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Palmetto





Florida ranchlands

Areas of conservation value and opportunities for restoration

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Clouds loom over head, the sky rumbles and cabbage palms rustle loudly. The anticipation of a storm is so strong that I cannot ignore it any longer; I decide to stop working and head indoors. As a field biologist, I've learned to heed the signs of the Florida sky. Nowhere else in Florida but on open rangeland does the sky seem so huge and have so many faces. A storm can produce swirling colors of dark blue, gray, and green while sunsets consist of varied combinations of red and orange interrupted by the dark silhouettes of palms. Under this vast Central Florida sky, cattle graze on a mosaic of habitats which also house many native species. The role of cattle ranches in protecting natural resources and Florida ecosystems is significant but often unrecognized.

Ranchland occupies most of the terrain surrounding Lake Okeechobee, especially north of the Lake (Swain et al. 2007). Ranches in southern Florida are valuable in many ways. They provide jobs and support rural economies. Many native Floridians grew up on or around ranches and associate ranchland with the "real" Florida. Unfortunately many of these ranches are threatened by development. The loss of ranches results not only in the loss of history and a sense of place for many people but it also means that many plant and animal species that make their homes on ranches could vanish or decline. Burrowing Owls, Crested Caracaras, Eastern Meadowlarks, and Bobwhite Quail rely on open ranchland as habitat. Also, one of the secrets of Florida ranches is that they contain extensive natural areas such as prairies, marshes, and hammocks that have not been highly altered from their original state.

Florida ranches consist of a combination of improved pasture (fertilized, bahia grass), unimproved or semi-native pasture (unfertilized, a mixture of native and exotic grasses) and native rangeland. Because many ranches contain substantial native areas,

they are extremely important for increasing and maintaining the biodiversity of the Florida landscape (Swain et al. 2007). In Florida and other places in the US, a pivotal conservation strategy is to work with ranchers to keep large parcels of private ranch land from being developed (Maestas et al. 2003). Native and semi-native rangelands (unfertilized and unplowed grasslands or prairies) are also important areas of biodiversity in many European countries, including Sweden, Finland, The Netherlands, Germany, and England, and the decline of semi-natural grasslands is one of the major threats to European flora and fauna (Fuller 1987).

Florida's semi-native ranchlands contain several rare habitat types including wet prairie, dry prairie, calcareous prairies and cabbage palm savannas. Expert botanists, Edwin Bridges and Steve Orzell (Avon Park Air Force Range), study prairies throughout Florida and have found calcareous prairies to have one of the highest incidences of vascular plant species diversity ever recorded in North America, with up to 171 species in 1000 m² (Orzell and Bridges 2006). Because of their rarity and extremely impressive biodiversity, disturbed or remnant calcareous prairies should be protected and restored. Unfortunately, there are several strong threats to Florida semi-native rangelands, including suburban development, intense agricultural uses such as sod and vegetable farming and conversion to improved pastures dominated by exotic forage grasses and more intense management practices.

Buck Island Ranch and the Indian Prairie

One prime example of a Florida ranch is Buck Island Ranch, the location of MacArthur Agro-Ecology Research Center (MAERC; a division of Archbold Biological Station). This ranch is composed of 51% improved pasture and 49% semi-native rangeland. Buck

Island Ranch is a large ranch (10,500 acres), and professional cowboys headed by ranch manager Gene Lollis, manage 3,000 head of cattle which include Brahman cross cows bred to Angus or Charolais bulls. Over 2,300 calves are raised annually making Buck Island Ranch among the top 20 producers of cow-calves in Florida. Hunting provides further revenue for the ranch as there are many deer, hogs, alligators and turkeys. Dr. Patrick Bohlen directs ecological research at MAERC. One major focus of the research program is to determine the impact of ranching on water quality and the capacity for ranches to store water and prevent phosphorus runoff from reaching downstream waterways, and ultimately Lake Okeechobee, the headwaters to the Everglades. High phosphorus loading has severely impaired Lake Okeechobee and is a threat to the Everglades restoration efforts. Another focus of the ranch research program is to understand the basic ecology of ranch systems, and to provide information about the ecological value of ranches to the broader scientific community, ranchers and the public. Researchers at MAERC collaborate with the University of Florida IFAS, South Florida Water Management District, the Florida Department of Agriculture and Consumer Services, The Florida Cattlemen's Association, the Florida Department of Environmental Protection, the USDA Natural Resource Conservation Service (NRCS) and Agricultural Research Service, and the World Wildlife Fund, as well as other

private ranches in the Lake Okeechobee watershed. Goals include determining how agricultural land can be utilized to minimize phosphorus flow and to maximize wildlife habitat and ecosystem services while remaining economically viable. Buck Island Ranch is situated in an area historically known

as the "Indian Prairie" a 250-square mile area in south-central Florida, extending from Lake Istokpoga to Lake Okeechobee (Kushlan 1990). Remnants of the original Indian Prairie can be found in the NRCS Wetland Reserve Program Site on Buck Island Ranch (Bridges and Orzell 2005), within the Fisheating Creek basin, Avon Park Bombing Range, and Kissimmee Prairie Preserve (Tanner et al. 1982). The Indian Prairie region historically consisted of wet palm savannas and wetlands, interspersed with dry prairie islands (Davis 1943, Meshaka 1997). Calcareous prairies, which are rare in south-central Florida and more common in south Florida, exist within the Indian

