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Palmetto





Jewels of the Ridge

20 imperiled plants of the Lake Wales Ridge



Photos: facing page, from top left – *Bonamia grandiflora*, *Warea carteri*, *Clitoria fragrans*, *Dicerandra frutescens*, *Polygonella myriophylla*, *Liatrix ohlingerae*, *Prunus geniculata*, *Warea amplexifolia*, *Chionanthus pygmaeus*. This page, below – *Eriogonum longifolium* var. *gnaphalifolium*. Photos © Shirley Denton.

BY CARL WEEKLEY



Twenty of the 47 vascular plants listed in Florida as threatened (T) or endangered (E) by the US Fish and Wildlife Service occur on the ancient sandy spine of the state known as the Lake Wales Ridge (LWR). Although the LWR comprises less than 1% of the land mass of the state, it encompasses over 40% of its federally listed plants. All

20 species are endemic to the Ridge's pyrogenic xeric upland ecosystems, including Florida rosemary scrub, scrubby flatwoods, oak-hickory scrub and sandhill. Lake Wales Ridge T & Es include species with fascinating biogeographical pasts and unusual ways of ensuring their reproductive futures. Some species are rare even when their preferred habitat is not, while others are so common that the ill-informed could mistake them for weeds. What the 20 species have in common is the loss of habitat due to rampant development since the 1950s and the need for fire to promote the long-term persistence of their imperiled populations.

The species accounts presented might have been organized by family, biogeographic affinities, soil and habitat preferences, fire ecology, reproductive systems, or degree of rarity. The pigeon-holing scheme used is arbitrary and was chosen to illustrate a few of the many facets of the unique flora of the Lake Wales Ridge.

Habitat generalists

One way to characterize species is by their habitat preferences. Several LWR T & Es are habitat generalists, occurring in several distinct habitats. For example, scrub morning-glory (*Bonamia grandiflora*), despite its misleading common name, occurs in both white sand scrub and yellow sand sandhills. It is a trailing vine with large showy white-throated blue flowers. Scrub morning-glory is unusual among co-occurring herbs in responding to fire by both resprouting and recruiting from a seedbank.

Papery whitlow-wort (*Paronychia chartacea* ssp. *chartacea*) is short-lived herb that grows in dense sand-hugging mats in

Florida scrub, scrubby flatwoods and in firelanes and other disturbed sites. Its name refers to its supposed medicinal properties in curing whitlow, the flaking off of the skin around fingernails. Flowers are minute and inconspicuous. Although the specifics of papery whitlow-wort's reproductive biology are poorly understood, its populations thrive come fire, flood or off-road vehicle.

Sandlace (*Polygonella myriophylla*), another mat-forming species, is also known as woody wireweed because, in contrast to most Florida members of its genus, it is a long-lived sub-shrub with woody stems. While sandlace generally prefers white sand habitats, it also occurs on yellow sands. With its needle-like leaves, dark twisting stems and profuse creamy white flowers it has the stark beauty of a Japanese print.

Habitat specialists

As well as being geographic endemics, about half of the 20 LWR T & Es are also habitat endemics – species narrowly restricted to certain soil types or plant communities. There are yellow sand endemics like scrub buckwheat, Lewton's milkwort and Florida ziziphus – each of which is described in a section below – and white sand endemics like the species described in this section.

The rarest of the white sand endemics is Avon Park harebells (*Crotalaria avonensis*), a diminutive herb known from only three sites in southern Polk and northern Highlands Counties. This tough little legume braves insect herbivory (and, at one "protected" site, damage by off-road vehicles) to maintain its small local populations. In response to herbivory and perhaps other factors, aboveground population sizes often fluctuate dramatically from month to month as stems die back and re-appear. Conspicuous yellow pea-like flowers require insect visitation for fruit set and seedling recruitment is rare.

Snakeroot (*Eryngium cuneifolium*), a member of the celery family, is both a Highlands County and a Florida rosemary scrub endemic. Rosettes of coarsely dentate wedge-shaped leaves are produced in the spring, followed by scapes bearing heads of greenish-white flowers. Snakeroot is killed by fire but

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quickly recruits postfire from a persistent seedbank. Populations decline rapidly with time-since-fire and without fire local extirpations can occur in as few as 20 years. Thus snakeroot makes the short list as poster child for fire in Florida rosemary scrub.

Highlands scrub hypericum (*Hypericum cumulicola*) has slightly broader habitat requirements than snakeroot. Its primary habitat is Florida rosemary scrub, but it also occurs in the xeric scrubby flatwoods that often surround rosemary balds. Scrub hypericum is a knee-high multi-stemmed herb producing hundreds of flowers in late summer. Each petal of the five-petaled yellow flowers is twisted at its base like a propeller blade. Insect pollinators, primarily solitary native bees, are required for fruit set. Like snakeroot, scrub hypericum is killed by fire and recruits from a persistent seedbank, but it requires less frequent fire to maintain its populations.

