	Chinsegut Hill.	13126	0	NULL	NULL	NULL
10	11-Aug-92	11-Aug-92	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Ca. 0.2 mi. NW of end of Miami Avenue (Higgs Lane) ca. 0	223717	0	Key Deer Nat	-81.385833	24.7066667
11	16-May-07	16-May-07	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Torch Key; Monroe Co. owned preserve (unnamed); 8	249035	0	NULL	NULL	NULL
12	31-Aug-00	31-Aug-00	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Torch Hammocks, Big Torch Key; Big Torch Road, ca. 3	233321	0	Florida Keys	-80.425278	24.6986111
13	NULL	s.d.	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Pine Key.	79612	0	NULL	NULL	NULL
14	13-Aug-63	13-Aug-63	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Miami-Dade	SW of Homestead; near intersection of Redland and 308tl	55022	0	Everglades N	NULL	NULL
15	6-Aug-66	6-Aug-66	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Pine Key; Watson's Hammock.	75800	0	NULL	NULL	NULL
16	22-Oct-65	22-Oct-65	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Pine Key, N end.	67278	0	NULL	NULL	NULL
17	20-Oct-85	20-Oct-85	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	W end of Ramrod Key, along S side of US 1. T66S, R28E, S	188878	0	NULL	NULL	NULL
18	1-Sep-54	1-Sep-54	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Near N end of Big Pine Key.	10841	0	NULL	NULL	NULL
19	12-Nov-64	12-Nov-64	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Big Pine Key, N end.	61567	0	NULL	NULL	NULL
20	6-Aug-66	6-Aug-66	Cyperaceae	Abildgaardia	ovata	NULL	Abildgaardia	Florida	Monroe Co.	Intersection US 1 and C-940, Big Pine Key.	261298	0	NULL	NULL	NULL
21	26-Sep-85	26-Sep-85	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	St. Lucie Co.	Ca. 2 mi. S of C-712 on C-707, S of Fort Pierce. T36S, R40E	188387	0	NULL	NULL	NULL
22	19-Sep-86	19-Sep-86	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Lee Co.	Railroad tracks E of Iona Road, N of Bonita Springs Road, E	190430	0	NULL	NULL	NULL
23	22-Mar-68	22-Mar-68	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Hillsborough	Northgate, Tampa.	82442	0	NULL	NULL	NULL
24	25-Sep-76	25-Sep-76	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Pinellas Co.	Dunedin Hammock, Dunedin Turtle Trail.	126031	0	NULL	NULL	NULL
25	31-Dec-62	31-Dec-62	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Miami-Dade	Near Old Cutler Road at 164th Trace, Miami. T56S, R41E,	57712	0	NULL	NULL	NULL
26	14-Jan-70	14-Jan-70	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Pasco Co.	River Road, New Port Richey.	88909	0	NULL	NULL	NULL
27	1-Sep-99	1-Sep-99	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Hillsborough	N of N hiking trail, Little Manatee River State Park. T32S,	230364	0	NULL	NULL	NULL
28	24-Jun-94	24-Jun-94	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Sarasota Co.	Burn zone 4A W, Oscar Scherer State Park. T38S, R18E, S1	214094	0	NULL	NULL	NULL
29	18-Sep-95	18-Sep-95	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Sarasota Co.	Clay Gulley Creek picnic area, Myakka River State Park.	230425	0	NULL	-82.249444	27.2880556
30	9-Oct-97	9-Oct-97	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Manatee Co.	T35S, R22E, S7, SW¼ of NW¼ of NE¼.	224187	0	Wingate Cre	NULL	NULL
31	19-Feb-02	19-Feb-02	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Brevard Co.	Wickham Park, NE of main office, along E side of road.	231994	0	Wickham Pa	NULL	NULL
32	1-Oct-69	1-Oct-69	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Miami-Dade	Along Old Cutler Road, near Montgomery Foundation, Co	96563	0	NULL	NULL	NULL
33	20-Jan-98	20-Jan-98	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Martin Co.	Ca. 2.5 mi. N of Jensen Beach, on old Florida Institute of T	222434	0	NULL	NULL	NULL
34	3-Jun-94	3-Jun-94	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Lee Co.	Near boat ramp footbridge, Koreshan State Historic Site.	232642	0	NULL	NULL	NULL
35	8-Apr-91	8-Apr-91	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Lee Co.	Cayo Costa Island.	206312	0	NULL	NULL	NULL
36	18-Apr-92	18-Apr-92	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Manatee Co.	South Fork State Park. T33S, R21E, Sec. 7.	207813	0	South Fork S	NULL	NULL
37	12-Oct-59	12-Oct-59	Fabaceae	Abrus	precatorius	NULL	Abrus precat	Florida	Hernando Cc	S of mansion on Chinsegut Hill	9949	0	Chinsegut Hi	NULL	NULL



