Plant-Pollinator Networks in Fire-Maintained Sandhills

Research Study (2019-2020)

Jennings State Forest

Site-specific results

Plot JE1

Plot JE2

Plot JE3

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Plant: Solidago odora
Pollinator: Ammophila procera

Introduction

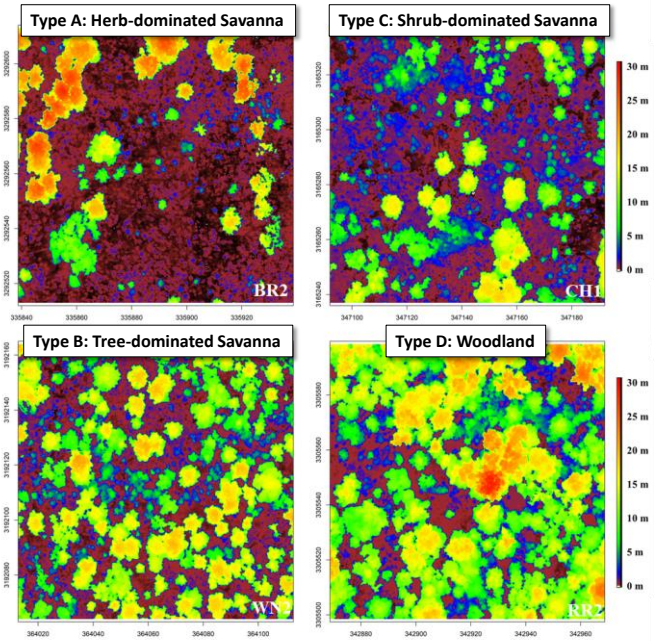
In Florida's fire-dependent longleaf pine savannas, as in terrestrial ecosystems worldwide, the mutualistic interaction networks formed by flowering plants and pollinators are of fundamental importance for the maintenance of biodiversity (Bascompte and Jordano 2007). Florida is part of the North American Coastal Plain floristic province, which is considered a global biodiversity hotspot due to unusually high vascular plant diversity and endemism (Noss et al. 2015). The pollinating insects of longleaf pine savannas likely play a central role in maintaining this high overall biodiversity, and they are also a diverse group in their own right, representing several prominent insect orders: Lepidoptera (butterflies and moths), Hymenoptera (bees and wasps), Coleoptera (beetles), and Diptera (flies) (Spiesman & Inouye 2013). Despite their ecological importance, the plant-pollinator networks of longleaf pine savannas have received little study (Spiesman & Inouye 2013). The purpose of this project is to begin filling critical baseline data gaps regarding plant-pollinator networks in Florida's fire-maintained uplands and their relationships to vegetation management.

Methods

24 1-hectare (2.5-acre) study plots were located at nine different fire-managed sandhill preserves in North-Central Florida: Ft. White WEA, Bell Ridge WEA, River Rise Preserve State Park, Jennings State Forest, Black Creek Ravines Conservation Area, Ordway-Swisher Biological Preserve, two separate tracts of Withlacoochee State Forest, and Chassahowitzka WEA. The study sites were carefully selected according to several criteria, including: 1) Frequent and ongoing prescribed fire, in most cases upwards of 20 years; 2) No history of intensive agriculture or plantation forestry; 3) Old growth species in the understory indicative of low soil disturbance (i.e. wiregrass, various wildflowers); and 4) Approximately one year since the last prescribed fire.

Within each preserve, two to three 1ha sampling plots were established at least 1km apart. Plant species composition was assessed in a grid of 25 5m x 5m quads. Species-specific flower abundance counts were conducted monthly from March 2019 – October 2019 along two transects (E-W and N-S) and in five 10m x 10m quads. Plant-pollinator interactions were sampled monthly using a 2hr timed transect sampling method. Every time the observer encountered an insect interacting with a flower, he or she captured the insect for identification and noted the plant species upon which it was encountered. Vegetation structure and surrounding landscape composition were assessed using LiDAR and aerial imagery via the GatorEye Unmanned Flying Laboratory.

One of the primary objectives of this study was to identify relationships between fire, vegetation structure, and plant-pollinator networks. To that end, we used LiDAR-derived Leaf Area Index (LAI) values to assess the density of four canopy strata beginning at 0.5m, which is the lowest height at which LAI can be reliably calculated from LiDAR: understory (0.5m – 1m), lowstory (1m – 3m), midstory (3m – 6m), and overstory (6m+). We used these data in conjunction with ground-collected percent herbaceous cover estimates to approximate the overall structure of each plot.

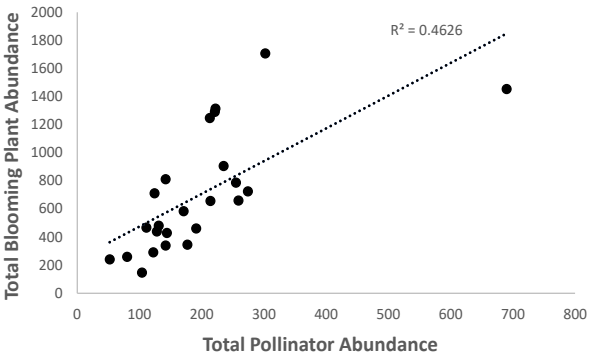


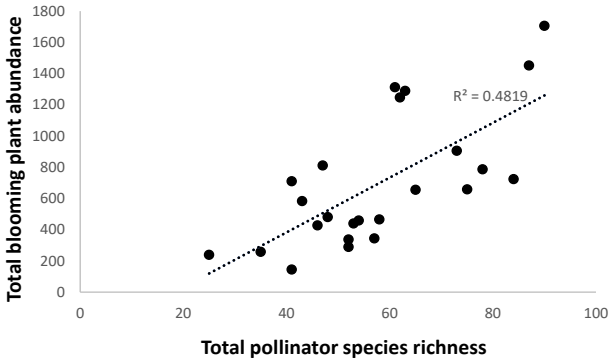
Overall Study Results: Vegetation Structure

Using multivariate statistical techniques to analyze the relative proportions of ground layer, shrub layer, and tree layer LAI, we identified four significantly different types of fire-maintained sandhill structures: Type A (herb-dominated savannas), Type B (tree-dominated savannas), Type C (shrub-dominated savannas), and Type D (woodlands). The images at left are visualizations of the LiDAR data, showing representative 1-ha plots belonging to each category.

Overall Study Results: Flower and Pollinator Abundance

Across the whole study, we found that flowering plant abundance was strongly correlated with total annual pollinator abundance and total pollinator species richness, and varied greatly across plots and seasons, with total flower abundance ranging from 145 to 1,707 blooming plants per plot.