As its name suggests, scrub blazing star (*Liatris ohlingerae*) is one of the most spectacular Lake Wales Ridge endemics. In the late summer, plants produce flowering stems bearing heads of bright pink flowers. Unlike snakeroot and scrub hypericum, scrub blazing star resprouts following fire. It is also unusual in having butterfly-pollinated flowers. While fruit set and germination rates are high, seedlings are rare and plants younger than four years of age generally do not flower.

Florida wireweed (*Polygonella basiramia*) is a wispy short-lived herb with multiple wire-like stems to two feet in height. The “weed” in its name may refer to its often dense populations. While its habitat requirements are as narrow as the preceding species, its geographic distribution is less so. Florida wireweed occurs on the Lake Wales, Winter Haven and Bombing Range Ridges. It produces small white flowers in the fall and is unusual in having separate bisexual and female plants, a breeding system known as gynodioecy. In contrast to other white sand endemics, Florida wireweed neither resprouts postfire nor recruits from a persistent seedbank. Instead it must re-colonize postburn sites by dispersal from nearby unburned populations.

Species with western affinities

At least three Lake Wales Ridge T & Es are disjunct taxa of genera centered on the deserts of the southwestern U.S. and

Mexico. These species are western colonizers of central Florida stranded by mid-Pleistocene climate change. Prior to 1.5 million years ago, what we think of as the Gulf (of Mexico) states formed a continuous band of xeric habitat from the Sonoran Desert to the Florida peninsula. A warmer and wetter climate isolated these species on the xeric central ridges of the state.

The most dramatic example of this phenomenon is Florida ziziphus (*Ziziphus celata*), which is also one of the rarest and most imperiled Lake Wales Ridge endemics. The nearest relative of Florida ziziphus is a species endemic to the Baja peninsula (*Z. parryi*) – about as far apart as two species can get and still occupy the same continent. Florida ziziphus is known from just six sites in Polk and Highlands Counties. It is a thorny shrub to six feet in height. While populations comprise dozens to hundreds of stems, most are clones – multiple “plants” sharing the same genotype. Although most populations flower profusely, none produce viable seeds because Florida ziziphus is self-incompatible. Currently there is only one publicly protected (sterile) population, but recent introductions offer the prospect of genetically and sexually viable populations in the future.

Scrub buckwheat (*Eriogonum longifolium* var. *gnaphalifolium*) and scrub beargrass (*Nolina brittoniana*) are two other Lake Wales Ridge plants with strong western affinities. Scrub buckwheat is a long-lived herb that occurs exclusively on yellow sands in sandhill or related habitats. Plants resprout following fire and flower profusely. Since scrub buckwheat, like other scrub members of the buckwheat family, does not have a seedbank, most seedling recruitment occurs from postfire flowering. Flowering plants produce stems with many-branched inflorescences, each with small greenish-white flowers covered in silky hairs. Non-flowering plants persist between burns as one to several rosettes from a common root-stock.

Scrub beargrass is the single monocot among Lake Wales Ridge T & Es. As its name suggests, vegetatively it is grass-like in appearance. It is dioecious, with separate male and female plants bearing conspicuous white flowers on stems up to four feet in height. Scrub beargrass is an edaphic generalist, occurring in both white and yellow sand habitats. It resprouts following fire, but also persists vegetatively in unburned sites.



To explore Archbold Biological Station, visit:
www.archbold-station.org

For a list of endangered, threatened and rare species of the Lake Wales Ridge, see:
www.archbold-station.org/fai/species4.html

Woody mints and annual mustards

In contrast to species with wide geographic affinities, several Lake Wales Ridge T & Es belong to genera restricted to the southeastern U.S. Woody mints in the genera *Conradina* and *Dicerandra* typically have narrowly restricted distributions in Florida and Georgia, while the genus *Warea* extends north to the Carolinas and west to Alabama.

Two of Florida's seven *Dicerandra* species occur exclusively on yellow sand scrub dominated by myrtle oak (*Quercus myrtifolia*) and scrub hickory (*Carya floridana*). Lake Wales balm (*D. christmanii*) and Lake Placid scrub mint (*D. frutescens*) share many features, but differ in two conspicuous respects: *D. frutescens* has purple anthers and a refreshing minty fragrance, while *D. christmanii* has yellow anthers and smells like Vicks VapoRub. Both species are sprawling woody multi-stemmed sub-shrubs. *Dicerandra* species have horned anthers that require visitation by large insects to release pollen. Lake Placid scrub mint is pollinated almost exclusively by a native bee-fly and most likely so is Lake Wales balm. Both species are killed by fire but recruit from persistent seedbanks.

Short-leaved rosemary (*Conradina brevifolia*) is another sprawling mint known from only a few sites in Polk and Highlands Counties. In contrast to the *Dicerandra* species, almost nothing is known about the biology of short-leaved rosemary. Even its taxonomic status is in doubt due to its similarity to *C. canescens* which is restricted to the Florida panhandle.