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
88	502201	NULL	19-Oct-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	US Hwy 31 at the north side of Pinchony Cre	UWAL00075	0	NULL	-86.417639	32.056861		
89	502234	NULL	21-Aug-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Butler County Hwy 28 at CSX railroad tracks.	UWAL00075	0	NULL	-86.701556	31.721417		
90	502786	NULL	16-Sep-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	1.78 air mi. SE of Pin Hook. Along N side of A	UWAL00075	0	NULL	-87.846667	32.343056		
91	502715	NULL	13-Aug-07	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Along railroad tracks at junction of CR-9 sout	UWAL00075	0	NULL	-88.2725	32.220833		
92	502657	NULL	6-Oct-06	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	3.4 air mi. SW of Ariton. Along E side of US H	UWAL00075	0	NULL	-85.760278	31.569167		
93	411074	NULL	9-Aug-60	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Agronomy farm. AU.	TROY000030	0	NULL	NULL	NULL		
94	410981	NULL	16-Sep-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	1.78 air mi SE of Pin Hook. Along N side of Al	TROY000018	0	NULL	-87.846667	32.343056		
95	410920	NULL	13-Aug-07	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Jct. of CR-9 south of CR-32 and south of Cron	TROY000029	0	NULL	-88.2725	32.220833		
96	410923	NULL	15-Jun-02	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Near old station in Lafayette. Near junction	TROY000018	0	NULL	-85.404444	32.898611		
97	410935	NULL	31-Jul-02	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	In Anniston near junction of 4th Street near t	TROY000018	0	NULL	-85.831944	33.648889		
98	410891	NULL	6-Oct-06	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	3.4 air mi SW of Ariton. Along E side of US Hv	TROY000018	0	NULL	-85.760278	31.569167		
99	410854	NULL	8-Aug-00	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	State Hwy. 134 and Pea River.	TROY000004	0	NULL	NULL	NULL		
100	410818	NULL	8-Nov-07	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Alabama Hwy. 167 at the south side of Choct	TROY000018	0	NULL	-85.74142	31.168863		
101	410795	NULL	27-Jul-05	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Un-numbered dirt road at ford on Cobb Cree	TROY000018	0	White Oak V	-86.710004	33.034715		
102	410792	NULL	27-Aug-05	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Crenshaw County Hwy. 59, just north of Dry	TROY000004	0	NULL	-86.228666	31.891833		
103	410766	NULL	19-Oct-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	US Hwy. 31 at the N side of Pinchony Creek.	TROY000018	0	NULL	279	32.056861		
104	410758	NULL	17-Jul-08	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Barbour County Hwy. 28 intersection with Ba	TROY000018	0	NULL	-85.347583	31.920417		
105	410755	NULL	16-Jul-09	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Montgomery County Hwy. 61 at the south si	TROY000028	0	NULL	-86.251278	32.208417		
106	410730	NULL	9-Oct-06	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	Alabama Hwy. 21 at the Lowndes County line	TROY000004	0	NULL	-86.858445	32.003278		
107	410702	NULL	30-Sep-06	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	U.S. Hwy.. 31 at the south side of Hawkins Cr	TROY000004	0	NULL	-86.647389	31.775194		
108	410663	NULL	2-Aug-03	EUPHORBIAC	Acalypha	ostryifolia	NULL	Alabama	NULL	U.S. Hwy. 84, ca 1.5 miles east of the Sepulga	TROY000004	0	NULL	-86.703361	31.403944		
109	205648	NULL	_ Jul 1886	EUPHORBIAC	Acalypha	poiretii	NULL	Alabama	NULL	Mobile River	UNA0002080	0	NULL	-88.03333	30.68333		
110	205746	NULL	4 Jul 1893	EUPHORBIAC	Acalypha	poiretii	NULL	Alabama	NULL	Sullivans Wharf and Mills	UNA0000949	0	NULL	-88.03333	30.68333		
111	205511	NULL	11-Jul-98	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	1 mi SE of Oneonta. Off of US 231, about 1 m	UNA0005429	0	NULL	-86.46194	33.94139		
112	205531	NULL	17-Jul-98	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	0 mi of Snead. At Snead Cross Road off of US	UNA0005437	0	NULL	-86.39472	34.11972		
113	205563	NULL	28-Jul-02	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	0 mi of Millport. Rail Crossing on side street	UNA0005865	0	NULL	-88.08278	33.56389		
114	205637	NULL	_ Aug 1896	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Mobile	UNA0002081	0	NULL	-88.03333	30.68333		
115	205569	NULL	3-Jul-98	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	1 mi SW of Blount Springs. At Murphy Creek,	UNA0005442	0	NULL	-86.81055	33.92528		
116	205594	NULL	7-Oct-07	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	2 air mi. WSW of Heflin. S of US Hwy 78 app	UNA0006887	0	NULL	-85.61583	33.63806		
117	205451	NULL	24-Oct-03	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Un-numbered dirt road just West of Indian C	UNA0006218	0	NULL	-85.96555	31.97611		
118	206632	NULL	9-Dec-02	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	0 mi of Mobile. St. Louis Street; Federal Cou	UNA0006044	0	NULL	-88.04278	30.69417		
119	206526	NULL	28-Jul-48	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Spanish River in Mobile Delta.	UNA0002082	0	NULL	-88.01667	30.71667		
120	206530	NULL	30-Jun-60	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	south side of Monument street, Mobile	UNA0002082	0	NULL	NULL	NULL		
121	205862	NULL	13 Jul 1874	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Prattville	UNA0002081	0	NULL	-86.45	32.45		
122	205787	NULL	27-Oct-84	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Creek just east of strip mine at Taft Coal Co.,	UNA0002082	0	NULL	-87.33833	33.69556		
123	205775	NULL	Sep-85	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Co. rte 3 at creek; 1.1 mi. N of AL 17. Ca. 2.5	UNA0002081	0	NULL	-87.99583	33.40861		
124	205916	NULL	12-Oct-66	EUPHORBIAC	Acalypha	rhomboidea	NULL	Alabama	NULL	Sipsey Swamp	UNA0002081	0	NULL	-87.75361	33.33556		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FID_ OCCURID PlantName CommonNar FLEPPC_CD STATE_CD USDA_CD GrossAcres Distributn PctCover Comments Access Maturity DisturbTyp DisturbSev FNAI_NC MA_Name Latitude Longitude
124175 Melia azedar Chinaberry II 0.01 Scattered pla 26-50% ZZ Easy - near a Mature Restoration Heavy Floodplain fc Ferndale Pre 28.624772 -81.69078
124177 Psidium guaj guava I 0.01 Single plant (<5% ZZ Easy - near a Immature Restoration Heavy Ruderal Ferndale Pre 28.62512 -81.69438
124178 Abrus precat rosary pea I N 0.01 Scattered pla 26-50% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.625023 -81.69435
124179 Melia azedar Chinaberry II 0.01 Single plant (5-25% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.623789 -81.69386
124181 Panicum ma Guinea grass II 1 Scattered de 51-75% ZZ Easy - near a Mature Restoration Heavy Bottomland f Ferndale Pre 28.623103 -81.69520
124183 Antigonon le coral vine II 0.25 Scattered pla 5-25% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.62461 -81.69626
124184 Schinus terel Brazilian pep I N,P 0.5 Scattered pla 5-25% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.625206 -81.69725
124185 Urena lobata Caesar's wee II 0.25 Scattered pla <5% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.625295 -81.69728
124186 Broussonetia paper mulbe II 0.5 Scattered pla 5-25% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.624018 -81.69985
124187 Dioscorea bu air-potato I N 0.1 Scattered pla 51-75% ZZ Easy - near a Mature Restoration Heavy Ruderal Ferndale Pre 28.62578 -81.70059
124158 Urena lobata Caesar's wee II 0.01 Scattered pla <5% ZZ Easy - near a Mature Trail Light Basin marsh Carlton Villag 28.935098 -81.88372
120116 Wisteria sine Chinese wist II 0.01 Single plant (<5% ZZ ZZ Mature Road ZZ Bottomland f Convict Sprir 30.090841 -83.11302
106803 Urochloa mu para grass I 0.1 Scattered pla 5-25% ZZ Difficult - nec Mature ZZ ZZ Floodplain fc Honey Creek 29.038924 -81.41657
106802 Urochloa mu para grass I 0.1 Scattered pla 5-25% ZZ Difficult - nec Mature ZZ ZZ Floodplain fc 29.037923 -81.41311
96610 Sapium sebif Chinese tallo I N 0.01 Single plant (<5% ZZ Easy - near a Both Road Moderate Pine plantati John David P 29.878411 -84.65719
96608 Sapium sebif Chinese tallo I N 0.01 Single plant (5-25% ZZ Easy - near a Both Road Moderate ZZ John David P 29.877796 -84.65621
120043 Albizia julibri mimosa I 0.1 Scattered pla 5-25% ZZ Easy - roadsi Mature Trail Light Bottomland f Lower Wacca 29.248521 -82.7194
109386 Lygodium mi old world cli I N 0.01 Single plant (51-75% ZZ ZZ ZZ ZZ Prairie hamm Myakka Pine 27.134878 -82.35791
125816 Cinnamomur camphor tre I 0.25 Scattered pla <5% ZZ Easy - roadsi Immature Road ZZ Upland mixe Alafia River C 27.824944 -82.13365
125817 Urena lobata Caesar's wee II 0.1 Linearly scat <5% ZZ Easy - roadsi Both Road ZZ Upland mixe Alafia River C 27.824875 -82.13355
125818 Urena lobata Caesar's wee II 0.1 Linearly scat <5% ZZ Easy - roadsi Both Agriculture/c ZZ Ruderal Alafia River C 27.82847 -82.12675
124156 Cinnamomur camphor tre I 0.1 Single plant (5-25% ZZ Easy - near a Mature Trail Moderate Bottomland f Haynes Creel 28.855101 -81.77114
124157 Alternanther alligator wee II P 0.1 Scattered pla 5-25% ZZ Easy - near a Mature Trail Moderate River/stream Haynes Creel 28.856818 -81.77169
124159 Sapium sebif Chinese tallo I N 0.01 Single plant (<5% ZZ Easy - near a Mature Land clearing Moderate Depression n Lake Thomas 28.693773 -81.90384
124160 Lantana cam lantana I 0.01 Single plant (5-25% ZZ Easy - near a Mature Land clearing Heavy Ruderal Lake Thomas 28.694025 -81.90468
124162 Melia azedar Chinaberry II 0.1 Scattered pla 5-25% ZZ Easy - near a Both Restoration Heavy Upland pine Ferndale Pre 28.627781 -81.69536
124164 Panicum rep torpedo gras I 0.5 Dominant co 51-75% ZZ Easy - near a Mature Restoration Heavy Upland pine Ferndale Pre 28.628763 -81.69484
124165 Panicum ma Guinea grass II 0.01 Scattered pla <5% ZZ Easy - near a Mature Restoration Heavy Upland pine Ferndale Pre 28.629118 -81.69427
124166 Melia azedar Chinaberry II 0.1 Scattered pla <5% ZZ Easy - near a Mature Restoration Heavy Upland pine Ferndale Pre 28.629187 -81.6943
124168 Urochloa mu para grass I 0.1 Linearly scat 5-25% Along edge c Easy - near a Mature Restoration Heavy Bottomland f Ferndale Pre 28.627455 -81.69227
124169 Urochloa mu para grass I 0.1 Linearly scat 5-25% Along edge c Easy - near a Mature Restoration Heavy Bottomland f Ferndale Pre 28.627904 -81.6912
124170 Abrus precat rosary pea I N 0.1 Linearly scat 5-25% ZZ Easy - near a Mature Restoration Heavy Bottomland f Ferndale Pre 28.627877 -81.69032
124171 Urochloa mu para grass I 0.5 Scattered de 51-75% ZZ Easy - near a Mature Restoration Heavy Floodplain fc Ferndale Pre 28.626819 -81.68893
124172 Panicum ma Guinea grass II 0.1 Scattered de 5-25% ZZ Easy - near a Mature Restoration Heavy Floodplain fc Ferndale Pre 28.626814 -81.68898
124137 Cinnamomur camphor tre I 0.1 Scattered pla 5-25% ZZ Easy - near a Mature Road Moderate Mesic hamm Palatlakaha E 28.733781 -81.86960
FNAI_FLINVpt.txt
Normal View Ready Sum=0