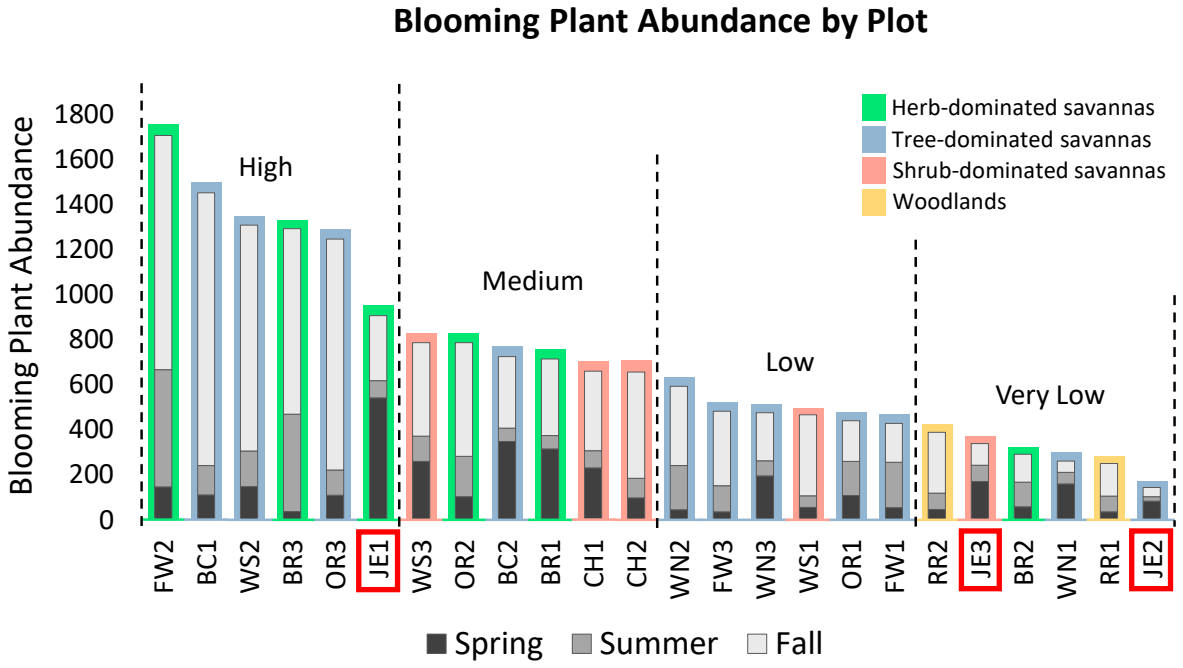


Flower and Pollinator Abundance Cont'd

We found that the spring bloom season in longleaf pine sandhills is dominated by shrubs (particularly saw palmetto and blueberries), while the fall bloom season is dominated by herbaceous plants (especially members of the Asteraceae or sunflower family). Most of the herb-dominated plots in the study fell at the moderate to high end of the flower abundance range. Tree-dominated savanna plots had highly variable flower abundance, ranging from the lowest flower abundance to the second-highest, while shrub-dominated and woodland plots were somewhat less variable, ranging from very low to moderate flower abundance. Our habitat models showed that the abundance of individual flower-producing plants was only one predictor of actual flower production; tree-layer LAI had a significant negative influence on flower production, suggesting that even where appropriate understory plants are present, their flower production may be suppressed by higher levels of tree canopy LAI. *For a more detailed accounting of data analysis, conclusions, and management recommendations, check our FWRI/Upland Habitat website for publications and reports, which will be uploaded* https://myfwc.com/research/habitat/upland/.

Jennings Results: Stand Structure and Flower Abundance

Jennings had one herb-dominated plot (JE1), one tree-dominated plot (JE2), and one shrub-dominated plot (JE3). Plot JE1 was in the highest blooming plant abundance quantile, while plots JE2 and JE3 were in the lowest blooming plant abundance quantile. These differences are likely related to differences in stand structure. Plot JE1 had a much more open canopy than the other two plots, and was particularly notable for its high abundance of spring-blooming plants, primarily *Vaccinium myrsinites* (shiny blueberry). Jennings State Forest was also notable for having a very high abundance of *Eryngium aromaticum* (Fragrant Eryngo), a flowering plant in the carrot family that is highly attractive to pollinators.

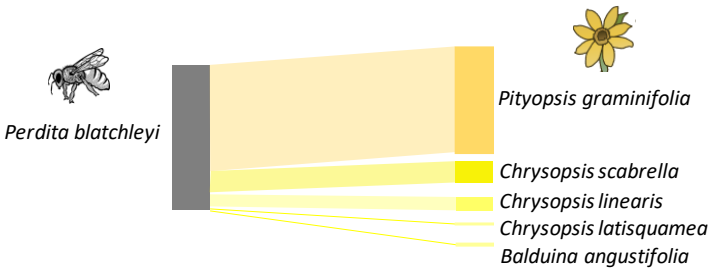


Jennings Results: Pollinator Overview

Pollinator abundance and species diversity varied dramatically between plots at Jennings, with herb-dominated plot JE1 generally having much higher abundance and diversity of both flowers and pollinators than the tree- and shrub-dominated plots JE2 and JE3. This pattern was most pronounced for Hymenoptera (Bees & Wasps), Lepidoptera (Butterflies & Moths), and Coleoptera (beetles); Dipteran (fly) abundance and diversity was highest in plot JE3. Order-specific pollinator results are presented in greater detail on the following pages, followed by plant-pollinator network diagrams for each plot.

