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THE VITAL LINK BETWEEN LAND AND WATER: THE IMPORTANCE OF UPLANDS FOR PROTECTING WETLAND FUNCTIONS

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Wetlands are valuable natural resources that provide many benefits to people and the environment. The importance of wetlands can be described in terms of the functions they perform, including flood control, water quality enhancement, water supply, wildlife habitat, energy transfer (from plant to animal or from animal to animal, as in the food chain), and nutrient cycling (movement of chemicals through the system, such as nitrogen or carbon or oxygen), as well as contributing much to Florida's natural beauty. In recognition of their environmental and economic value, wetlands are legally protected at the local, regional, state, and national level.

The occurrence of both wetlands and uplands is dependent upon the local geography, topography, geology, hydrology, soil types, and frequency of fire. A wetland occurs in a low spot in the topography and is defined by and dependent upon the surrounding upland habitats. Unfortunately, the upland habitats bordering freshwater wetlands have not been provided protection to the same extent as wetlands.

Upland habitats have been extensively developed for residential and agricultural use, often right up to the wetland boundaries. Such development may well result in degradation and loss of the value for which wetlands were protected. The wetland functions most threatened by loss of upland habitats are water quantity and quality, energy and nutrient systems, and wildlife habitat.

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The relationship between surface water in wetlands and ground water in the surrounding uplands is very complex, but frequently in Florida, the surface water in the wetland is dependent upon the ground water in the upland. Drilling wells in an upland to supply water for development or agriculture will reduce the ground water level and decrease the depth of water and the hydroperiod (the length of time the surface is inundated) in the nearby wetland. This decrease can cause changes in the structure and composition of the wetland community. The usual result following drainage of a wetland is a replacement of plant and animal life adapted for deeper water and a longer hydroperiod with those species adapted for shallower water and/or shorter hydroperiods. Small wetlands are the most vulnerable to changes in water levels and small wetlands with short hydroperiods can easily be completely eliminated.

Uplands that border wetlands can filter, catch and retain dissolved and suspended matter carried by surface runoff of water from surrounding landscapes. When an upland adjacent to a wetland is developed, sedimentation (the increase of deposited particulate matter), can become a major water quality problem for the wetland. The upland vegetation is particularly effective at controlling sedimentation and turbidity (particulate matter suspended in water). Without the benefit of this first stage of filtration and catchment, sediments carried by overland flow can fill the wetland, eventually causing a transition to upland habitat.

When wetlands are degraded or lost in this manner, open waters are affected, which may ultimately affect the quality of the water that recharges the aquifer. Preserving wetland and upland linkages is important to maintaining good water quality in the wetland and in the groundwater.

The major structural components of an ecosystem, including energy, chemicals and organisms, are connected by the systems of energy flow and nutrient recycling. Energy flows from the sun to primary producers (plants), through the consumers (mostly animals) and finally to decomposers (bacteria and fungi), which then recycle it back into the environment as essential nutrients (nitrogen, carbon, etc.). Alterations that disrupt the flow of energy and nutrients between uplands and wetlands decrease the ability of both habitats to function normally.

Interactions between wetland and upland habitats can be a major factor in determining the amount of energy and nutrients in these systems and how the energy and nutrients are used. Wetlands provide habitat for many species of birds, mammals, reptiles, amphibians, fish and a variety of invertebrates. Many of these species feed and/or breed in wetlands and then spend time in adjacent upland habitats where they defecate, die and become food for upland animals, adding both energy and organic matter to the upland community. Surface runoff then carries the organic and mineral material back into wetlands. The exchange of organic material and energy between terrestrial and aquatic habitats provides important nutrients for both systems.

Wetland areas provide habitat for many wildlife species. Some are completely aquatic such as fish. Some are semiaquatic such as alligators, amphibians, and some turtles. Wetlands also provide critical habitat components for species that are generally considered strictly terrestrial. A typical direct upland and wetland linkage occurs when a species resides and feeds in one of these two habitats and breeds in the other. Examples include the aquatic turtles such as the snapping turtles (Chelydra serpentina), which reside in wetlands and open water areas, but require adjacent uplands for nesting; and tree frogs, which have the opposite pattern.

Together, amphibians and fresh water turtles often make up the majority of the biomass of the larger vertebrates in their respective habitats, and therefore can have a great affect on community structure and function. Turtles carry seeds and parasites between habitats. Amphibians often are top predators in aquatic systems, and the most important prey in some terrestrial systems. The disruption or elimination of one habitat destroys the linkages that provide essential elements for species survival and could have drastic effects.

The preservation of the linkages between uplands and wetlands is essential for protecting the structure and function of wetland systems. One solution for preserving wetland/upland linkages is the creation of buffer zones to separate developed upland areas from wetland systems. But the adequate size of the buffer zone must be determined scientifically. The preservation of upland buffer zones is controversial because it changes the designation of land previously considered suitable for development. This carries a considerable economic cost and must therefore be strongly justified.

Although buffer zones can protect some of the aquatic and terrestrial linkages, they will not protect them all. For example, the importance of the amphibian component of a wetland contribution to local energy cycles extend far beyond their borders. Some frogs and toads utilize habitat surrounding their-breeding ponds up to a distance of 2 km (1.24 miles). A buffer of 2 km around a small pond to protect this food web interaction would encompass 1300 ha (3211 acres). Since small wetlands tend to be scattered widely over the landscape, an upland of this size set aside to completely protect this linkage would not be realistic in a development site plan, but might be in a large, intact area such as a mitigation bank.

As we learn more about wetland functions we realize the challenges in preserving them. Our ability to predict the effects of upland habitat loss on wetland habitats must be improved to provide a scientific basis for sound natural resource management decisions. Only then can these decisions reduce or eliminate negative impacts caused by urban growth.

REFERENCES: Moler, P.E. and R. Franz. 1987. Wildlife values of small isolated wetlands in the southeastern coastal plain. Proc. of the Third SE Nongame and Endangered Wildlife Symp. GA Dept. of Natural Resources. pp. 234-238.