Formatting challenges

- Reconciling datasets within each institution
- Reconciling datasets between institutions
- Georeferencing specimens
- Transforming Lat/Long
- UNCERTAINTY info missing !!!!
- Dates format (had to make assumptions)
- Taxonomic Name Reconciliation
- Pool datasets together – large files

Data collecting

- Florida Plant Atlas
- Florida Native Area Inventory
- Global Information Facility
- Florida State University Herbarium
- Louisana State University Herbarium
- University of North Carolina Herbarium
- Alabama Plant Atlas
- Mississippi State University Herbarium
- Florida Museum of Natural History Herbarium
  - ~500,000 georeferenced points

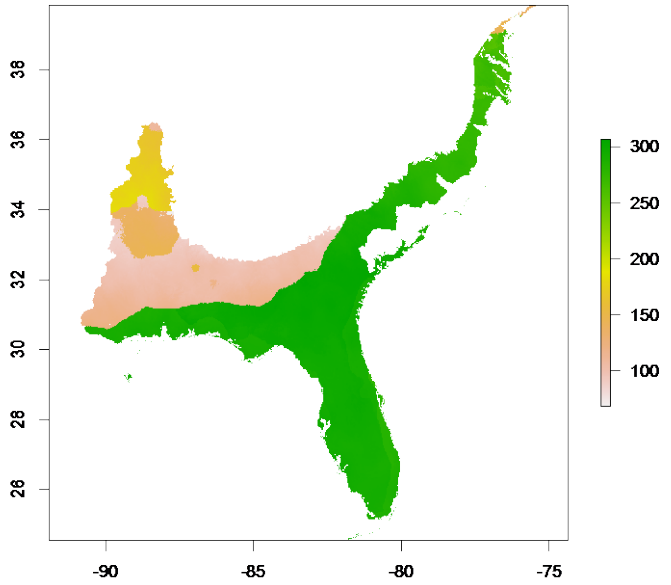
¡DigBio to the rescue !!!