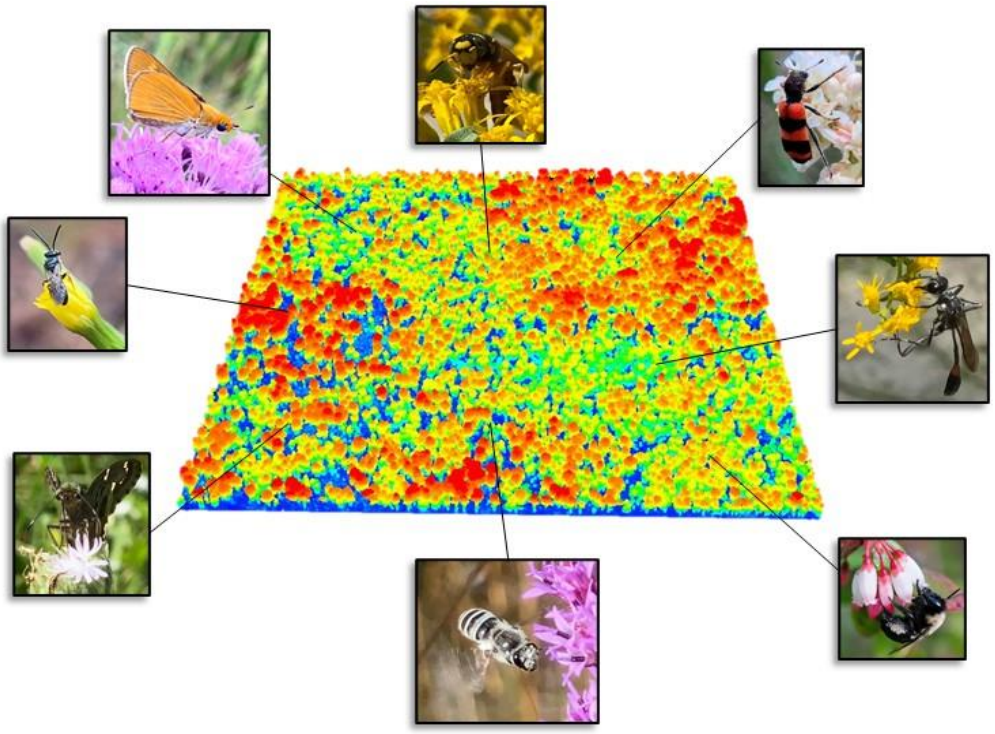
Species of Greatest Conservation Need

We found one pollinator Species of Greatest Conservation Need (SGCN) at Jennings, *Perdita blatchleyi.* We recorded enough observations of *P. blatchleyi* in the overall study to draw conclusions about their flower preferences and make preliminary management recommendations. *P. blatchleyi* is a specialist on the closely-related plant genera *Pityopsis* and *Chrysopsis*. *P. graminifolia*'s flower production and reproductive success are fire-induced and strongly influenced by season of burn, with spring and summer fires stimulating more flowers than winter fires (Brewer and Platt 1994). P. graminifolia is sensitive to vegetation structure and become locally extirpated when shrub and tree cover become excessive. Management regimes that emphasize growing season fire and decrease woody dominance can be expected to favor this SGCN bee.



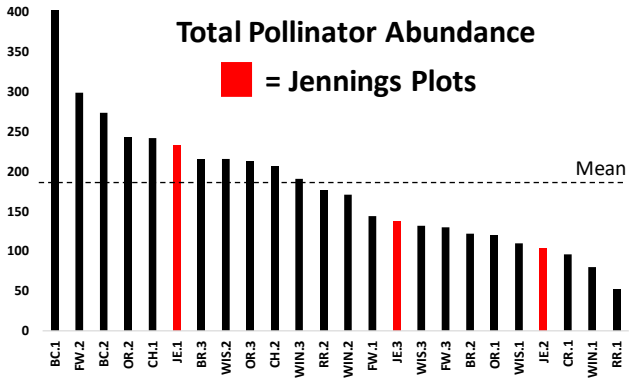
Flower interactions of *Perdita blatchleyi*, based on 103 observations recorded during the project.

Jennings Results
Pollinator Abundance and Species Richness



Overall Pollinator Abundance & Species Richness

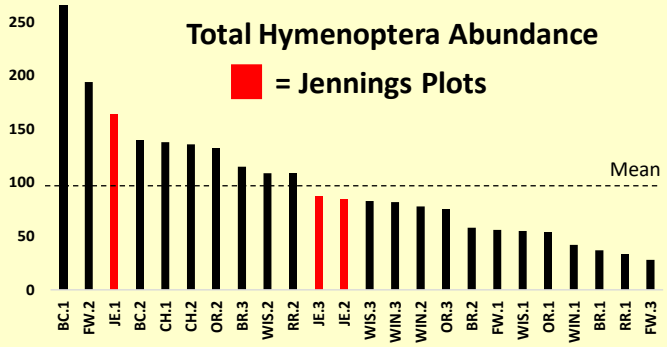
	Abundance # of individuals		Species Richness	
	Total	Quantile	Total	Quantile
Plot **JE1**	**235**	**Med-High**	**73**	**Med-High**
Plot **JE2**	**104**	**Med-Low**	**41**	**Med-Low**
Plot **JE3**	**142**	**Med-Low**	**52**	**Med-Low**
Study Average	181.6		57.6	
Study Range	52 - 402		25 - 90	



The above table shows the total pollinator abundance (number of individual insects caught) and total pollinator species richness for the three study plots at Jennings, along with their rank relative to the entire 24-plot study. Plots within one Standard Deviation (SD) above the mean were ranked "**Medium-High**," and plots within one SD below the mean were ranked "**Medium-Low**." Plots >1 SD above the mean were ranked "**High**," and >1 SD below the mean were ranked "**Low**." Plot JE1 had high species richness and pollinator abundance relative to the overall study, while plots JE2 and JE3 had lower than average pollinator abundance and species richness. These differences are most likely due to the differences in stand structure between plots at Jennings, and their effects on the types of flowering plant species present and the amount of flowers they produced. In the following sections, the same method is used to assess pollinator abundance and species richness within insect groups (Bees/Wasps, Butterflies/Moths, Beetles, and Flies).

Hymenoptera (Bees & Wasps)

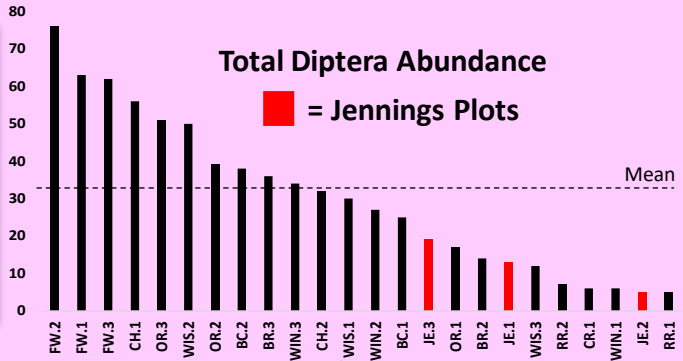
	Abundance # of individuals		Species Richness	
	Total	Rank	Total	Rank
Plot **JE1**	164	High	47	High
Plot **JE2**	85	Med-Low	26	Med-Low
Plot **JE3**	87	Med-Low	31	Med-Low
Study Average	98.1		33.6	
Study Range	28 - 266		12 - 61	



Bee & wasp species richness and abundance were very high in plot JE1, and medium-low in plots JE2 and JE2. Some of the most abundant Hymenopteran species at Jennings were *Augochlorella gratiosa* (a Green Sweat Bee), *Lasioglossum floridanum* (a Sweat Bee), *Paracyphononyx funereus* (a Spider Wasp), *Andrena fulvipennis* (a Mining Bee), and *Perdita blatchleyi* (a Fairy Bee). *Credits for non-FWRI photos on last page.