Prairie, and support a unique flora. The calcareous prairie is often dominated by muhly grass, *Muhlenbergia capillaris* var. *filipes* (Photo 1), and love grasses (*Eragrostis* spp.) both of which display striking purple inflorescences in fall (Bridges and Orzell 2005, Orzell and Bridges 2006), and are present in the semi-native pastures of Buck Island Ranch. In a survey conducted on Buck Island Ranch in 2005, in addition to finding wet and calcareous prairie types, Bridges and Orzell found two types of little disturbed, Indian Prairie savanna; including *Sabal palmetto*/*Spartina bakeri* wet savanna and *Sabal palmetto*/*Cladium jamaicense* wet savanna. Other species found in the prairies at Buck Island Ranch include

Mecardonia acuminata var. *peninsularis* (endemic to peninsular FL), *Sacoila lanceolata* var. *lanceolata* (Photo 2), *Polygala grandiflora* var. *angustifolia*, *Aristida palustris*, *Aristida patula* (endemic), and *Euthamia graminifolia* var. *hirtipes* (the most extensive inland population ever observed by Bridges and Orzell (2005); (Photo 3).

Light or moderate grazing on semi-native pastures or native range, both of which are used as winter pastures on many ranches, maintains a diverse prairie community, including the more sensitive species (Duever 1986). The strong threat of converting semi-native

pastures to improved pastures in order to support more cattle or to convert them into subdivisions threatens the future of these valuable prairie and savanna remnants in Florida. There are only a few protected prairie reserves, including Paynes Prairie near Gainesville and Kissimmee Prairie near Okeechobee, making prairie remnants on ranchlands extremely important as intermediate habitat and buffers providing habitat continuity and connectivity with public prairie preserves.



Photo 1: *Muhlenbergia capillaris* var. *filipes*



Photo 2: *Sacoila lanceolata* var. *lanceolata*



Photo 3: *Euthamia graminifolia* var. *hirtipes*

Continued on page 14

Florida ranchlands

Marshes and Wetlands on Ranchland: Refuges for Native Plants

Marshes and wetlands on Buck Island Ranch serve as refuges for native plants in a drained landscape. There are 628 small isolated wetlands on the property and these wetlands harbor considerable native diversity. In a survey of 40 wetlands on the ranch, 20 improved and 20 semi-native, we found 154 species, of which



Photo 4: *Hypericum edisonianum*

nine were exotic. Endemic species include a large population of the federally endangered *Hypericum edisonianum* (Photo 4). Another endemic, *Aristida patula*, is found commonly within the semi-native pasture wetlands, and muhly grass, which is nearly endemic with calcareous affinities, is found along the borders of many of the semi-native wetlands. Some commonly found species include: *Amphicarpum muhlenbergianum*, *Cephalanthus occidentalis*, *Cladium jamaicense*, *Fuirena scirpoidea*, *Hypericum fasciculatum*, *Ipomoea sagittata*, *Oxypolis filiformis*, *Polygala cymosa*, *Rhynchospora filifolia*, *R. inundata*, *R. tracyi*, *Sabatia grandiflora*, *Sagittaria latifolia*, and *Utricularia foliosa*.

Restoration of Natural Communities on Working Ranches

Semi-native pastures are easier targets for restoration than improved pastures and could serve as valuable mitigation land. Semi-native pastures typically have never been fertilized or limed and therefore soils in these pastures and wetlands tend to have much lower phosphorous contents and the soils and detrital layers are less disturbed. Because semi-native pastures haven't been plowed, it is likely that a native seed bank still exists and many native species are still present. For restoration of prairie remnants, a short hydroperiod is required, with approximately four months of shallow flooding (Orzell and Bridges 2006). Fire regime is extremely important for prairie species and a natural spring burning regime is needed to increase the number of plant species found in these areas and also increase flowering of existing species (Main and Barry 2002, Bridges and Orzell 2005). Grazing should be low intensity and areas should be closely monitored for any problems caused by exotic species.

In marshes, restoration of a longer hydroperiod is important for wetland plants that thrive in deeper water conditions, such

as *Cladium jamaicense*, *Rhynchospora inundata*, *Panicum hemitomon*, *Saccharum giganteum*, *Cephalanthus occidentalis*, and *Paspalidium geminatum*. A fluctuating water regime would best mimic the historical hydrology as many species are adapted to a period of both wet and dry periods. For example, maidencane (*Panicum hemitomon*) can die out if there is prolonged flooding and is replaced by emergent vegetation such as pickerelweed (*Pontederia cordata*) or cattail (*Typha latifolia*) (Kushlan 1990). There are also many shallow marsh species at Buck Island Ranch such as spider lily (*Hymenocallis latifolia*) and *Canna flaccida* which would benefit from a fluctuating water regime. Resuming a natural fire regime (early growing season) would also be integral to restoring marshes and wetlands on ranchlands where most fires usually occur in the winter. Fire plays a crucial role in marshes affecting both species composition and nutrient dynamics, and most deep water marshes historically burned every three to five years while shallow marshes burned every one to three years (Kushlan 1990).