Data cleaning

- Wunderlin list of 4,094 species of Florida plants
  - Check list against Tropicos accepted names
- All non-Florida species removed
- Duplicates removed

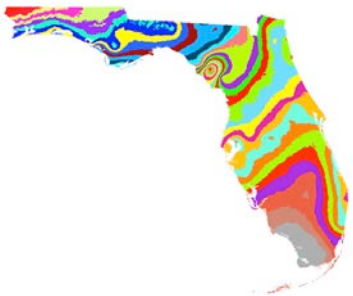
- 3 EPA ecoregions
  391,937 points
  343,266 dated points

- 30+ points per species
  - 372,241 pts and 1,548 species

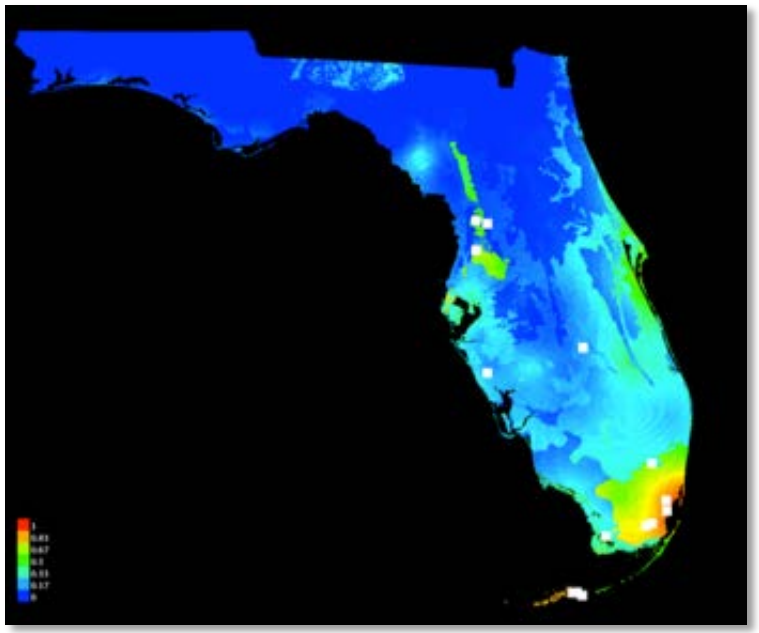


Ecological Niche Modeling

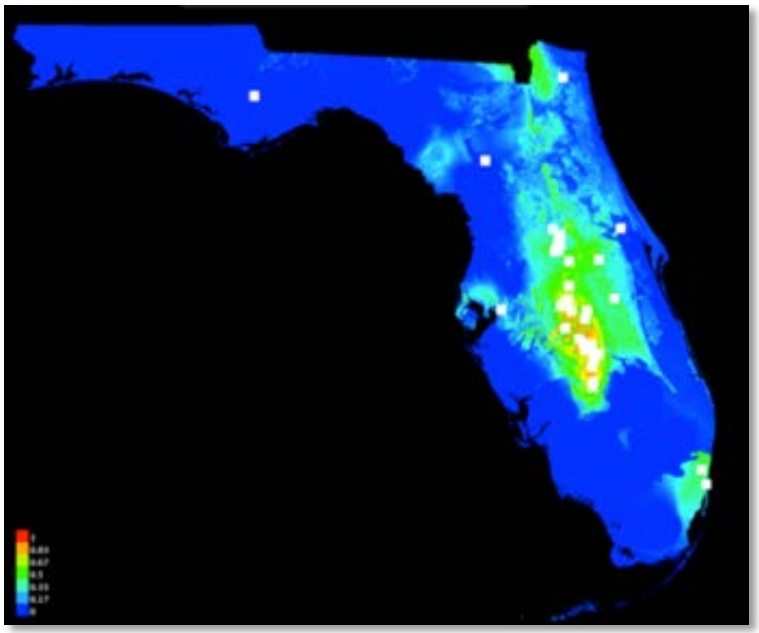
Flatspike Sedge

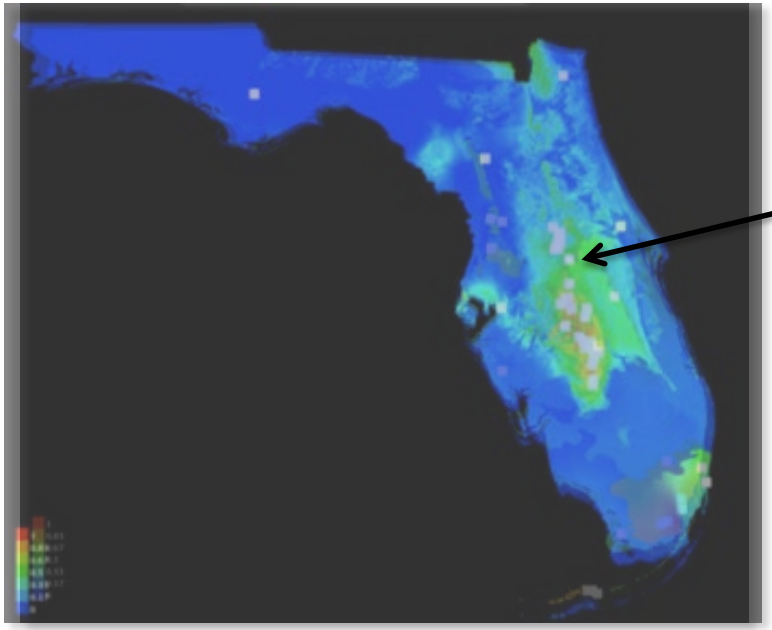


Flatspike Sedge



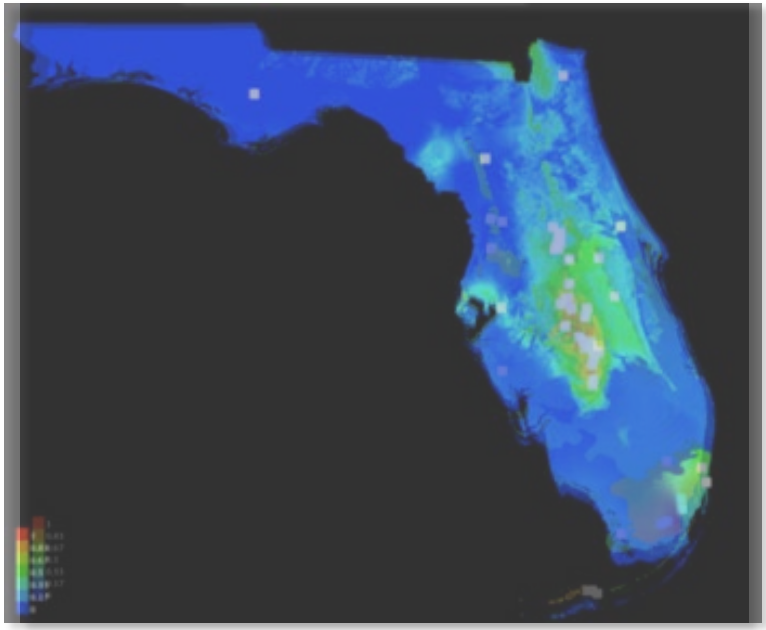
Scrub Palm