Diptera (Flies)

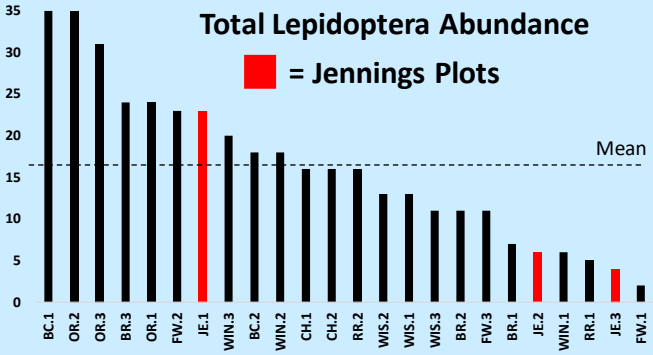
	Abundance # of individuals		Species Richness	
	Total	Rank	Total	Rank
Plot **JE1**	13	Med-Low	4	Med-Low
Plot **JE2**	5	Low	5	Med-Low
Plot **JE3**	19	Med-Low	9	Med-High
Study Average	32.1		8.0	
Study Range	5 - 79		2 - 18	



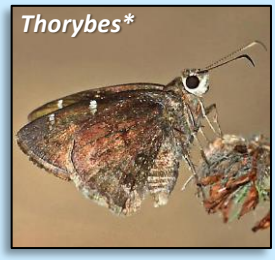
Fly abundance and species richness were low to very low across all three of the study plots at Jennings, with the exception of plot JE3, which had moderate fly species richness. Some of the most abundant fly species at Jennings were Allograpta obliqua (Oblique Streaktail), Exoprosopa fasciata (Banded Bee Fly), Poeciliognathus sulphureus (Sulphurus Bee Fly), Ocyptamus fuscipennis (Dusky-Winged Hoverfly), and Poeciliognathus punctipennis (a Bee Fly). *Credits for non-FWRI photos on last page.

Lepidoptera (Butterflies & Moths)

	Abundance # of individuals		Species Richness	
	Total	Rank	Total	Rank
Plot **JE1**	23	Med-High	10	Med-High
Plot **JE2**	6	Low	5	Med-Low
Plot **JE3**	4	Low	2	Low
Study Average	16.2		8.1	
Study Range	2 - 35		2 - 14	

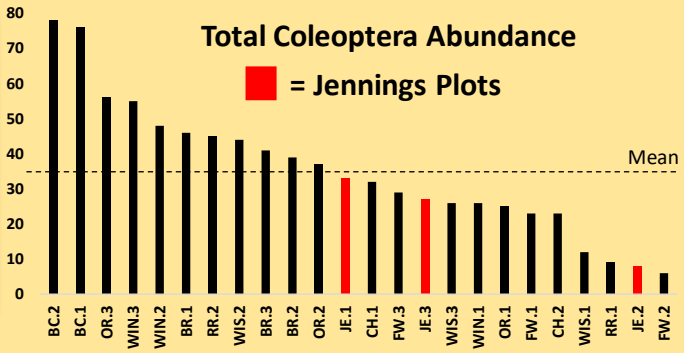


Butterfly & moth abundance and species richness were above the study average in plot JE1, and well below the study average in plots JE2 and JE3. Some of the most abundant Lepidopteran species collected at Jennings were *Hemiargus ceraunus* (Ceraunus Blue), *Pyrisitia lisa* (Little Yellow), *Thorybes confusis* (Confused Cloudywing), *Calycopis cecrops* (Red-banded Hairstreak), and *Polites vibex* (Whirlabout). *Credits for non-FWRI photos on last page.



Coleoptera (Beetles)

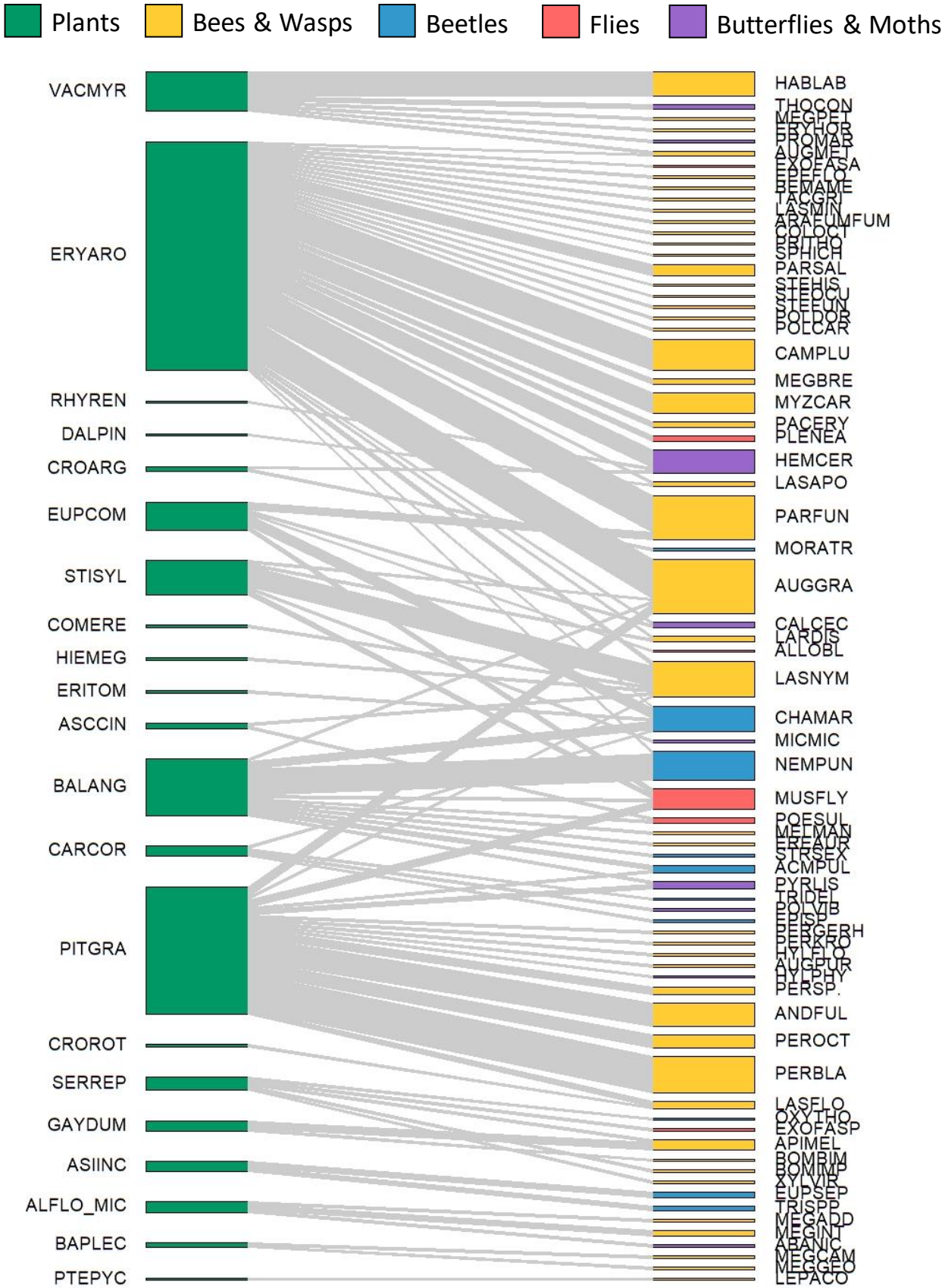
	Abundance # of Individuals		Species Richness	
	Total	Rank	Total	Rank
Plot **JE1**	33	Med-Low	10	Med-High
Plot **JE2**	8	Low	6	Med-Low
Plot **JE3**	27	Med-Low	9	Med-High
Study Average	35.2		8.0	
Study Range	6-78		4-14	



