







Photo Courtesy of Ginger L. Corbin, U.S. Fish & Wildlife Service

Controlled burns of underlying vegetation are a must for many Florida habitats and needs to be factored into local planning and development decision.

In addition to the planning tools described earlier, there are a number of management and design factors that can be incorporated into communities and developments to make them more wildlife friendly. For example, following “Firewise” practices such as establishing buffer zones and removing exotic vegetation benefit humans and wildlife alike. Dark Skies ordinances protect wildlife from the harmful effects of ecological light pollution. Additionally, steps can be taken to plan stormwater management, buffer waterbodies and managing the long-term behavior of residents for wildlife value.

### MANAGING FOR FIRE

It is counter-intuitive to many, but Smokey the Bear was quite wrong—at least when it comes to fire-adapted ecosystems. Fire is a desirable and essential event for many of Florida’s natural systems, as well as for the safety of developed areas. Fire is part of the natural regime in many Florida ecosystems including pine flatwoods, dry prairies, scrubby flatwoods, sandhills, sand pine scrub and xeric oak scrub. Even many of Florida’s wetland areas benefit from fires that sweep across their expanses during extended droughts.

Many habitat types depend on cyclic regularity of fire, plant growth, fuel accumulation and fire again. Fire brings benefits to ecosystems, including reducing fuel, opening the landscape, killing back certain plant species, releasing nutrients, and stimulating new growth, as some species only go to seed after a fire. The changes that fire causes in plant community structure are essential for many species of wildlife. Without periodic fire, the type and distribution of plant communities change. The habitats become increasingly unsuitable for native wildlife adapted to these environments. Additionally without periodic fire, fuel loads accumulate. This results in extremely disastrous fires that destroy or damage both human and wildlife habitats during drought years.

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## Management and Design Factors

*The idea behind prescribed fire for fire-adapted ecosystems is that regular landscape fires are not destructive to the prevailing habitat types and, in fact, burning acts to sustain the native composition and density of vegetation. This can serve to reduce competing invasive plants, and control pest problems and opens space for tree regeneration, wildlife feeding and travel.*



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In many areas, the natural fire cycle has been disturbed. This is due to a developing consensus that the best way to eliminate damaging fires was to suppress fires. In Florida and around the nation, this has led to dangerous fuel load accumulation. As a result, there is greater potential for fires to burn out of control. This impacts rural and suburban communities. In addition to obvious property damage or destruction, these fires can result in a temporary reduction of air quality and impacts on human health, due to smoke, as well as reduced visibility and more accidents due to smoke encroachment on roadways. Where prescribed burns are regularly and properly conducted, a smaller fuel load remains than under periodic wildfire conditions, causing less damage to wildlife and human settlement areas.

**Ecosystem Benefits of Prescribed Burning** – For wildlife and habitats there are many benefits from fire. Many species of plants and animals require periodic fire to maintain habitat conditions needed for their survival. For example, the Florida

scrub jay and red-cockaded woodpecker, both listed endangered species, are each dependent upon fire to maintain suitable habitat conditions. In the absence of fire, habitat conditions change and the diversity and abundance of wildlife eventually declines.

The idea behind prescribed fire for fire-adapted ecosystems is that regular landscape fires are not destructive to the prevailing habitat types and, in fact, burning acts to sustain the native composition and density of vegetation. This can serve to reduce competing invasive plants, and control pest problems and opens space for tree regeneration, wildlife feeding and travel. Surprisingly, wildlife begins to use burned areas immediately following a fire, often literally before the smoke clears. Observations reveal a wide variety of species, including white tailed deer, tortoises, snakes, and all manner of bird life in areas immediately following a fire.

The post-fire recovery process is influenced by fire intensity, type of habitat, and patterns of rainfall. Recently burned areas actually attract many species of wildlife and seem to have little effect on use by others. Tender shoots from re-sprouting shrubs and herbaceous vegetation that emerge following a fire are highly nutritious and attract wildlife such as white-tailed deer and other herbivores. Fruit production is also stimulated by fire, resulting in increased availability of seeds and berries that provide food for many species of wildlife. Predators too, are attracted to these areas, presumably in response to the abundance of prey. Recently burned areas also are important feeding areas for chicks of ground foraging species, such as turkey and bobwhite quail. The rapid recovery of vegetation, the apparent ability for most species of wildlife to use recently burned areas, and the high-quality habitat provided during post-fire recovery indicate that fire enhances wildlife habitat in Florida's fire-adapted habitats. Fire in Florida often represents renewal of wildlife habitats.

In this regard, to most closely mimic the natural regime, controlled burns are generally conducted during the lightning season (May-June). Nevertheless, season timing of a burn is site specific and specific to particular management goals. Further, the return frequency of controlled burns for an area should strive to mimic the natural fire adapted ecology regime. The Division of Forestry's *Basics Prescribed Fire Training Manual* for maintaining natural communities and wildlife habitat provides recommended burning frequencies for different habitat types. It is available at [www.fl-dof.com/wildfire/rx\\_training.html](http://www.fl-dof.com/wildfire/rx_training.html).