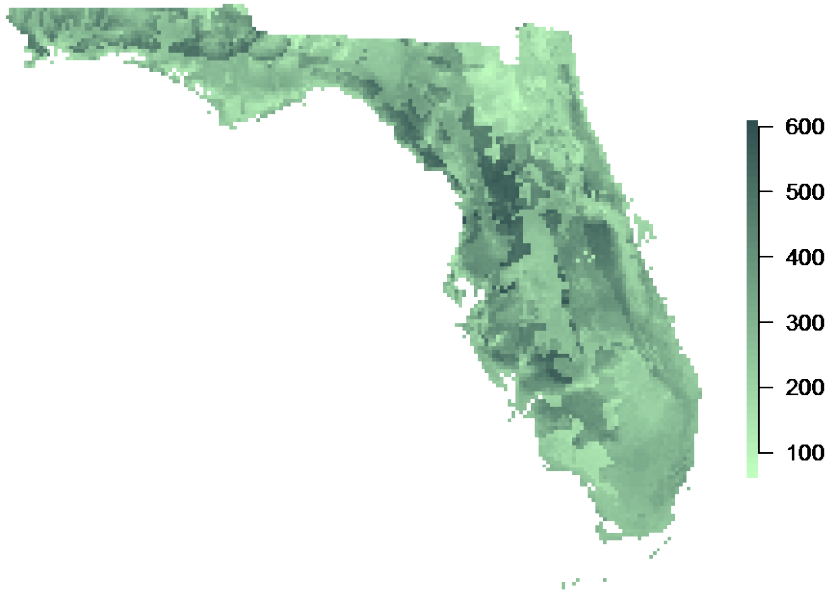




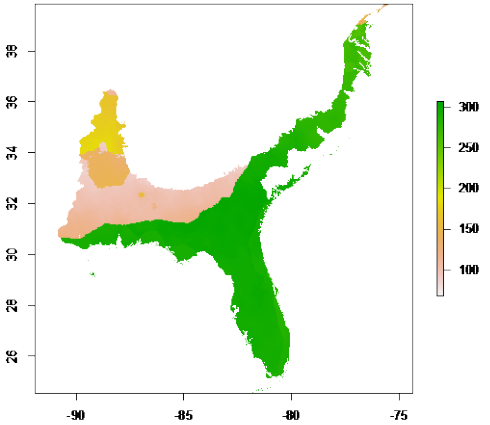
How many species are predicted to reside in this point?

All Plant Diversity





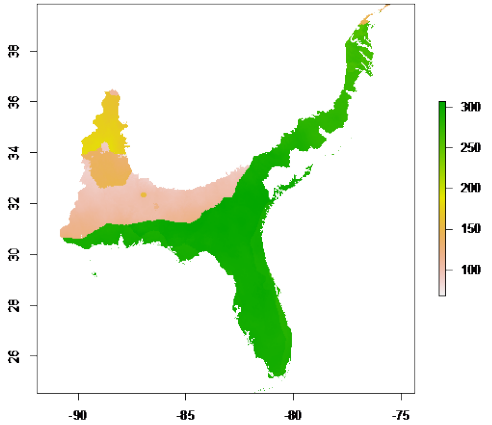
Museum Specimens and Climate Data



- Extraction R – package – dismo to create bioclim layers from monthly PRISM data

  - Associate each species record with the climate data for the correct year.

Museum Specimens and Climate Data



- Extraction R – package – dismo to create bioclim layers from monthly PRISM data

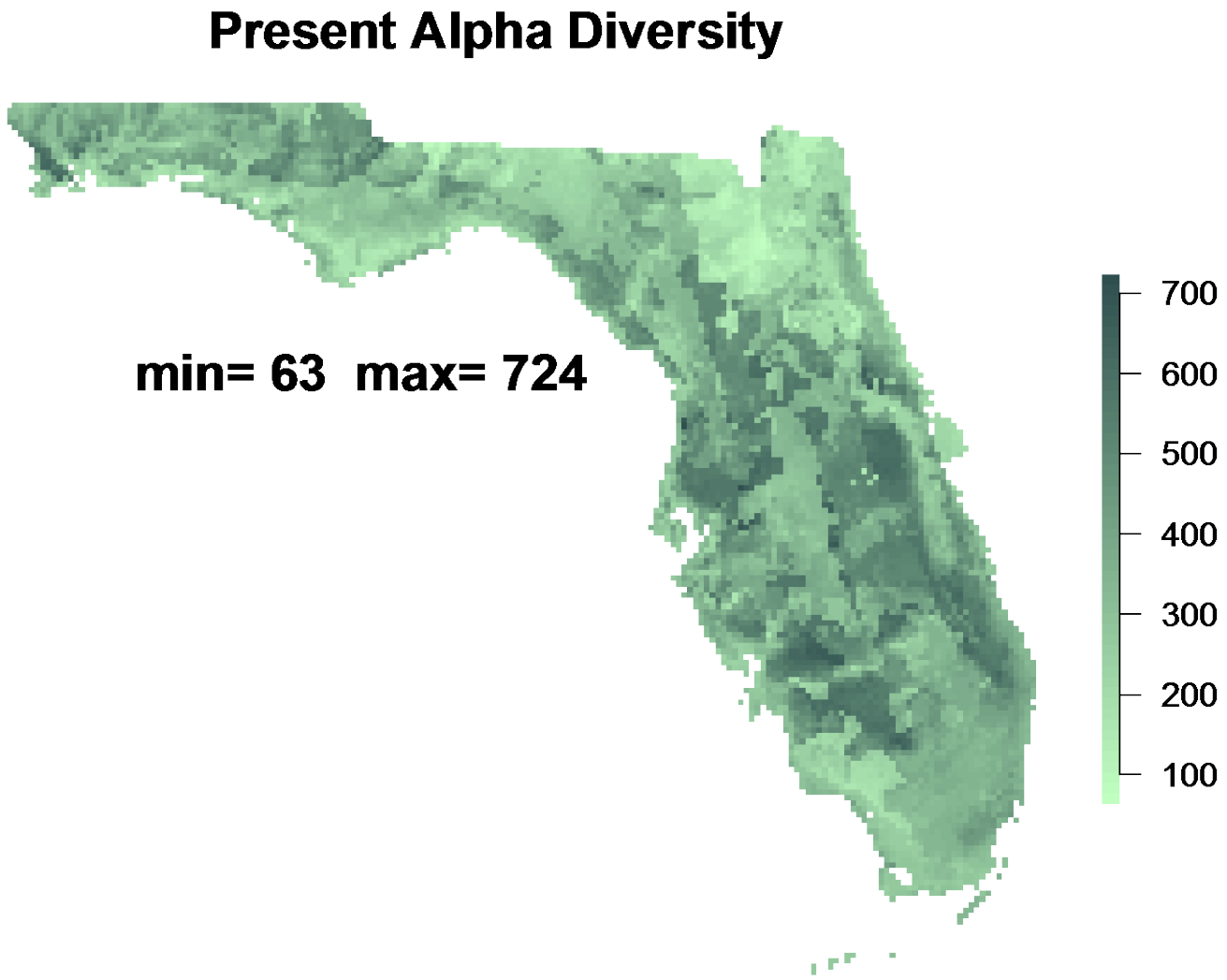
  - Assoc[illegible]vith the clima[illegible]r.