Beetle abundance was moderate in plot JE1, and low to very low in plots JE3 and JE2. Beetle species richness was above average in Plots JE1 and JE3 and below average in Plots JE2. Some of the most abundant beetle species collected at Jennings were *Chauliognathus marginatus* (Margined Leatherwing), *Mordella marginata* (Tumbling flower beetle), *Nemognatha punctulata* (a Blister Beetle), *Trichiotinus sp.* (a Flower Scarab), and *Acmaeodera pulchella* (Bald-Cypress Sapwood Beetle). *Credits for non-FWRI photos on last page.

JE1 Plant-Pollinator Network

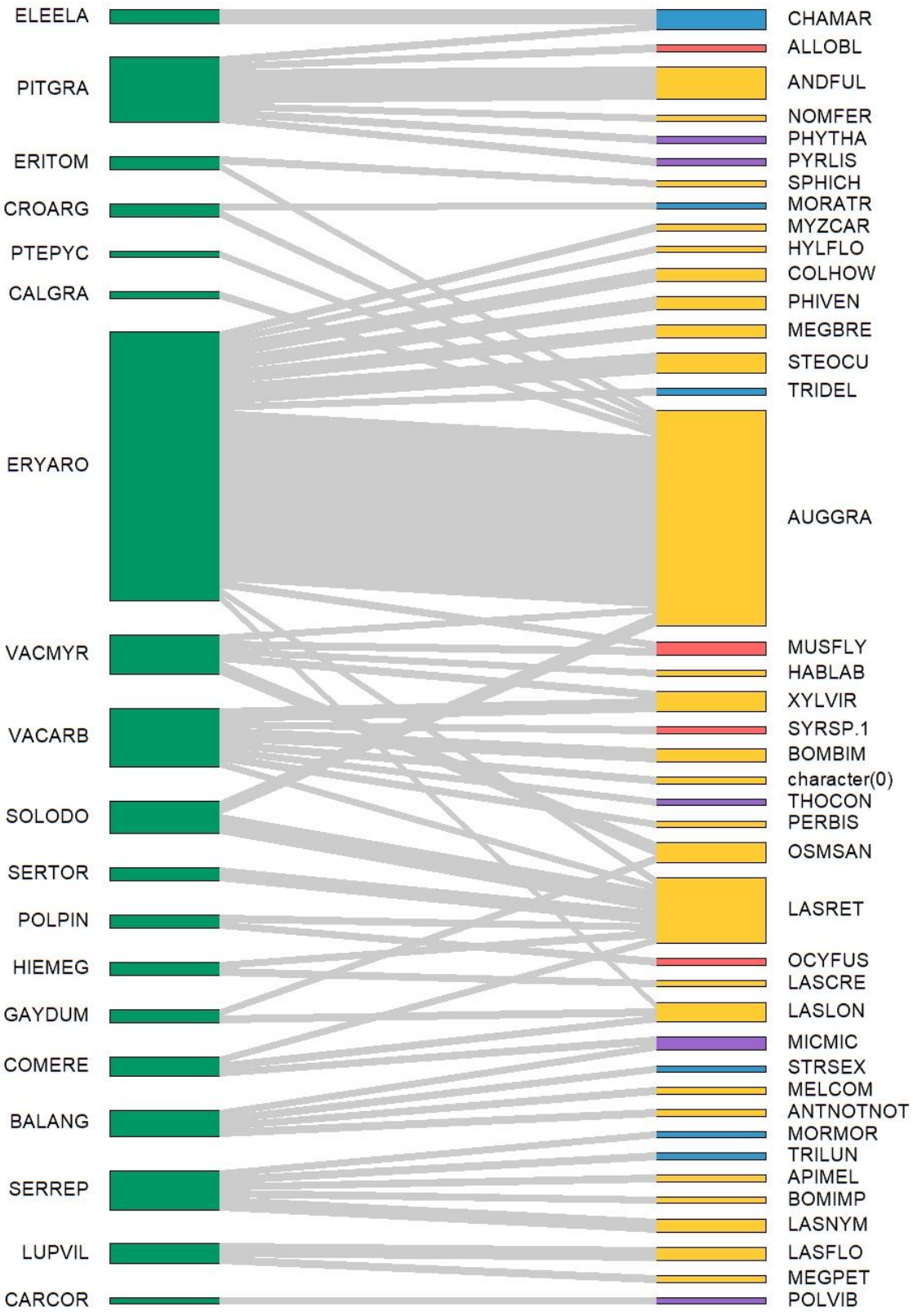
*Plant and insect code key included at end of report