In addition to restoring hydroperiod in ranch wetlands, some of the more intensely grazed wetlands may require more work than just simply removing cattle. At Buck Island Ranch, intensely grazed wetlands are dominated by *Juncus effusus* subsp. *solutus*, plant diversity is reduced, and nutrient levels are higher. The effect of *Juncus* on other plant species may be of importance for grazed wetland restoration (see the "Closer Look" sidebar). How wetlands respond to complete removal of grazing is unknown and historical successional trajectories may be altered. For example, in herbaceous sedge meadows in Wisconsin, removal of cattle resulted in a dominance of shrubs (Middleton 2002). A possible solution could be light or moderate grazing that allows for recovery of native species while inhibiting establishment of undesirable shrub species. Management of vegetation through mechanical chopping or through prescribed fire are other possible alternatives. A new experiment at Buck Island Ranch, funded by the USDA, in which 20 entire wetlands (10 improved pasture wetlands and 10 semi-native pasture wetlands) are fenced (established in spring 2007) will determine how complete removal of grazing influences plant species composition and spread of exotic species.

Ranches or Suburbs?

The development of Florida ranches into subdivisions or more intensive agricultural activities threatens a spectacular array of natural communities (Hiscock et al. 2003; Swain et al. 2007). Florida's ranchlands contain areas that have been relatively little disturbed with impressive examples of natural communities; just one example are the prairies and savannas found on Buck Island Ranch. Ranchlands also provide a buffer for more natural conserved areas. Attempts should be made to conserve and restore these precious areas and to create incentives for ranchers to maintain and restore natural communities located on their ranches. Florida ranches provide windows of what Florida looked like in the past and contribute greatly to the current beauty and biodiversity of the Florida landscape.

A CLOSER LOOK:

The role of *Juncus effusus* in grazed wetlands

The edges of improved pasture wetlands are dominated by soft rush, *Juncus effusus* subsp. *solutus*, which creates a large tussock. Cattle avoid *Juncus*, presumably due to the plant's tough spiky culms. At Buck Island Ranch, I am investigating the role of *Juncus* in protecting native wetland plants from being eradicated by cattle in grazed wetlands. It appears that *Juncus* tussocks prevent many species from being eaten and that plants growing within or next to *Juncus* are protected from grazing. My data show that native plants such as maidencane (*Panicum hemitomon*), regain dominance when cattle are removed (Photo 5).

Other native plants that I have observed growing within the *Juncus* clump include *Justicia ovata* var. *ovata*, *Ipomoea sagittata*, *Centella asiatica*, *Galium tinctorium* and *Diodia virginiana*. This suggests that plant communities in grazed wetlands can be restored because they still contain native diversity. Additionally, once grazing is removed, we have found that *Juncus* declines.

In many grazed ecosystems, unpalatable plants such as *Juncus* are seen as pests and ranch managers have focused on controlling these plants. However numerous studies have shown that unpalatable plants protect substantial native plant populations, beneficial for both agricultural and conservation interests (Callaway et al. 2005, Rebollo et al. 2005). A down-side is that exotic plants also benefit. I have found that *Juncus* seems to provide protection to limpo grass (*Hemarthria altissima*; FLEPPC 2007, Cat. II); alligatorweed (*Alternanthera philoxeroides*; FLEPPC Cat. II) and torpedo grass (*Panicum repens*; FLEPPC Cat. I). Experimental grazing exclosures built in wetlands with limpo grass, an exotic forage grass from Africa, results in a complete monoculture of this mat-forming exotic. The rancher may prefer to see this exotic species proliferate because of its value as a forage species. Torpedo grass and alligatorweed do not form monocultures in these seasonal wetlands when grazing is removed but long-term data on the response of these species are lacking.

Research on the ecological relationships in managed ecosystems, such as rangeland, is important to elucidate mechanisms that might aid in restoration of these areas as well as control the proliferation of exotic species.

Photo 5: A typical improved pasture wetland on Buck Island Ranch. On the left is a fenced area that has been protected from cattle for four years and is dominated by *Panicum hemitomon* and *Sacciolepis striata*. *Juncus* is declining. Pasture on the right side of the fence shows an area dominated by *Juncus* that has been severely grazed.



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Palmetto

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is to conserve, preserve, and restore the native plants and native plant communities of Florida.

Official definition of native plant:

For most purposes, the phrase Florida native plant refers to those species occurring within the state boundaries prior to European contact, according to the best available scientific and historical documentation. More specifically, it includes those species understood as indigenous, occurring in natural associations in habitats that existed prior to significant human impacts and alterations of the landscape.

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