R package in progress

Climate Data

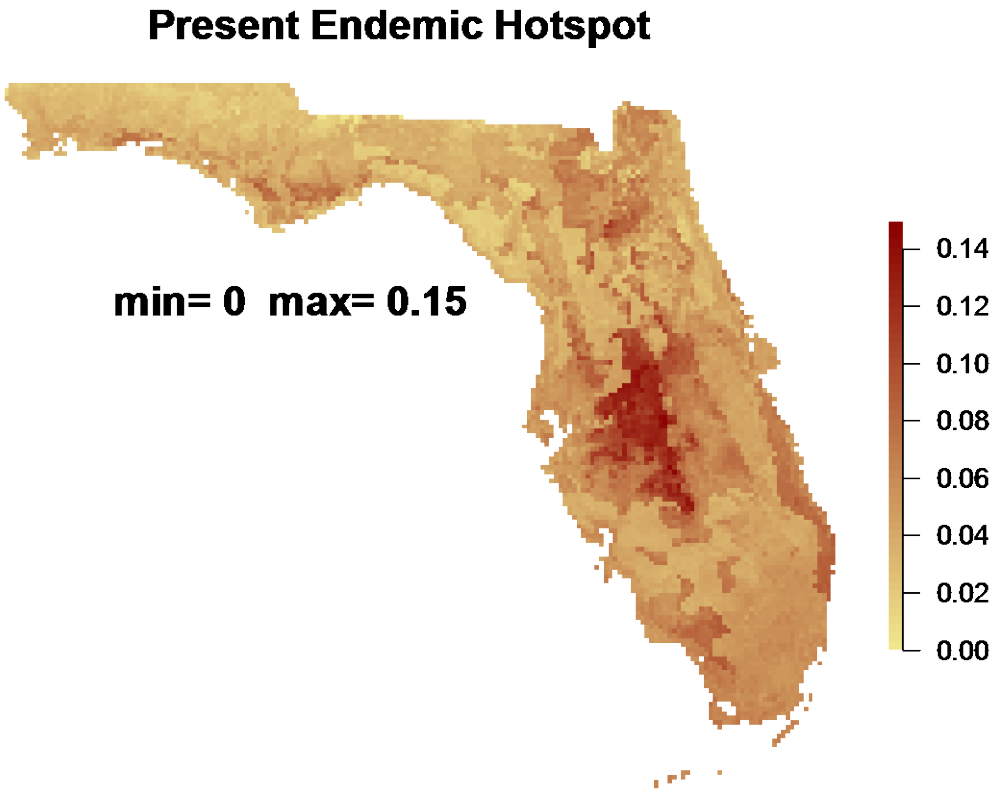
- Bioclim correlation 8 layers < 0.85
- Altitude
- Geology

Ran models for all 1,548 species. Combined maps to create a heat map of all species and then cropped it to Florida.