JE2 Plant-Pollinator Network

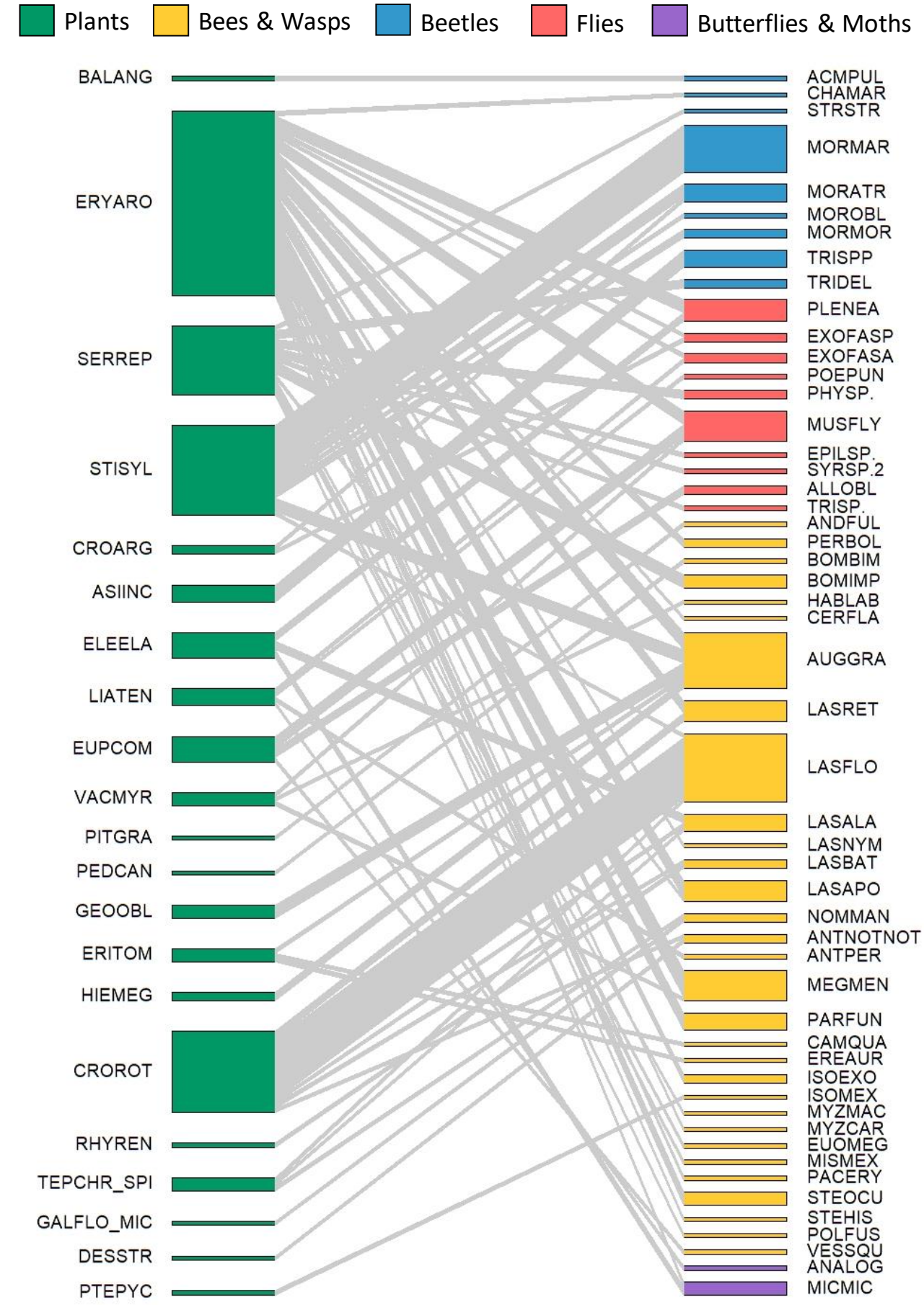
*Plant and insect code key included at end of report

Plants | Bees & Wasps | Beetles | Flies | Butterflies & Moths



JE3 Plant-Pollinator Network

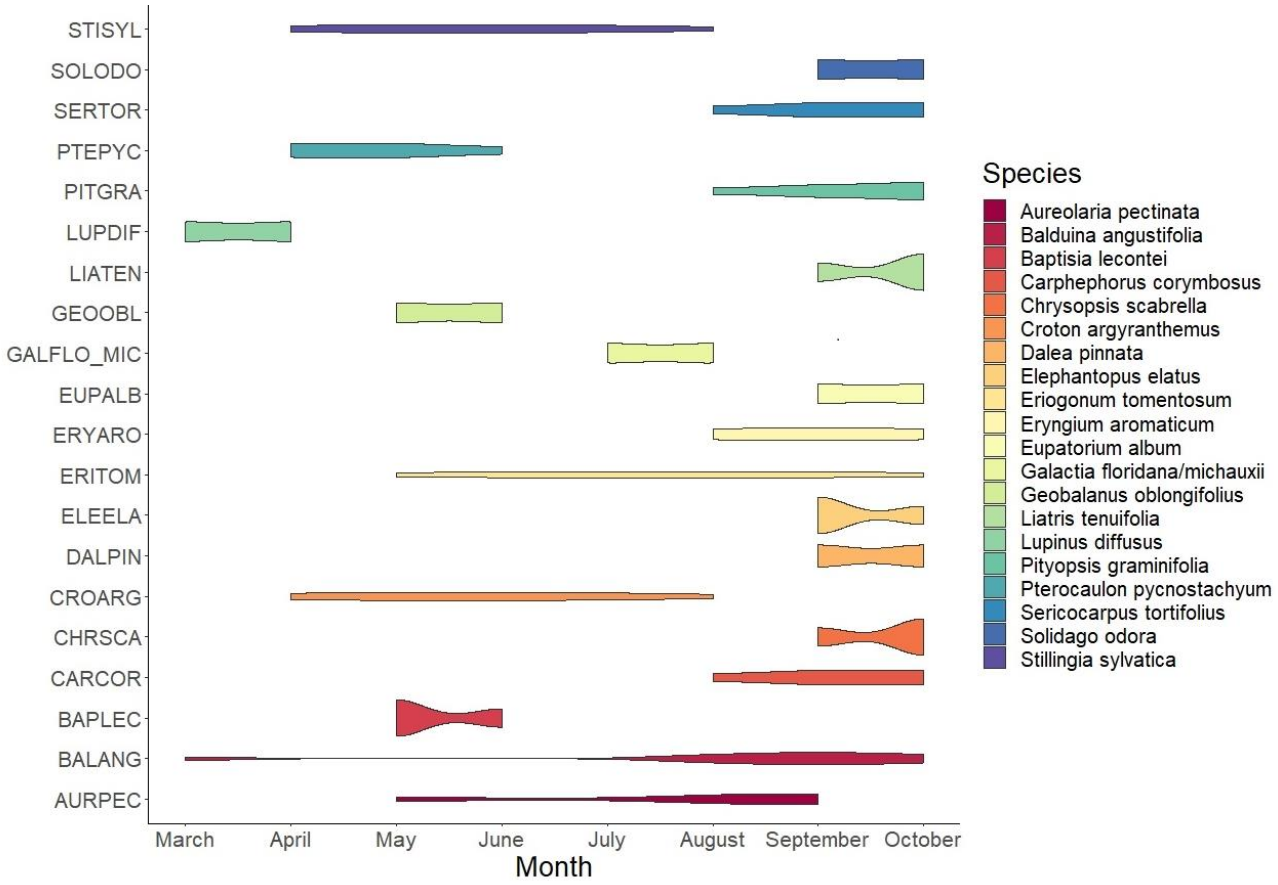
*Plant and insect code key included at end of report



Most frequently observed pollinator genera at Jennings

Key flowering plant species

We identified 20 of the most important herbaceous flowering species that were present on multiple sites and had high pollinator interaction rates throughout the study. Many of these species, shown in the graphic below with their blooming time/duration, were prevalent in Jennings sandhills.