Carter's mustard (*Warea carteri*) and wideleaf warea (*W. amplexifolia*) are the only two annuals among the 20 T & Es. Carter's mustard once ranged eastward to the Atlantic Coastal Ridge but is now restricted to the southern half of the Lake Wales Ridge. Wideleaf warea is known only from the "Warea Archipelago", a fanciful name for the few remaining patches of sandhill where this critically imperiled species still occurs. Both species are single-stemmed but multi-branched herbs to three feet in height, and both occur primarily in oak-hickory scrub, turkey oak sandhill and scrubby flatwoods. Both species have ping-pong ball sized inflorescences consisting of dozens of four-petaled flowers. The flowers of Carter's mustard are white, while those of wideleaf warea are rose Chablis-pink. Postfire recruitment from a persistent seedbank

results in dramatic population booms, resulting in fields sparkling with bloom.

Unusual breeding systems

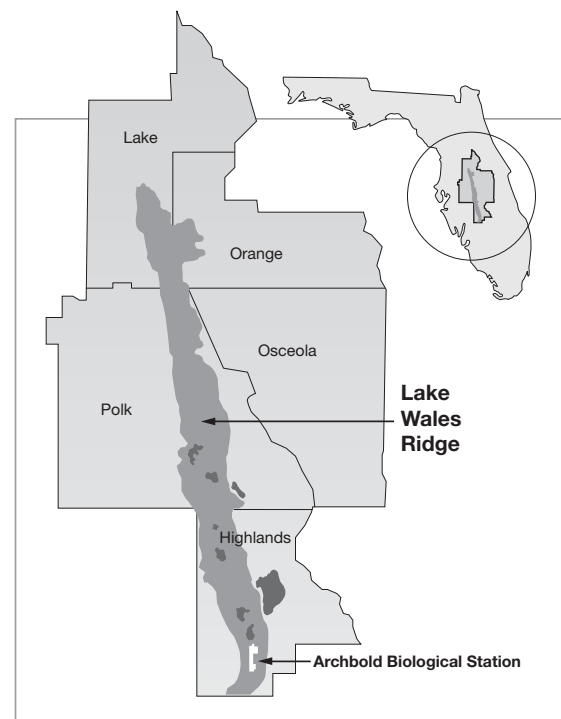
Most Lake Wales Ridge endemics, like most flowering plants worldwide, are hermaphrodites capable of producing viable seeds through both outcrossing and self-fertilization, but four T & Es are noteworthy because of their unusual breeding systems.

Pygmy fringe-tree (*Chionanthus pygmaeus*), a member of the olive family, is a small multi-stemmed tree typically occurring as scattered individuals in sandhill or scrubby flatwoods. It is easily overlooked until it flowers in February.

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Over millennia, rising and receding seas have exposed and covered much of the Florida Peninsula. Following glacial stages, polar ice-caps melted, waters rose, and a series of ridges stood as islands in a vast ocean that covered most of Florida. Isolated from their distant relatives, plants and animals existing on these ridges evolved unique characteristics. The largest of these ridges is the Lake Wales Ridge.

Source: Florida's Ancient Islands – www.archbold-station.org





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Profuse blossoms with long white petals create an arresting image against a background of large dark green leaves. Pygmy fringe-tree flowers are morphologically bisexual (with both stamens and carpels), but are functionally either male or female.

Scrub plum (*Prunus geniculata*), a multi-stemmed shrub in the rose family, grows to five feet in height, but due to its sprawling habit it is often wider than tall. Plants are long-lived and resprout vigorously after fire. Showy white flowers appear in February. Scrub plum individuals produce both male and bisexual flowers, a rare breeding system known as andromonoecy.

Two T & Es, butterfly-wings (*Clitoria fragrans*) and Lewton's milkwort (*Polygala lewtonii*) have both “normal” (chasmogamous) flowers that open to receive insect visitors and closed (cleistogamous) flowers that self-fertilize. Cleistogamy is considered an adaptation to ensure sexual reproduction in habitats where mates or pollinators may be absent or unreliable. Butterfly-wings is a free-standing herb with one or a few purple-black stems to two feet in height. The large pea-like “normal” flowers resemble the more common butterfly pea (*Centrosema virginianum*); the cleistogamous flowers are similar in bud, but do not open.

Lewton's milkwort, a multi-stemmed herb usually less than six inches in height, occurs exclusively on yellow sands. Aboveground flowering stems produce 12-20 small bright pink-purple flowers that mimic pea flowers. Lewton's milkwort also produces cleistogamous flowers on underground stems. It is one of only a few dozen species documented to produce both above- and below ground flowers, a trait known as amphicarpy. Lewton's milkwort is perhaps unique within the Florida scrub and sandhill flora in having ant-dispersed seeds. ⚙️

Research by plant ecologists from Archbold Biological Station, Historic Bok Sanctuary, The Nature Conservancy and several other institutions has greatly increased our knowledge of Lake Wales Ridge T & Es over the last 15-20 years. The latest available information from this research is included in the brief species accounts presented in this article. More detailed species descriptions, further information on on-going research, an exhaustive bibliography, and links to other websites are available at www.archbold-station.org.

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