Present Alpha Diversity
min= 63 max= 724
700
600
500
400
300
200
100

2002 - 2012

Endemism hotspots



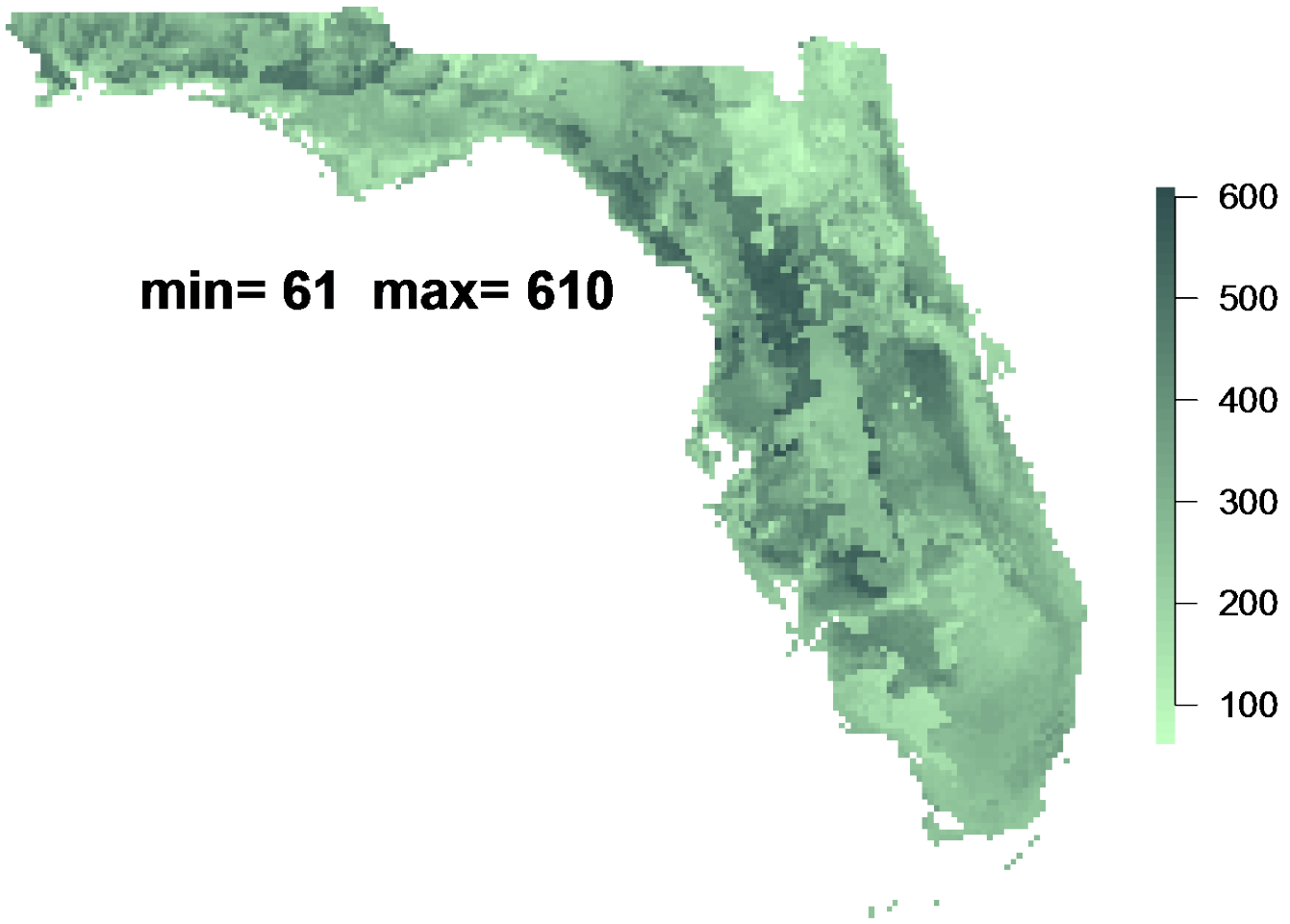
2002 - 2012

Endemic diversity / Total diversity

Florida’s Past

- Take models of each species and project it to the climate layers created from 1902 – 1912.

Florida's Past



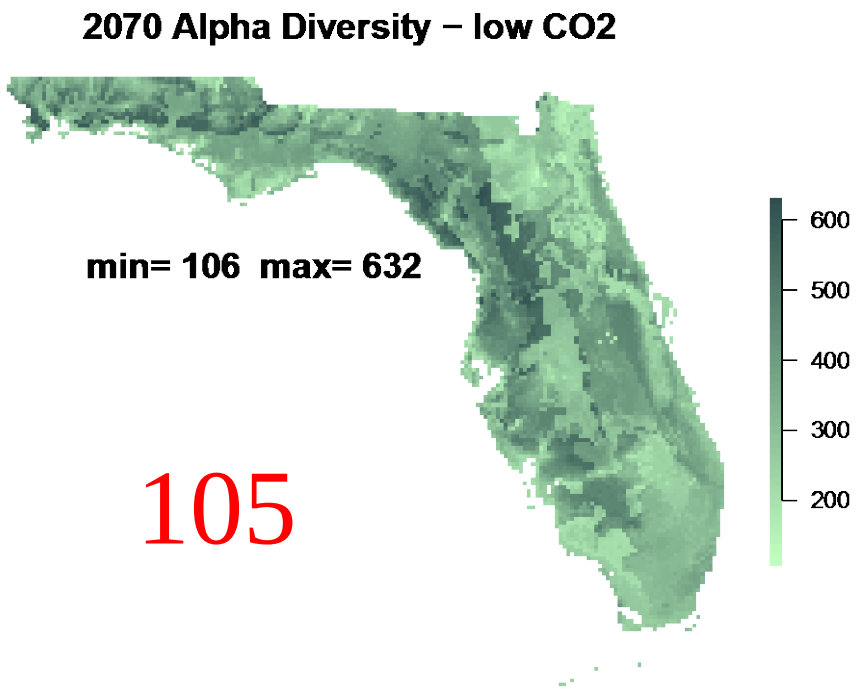
1902 - 1912

Future Models

- Consensus models from 3 hand-picked future scenarios:
  - *CCSM4 –Community Climate System Model*
  - *MPI – Max Plank Institute*
  - *MIROC5 – Model for the Interdisciplinary Research on Climate*
- Both highest and lowest estimates of CO_2
- 2050 and 2070

12 models for all 1,548 species
averaged for a consensus of these models

Future Projections



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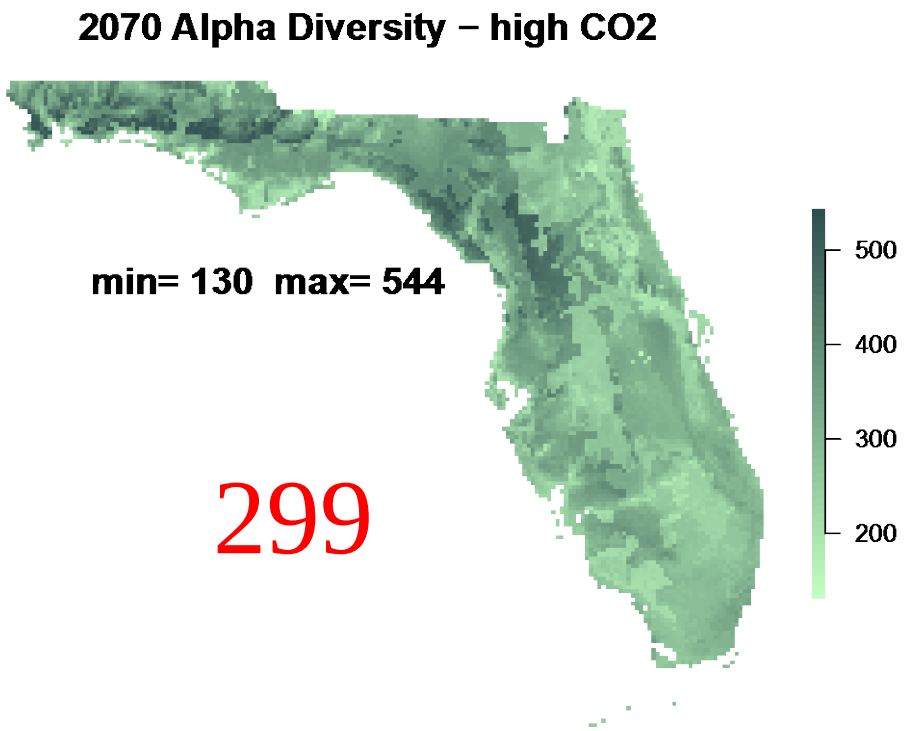