Insect Code Key for network diagrams, with plot occurrence data

		Number Caught			
Code	**Species**	**JE-1**	**JE-2**	**JE-3**	**Insect type**
ABANIC	Abaeis nicippe	1	0	0	Butterflies & Moths
ACMPUL	Acmaeodera pulchella	3	0	1	Beetles
ALLOBL	Allograpta obliqua	1	1	2	Flies
ANALOG	Anatrytone logan	0	0	1	Butterflies & Moths
ANDFUL	Andrena fulvipennis	9	5	1	Bees & Wasps
ANTNOTNOT	Anthidiellum notatum notatum	0	1	2	Bees & Wasps
ANTPER	Anthidiellum perplexum	0	0	1	Bees & Wasps
APIMEL	Apis mellifera	4	1	0	Bees & Wasps
ARAFUMFUM	Arachnospila fumipennis fumipennis	1	0	0	Bees & Wasps
AUGPUR	Augochlora pura	1	0	0	Bees & Wasps
AUGGRA	Augochlorella gratiosa	22	33	13	Bees & Wasps
AUGMET	Augochloropsis metallica	2	0	0	Bees & Wasps
BEMAME	Bembix americana spinolae	1	0	0	Bees & Wasps
BOMBIM	Bombus bimaculatus	1	2	1	Bees & Wasps
BOMIMP	Bombus impatiens	1	1	3	Bees & Wasps
CALCEC	Calycopis cecrops	2	0	0	Butterflies & Moths
CAMPLU	Campsomeris plumipes fossulana	12	0	0	Bees & Wasps
CAMQUA	Campsomeris quadrimaculata	0	0	1	Bees & Wasps
CERFLA	Cerceris flavofasciata floridensis	0	0	1	Bees & Wasps
CHAMAR	Chauliognathus marginatus	10	3	1	Beetles
COLHOW	Colletes howardi	0	2	0	Bees & Wasps
COLOCT	Colpa octomaculata	1	0	0	Bees & Wasps
EPEFLO	Epeolus floridensis	1	0	0	Bees & Wasps
EPISP.	Epicauta sp.	1	0	0	Beetles
EPILSP.	Epistrophella sp.	0	0	1	Flies
EREAUR	Eremnophila aureonotata	1	0	1	Bees & Wasps
ERYHOR	Erynnis horatius	1	0	0	Butterflies & Moths
EUOMEG	Euodynerus megaera	0	1	1	Bees & Wasps
EUPSEP	Euphoria sepulcralis	2	0	0	Beetles
EXOFASA	Exoprosopa fasciata	1	0	2	Flies
EXOFASP	Exoprosopa fascipennis	1	0	2	Flies
HABLAB	Habropoda laboriosa	9	1	1	Bees & Wasps
HEMCER	Hemiargus ceraunus	9	0	0	Butterflies & Moths
HYLFLO	Hylaeus floridanus	1	1	0	Bees & Wasps
HYLPHY	Hylephila phyleus	1	0	0	Butterflies & Moths
ISOEXO	Isodontia exornata	0	0	2	Bees & Wasps
ISOMEX	Isodontia mexicana	0	0	1	Bees & Wasps
LARDIS	Larropsis discreta	2	0	0	Bees & Wasps
LASALA	Lasioglossum alachuense	0	0	4	Bees & Wasps
LASAPO	Lasioglossum apopkense	2	0	5	Bees & Wasps
LASBAT	Lasioglossum batya	0	0	2	Bees & Wasps
LASCRE	Lasioglossum creberrimum	1	1	0	Bees & Wasps

LASFLO	Lasioglossum floridanum	3	2	16	Bees & Wasps
LASLON	Lasioglossum longifrons	0	3	0	Bees & Wasps
LASMIN	Lasioglossum miniatulum	1	0	0	Bees & Wasps
LASNYM	Lasioglossum nymphale	14	2	1	Bees & Wasps
LASRET	Lasioglossum reticulatum	0	10	5	Bees & Wasps
LEPACO	Leptochilus acolhuus	1	0	0	Bees & Wasps
MEGADD	Megachile addenda	1	0	0	Bees & Wasps
MEGBRE	Megachile brevis	2	2	0	Bees & Wasps
MEGCAM	Megachile campanulae	1	0	0	Bees & Wasps
MEGGEO	Megachile georgica	1	0	0	Bees & Wasps
MEGINT	Megachile integra	2	0	0	Bees & Wasps
MEGMEN	Megachile mendica	0	0	7	Bees & Wasps
MEGPET	Megachile petulans	1	1	0	Bees & Wasps
MELCOM	Melissodes communis	0	1	0	Bees & Wasps
MELMAN	Melissodes manipularis	1	0	0	Bees & Wasps
MICMIC	microlep	1	2	3	Butterflies & Moths
MISMEX	Mischocyttarus mexicanus	0	0	1	Bees & Wasps
MORATR	Mordella atrata	1	1	4	Beetles
MORMAR	Mordella marginata	0	0	11	Beetles
MOROBL	Mordella obliqua	0	0	1	Beetles
MORMOR	Mordellidae	0	1	2	Beetles
MUSFLY	muscoid fly	8	2	7	Flies
MYZCAR	Myzinum carolinianum	8	1	1	Bees & Wasps
MYZMAC	Myzinum maculatum	0	0	1	Bees & Wasps
NEMPUN	Nemognatha punctulata	11	0	0	Beetles
NOMFER	Nomada fervida	0	1	0	Bees & Wasps
NOMMAN	Nomia maneei	0	0	2	Bees & Wasps
OCYFUS	Ocyptamus fuscipennis	0	1	0	Flies
OSMSAN	Osmia sandhouseae	0	3	0	Bees & Wasps
OXYTHO	Oxycopois thoracica	1	0	0	Beetles
PACERY	Pachodynerus erynnis	2	0	1	Bees & Wasps
PARFUN	Paracyphononyx funereus	17	0	4	Bees & Wasps
PARSAL	Parancistrocerus salcularis	4	0	0	Bees & Wasps
PERBIS	Perdita bishoppi	0	1	0	Bees & Wasps
PERBLA	Perdita blatchleyi	14	0	0	Bees & Wasps
PERBOL	Perdita boltoniae	0	0	2	Bees & Wasps
PERGERH	Perdita gerhardi	1	0	0	Bees & Wasps
PERKRO	Perdita krombeini/georgica	1	0	0	Bees & Wasps
PEROCT	Perdita octomaculata	5	0	0	Bees & Wasps
PERSP.	Perdita sp.	3	0	0	Bees & Wasps
PHIVEN	Philanthus ventilabris	0	2	0	Bees & Wasps
PHYTHA	Phyciodes tharos	0	1	0	Butterflies & Moths
PHYSP.	Physoconops sp.	0	0	2	Flies
PLENEA	Plecia nearctica	2	0	5	Flies
POEPUN	Poeciliognathus punctipennis	0	0	1	Flies
POESUL	Poeciliognathus sulphureus	2	0	0	Flies

POLCAR	Polistes carolina	1	0	0	Bees & Wasps
POLDOR	Polistes dorsalis	1	0	0	Bees & Wasps
POLFUS	Polistes fuscatus	0	0	1	Bees & Wasps
POLVIB	Polites vibex	1	1	0	Butterflies & Moths
PRITHO	Prionyx thomae	1	0	0	Bees & Wasps
PROMAR	Protographium marcellus	1	0	0	Butterflies & Moths
PYRLIS	Pyrisitia lisa	3	1	0	Butterflies & Moths
SPHICH	Sphex ichneumoneus	1	1	0	Bees & Wasps
STEFUN	Stenodynerus fundatiformis	1	0	0	Bees & Wasps
STEHIS	Stenodynerus histrionalis	1	0	1	Bees & Wasps
STEOCU	Stenodynerus oculeus	1	3	3	Bees & Wasps
STRSEX	Stranglia sexnotata	1	1	0	Beetles
STRSTR	Stranglia strigosa	0	0	1	Beetles
SYRSP.1	Syrphidae sp. 1	0	1	0	Flies
SYRSP.2	Syrphidae sp. 2	0	0	1	Flies
TACGRI	Tachytes grisselli	1	0	0	Bees & Wasps
THOCON	Thorybes confusis	3	1	0	Butterflies & Moths
TRILUN	Trichiotinus lunulatus	0	1	0	Beetles
TRISPP	Trichiotinus spp.	2	0	4	Beetles
TRISP.	Trichopoda sp.	0	0	1	Flies
TRIDEL	Trigonopeltastes delta	1	1	2	Beetles
VESSQU	Vespula squamosa	0	0	1	Bees & Wasps
XYLVIR	Xylocopa virginica	1	3	0	Bees & Wasps

Plant Code Key for network diagrams, with plot occurrence data

		Relative Frequency (% of quads in which present)			
		JE1	JE2	JE3	Plant Type
AGAFAS	Agalinis fasciculata	0	2	3	Forb
AGEJUC	Ageratina jucunda	0	0	1	Forb
ARNFLO	Arnoglossum floridanum	3	0	2	Forb
ASCCIN	Asclepias cineria	2	0	0	Forb
ASIINC	Asimina incana	14	26	11	Shrub
BALANG	Balduina angustifolia	14	0	2	Forb
BAPLEC	Baptisia lecontei	4	4	3	Forb
CALAME	Callicarpa americana	0	0	4	Shrub
CALGRA	Callisia graminea	0	1	0	Forb
CARCOR	Carphephorus corymbosus	23	10	15	Forb
CENVIR	Centrosema virginianum	0	1	3	Forb
CHANIC	Chamaecrista nictitans	3	20	7	Forb
CIRHOR	Cirsium horridulum	0	0	2	Forb
CNISTI	Cnidoscolus stimulosus	5	20	7	Forb
COMERE	Commelina erecta	8	1	0	Forb
CONCAN	Conyza canadensis	7	0	1	Forb
CROARG	Croton argyranthemus	8	2	0	Forb
CROCOR	Crocantheumum corymbosum	0	1	2	Forb
CROMIC	Croton michauxii	4	0	0	Forb
CROROT	Crotalaria rotundifolia	37	14	34	Forb
DALPIN	Dalea pinnata	2	0	0	Forb
DIOSVI	Diospyros virginiana	4	2	3	Shrub
ELEELA	Elephantopus elatus	0	2	7	Forb
ERISTR	Erigeron strigosus	2	1	0	Forb
ERITOM	Eriogonum tomentosum	6	4	1	Forb
ERYARO	Eryngium aromaticum	21	5	15	Forb
EUPALB	Eupatorium album	0	1	3	Forb
EUPCOM	Eupatorium compositifolium	70	0	40	Forb
GALFLO_MIC	Galactia floridana/michauxii	66	36	28	Forb
GAYDUM	Gaylussacia dumosa	3	20	6	Shrub
GEOOBL	Geobalanus oblongifolius	12	2	2	Forb
HIEMEG	Hieracium megacephalon	15	17	13	Forb
HYPSUF	Hypericum suffruticosum	0	0	1	Shrub
LACGRA	Lactuca graminifolia	0	1	0	Forb
LESHIR	Lespedeza hirta	1	0	0	Forb
LIATEN	Liatris tenuifolia	4	1	5	Forb
LUPVIL	Lupinus villosus	1	1	9	Forb

LYGAPH	Lygodesmia aphylla	0	0	1	Forb
OPUHUM	Opuntia humifusa	15	2	8	Forb
PALINT	Palafoxia integrifolia	0	32	15	Forb
PENMUL	Penstemon multiflorus	1	0	0	Forb
PITGRA	Pityopsis graminifolia	81	32	22	Forb
POLPIN	Polygonum pinicola	0	7	0	Forb
PTEPYC	Pterocaulon pycnostachyum	4	14	2	Forb
RHUCOP	Rhus copallinum	0	3	26	Shrub
RHYREN	Rhynchosia reniformis	49	22	38	Forb
RUBCUN	Rubus cuneifolius	1	0	6	Shrub
RUECAR	Ruellia caroliniensis	0	0	7	Forb
SCUINT	Scutellaria integrifolia	0	10	1	Forb
SERREP	Serenoa repens	18	10	17	Shrub
SERTOR	Sericocarpus tortifolius	5	13	8	Forb
SILCOM	Silphium compositum	6	0	5	Forb
SISNAS	Sisyrinchium nashii	1	0	0	Forb
SMIAUR	Smilax auriculata	21	48	43	Shrub
SOLODO	Solidago odora	2	8	15	Forb
STISYL	Stillingia sylvatica	17	18	18	Forb
STYBIF	Stylosanthes biflora	3	1	0	Forb
STYPAT	Stylisma patens	1	13	8	Forb
TEPCHR_SPI	Tephrosia chrysophylla/spicata	57	14	6	Forb
TEPFLO	Tephrosia florida	0	2	25	Forb
VACARB	Vaccinium arboreum	6	73	79	Shrub
VACMYR	Vaccinium myrsinites	28	42	11	Shrub
VACSTA	Vaccinium stamineum	12	8	37	Shrub
VERANG	Vernonia angustifolia	0	0	1	Forb

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Additional Resources

For more information on the natural history and identification of the insects we found at Jennings, these are good places to start:

BugGuide.net: https://bugguide.net/node/view/15740

Discover Life: https://www.discoverlife.org/

For more information on the natural history and identification of the pollinator plants at Jennings, start with these resources:

Flora of North America: http://floranorthamerica.org/Main_Page

Atlas of Florida Vascular Plants: https://florida.plantatlas.usf.edu/

For a more detailed accounting of data analysis, conclusions, and management recommendations, check our FWRI/Upland Habitat website for publications and reports, which will be uploaded as they are finalized: https://myfwc.com/research/habitat/upland/.

Feel free to contact FWRI's Upland Habitat Research & Monitoring team with plant and pollinator questions any time, if we don't have the answer we can find out or point you in the right direction:

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