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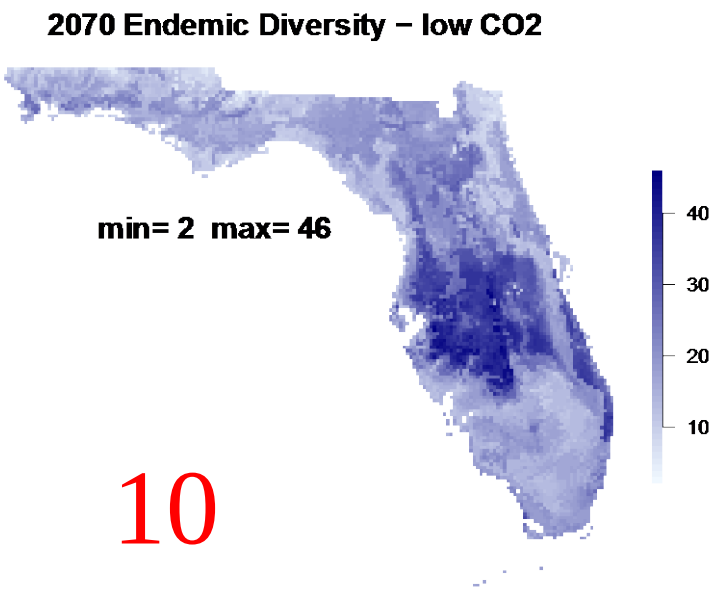
Species Extinct from Florida

Future Endemics



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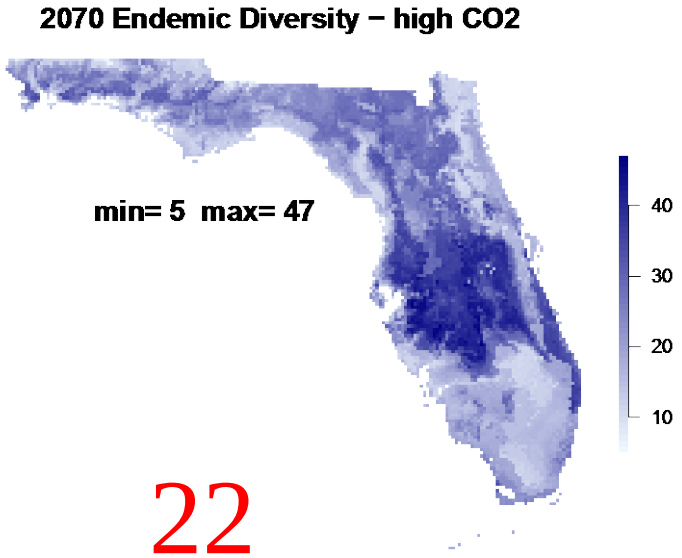
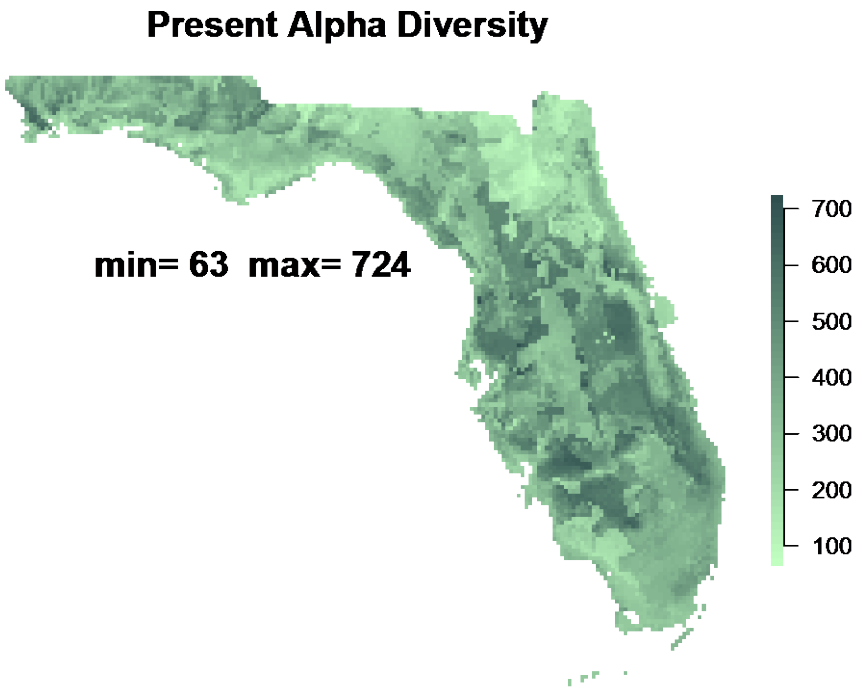


22

Endemic Species Extinct

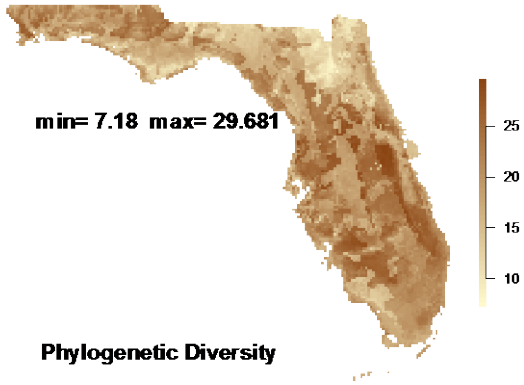
Next Steps

- Species clusters
- Movement Analysis
- Sea level rise change



Florida Phylogeny

1,548 species
685 genera
183 Families



Aquifoliales
Cornales
Ericales
Caryophyllales
Fabales
Fagales
Malvales
Sapindales
Myrtales
Vitales
Eudicots
Poales
Arecales
Zingiberales
Angiosperms
Magnoliales
Pinaceae
Cupressaceae
Polypods
Monilophytes

400.0 300.0 200.0 100.0 0.0

‘basic’ niche modeling

- R package Biomod2
- Use Bioclim climatic layers
- Use altitude and geology
- 9 species
- Run 3 algorithms: general linear model, random forest, maximum entropy