**"Firewise" Design and Management** – Due to the impacts of repeated wildfires on ecosystems and developed areas, Florida has adopted a design and management approach known as "Firewise." This approach seeks to strike a balance between known ecological benefits of regular fires across many of Florida's landscapes, and the pragmatic realities that human development must be designed to be safe and sustained within fire the dependent ecosystems. Firewise development design is well covered in the Florida Departments of Community Affairs and Agriculture and Consumer Services 2004 publication, *Wildfire Mitigation in Florida: Land Use Planning Strategies and Best Development Practices*, which is available at [www.firewise.org](http://www.firewise.org).

Firewise community planning and development design actions can incorporate the following:

- Preservation of Critical Smoke Dispersal Areas (CSDAs) or important smoke sheds that are essential for the safe and effective dispersal of smoke resulting from prescribed fire. These areas are identified through GIS mapping and delineate portions of the landscape needed for smoke dispersal dependent upon the spatial context of the fire use area and the ambient wind direction patterns used for prescribed fire. Proper growth design should avoid placement of critical smoke targets such as airports, schools, hospitals and roadways within these historic dispersal areas. Uses such as agriculture, silviculture, low density residential

development, and appropriately designed and configured roadways may be appropriate within these areas.

- Creation of an overlay for developed areas adjacent or proximate to managed lands receiving ecological burns, which note the realities of regular burns and a "Notice of Proximity" issued. This notice is recorded in the deed or rental agreement on all properties within the overlay zoned area boundary. It makes all property owners aware that the managed area is within close proximity and that there are certain practices regularly take place such as prescribed fire (and thus smoke and increased fire risk), pesticide usage, heavy machinery usage, removal of exotic plants and animals.
- For developments within fire dependent ecosystems, not only should habitat be saved, but a minimum 30 foot buffer for a fire line should be saved adjacent to habitat. This, due to the periodic construction of fire lines separating developed areas and preserved habitat.
- Incorporation of Firewise Practices in any subdivision built within fire dependent ecosystems. Without these practices it will be harder to do prescribe burns or protect homes and lives from wildfires.
- Placement of stormwater ponds, trails, or other open space along outer edge of developed areas adjacent to managed lands to act a fire break.
- Use of conservation subdivision designs wherein the common area set-aside is strategically placed as a fire break between the managed fire-adapted area and the developed area.
- Regular elimination and control of exotic plants that may contribute to the fuel load can be programmed.
- Hydrology restoration for altered, over-drained land and habitats proximate to developed or developing areas can be instituted. This is often possible as old agricultural areas are urbanizing or suburbanizing.

**Conducting Prescribed Burns** – From a wildlife and habitat perspective, before development dominated the Florida land-

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## Management and Design Factors

*Today, the principal management tool to supplement wildfire's role in perpetuating such communities is the "prescribed ecological burn". (i.e., a controlled burn which promotes ecological benefits), mechanical treatments, herbicides, and biomass removal.*

scape, fires were generally ignited by lightning strikes. The intensity of the fire varied by plant community, and frequency ranged from 1 to 40 years. Today, the principal management tool to supplement wildfire's role in perpetuating such communities is the "prescribed ecological burn" (i.e., a controlled burn which promotes ecological benefits), mechanical treatments, herbicides, and biomass removal.

In many instances, prescribed burning is by far the most cost effective treatment to reduce fuel loads. In Florida, prescribed burning is authorized by Chapter 590, Florida Statutes and Chapter 51-2 of the Florida Administrative Code, commonly known as the Florida Prescribed Burning Act. The statute includes two sets of provisions regulating prescribed burning, one for non-certified burners, and another for certified prescribed burn managers. A "certified prescribed burn manager" is a person who has completed the Division of Forestry (DOF) prescribed burning certification program. Such an individual can be authorized to conduct burns under the sensitive, open, and forest and range categories. A certified prescribed burn manager can burn under less restrictive air dispersion criteria, and enjoys increased liability protection. Under the Florida Prescribed Burning Act, prescribed burning must:

- Be performed only when at least one certified prescribed burn manager is present on site.
- Have a written prescription (a plan for starting and controlling a prescribed burn) prepared prior to receiving authorization from DOF to burn.
- Be in the public interest and not cause a public or private nuisance when conducted pursuant to state/local air pollution statutes and rules applicable to prescribed burning.
- Be considered a property right of the property owner if naturally occurring (vegetative) fuels are used and when conducted pursuant to the Act's provisions.

As long as these provisions are fulfilled, no one can be held

liable for injury or damage caused by a fire unless negligence can be proven.

The Florida Division of Forestry has a Smoke Screening Tool available at [www.fl-dof.com/wildfire/tools\\_and\\_downloads.html](http://www.fl-dof.com/wildfire/tools_and_downloads.html). Anyone can use the tool, but it is primarily designed to allow individuals who are planning on conducting acreage or pile burning to view a predicted smoke plume for the planned burn. As long as all burn parameters are the same, you will see the same plume with the Smoke Screening Tool that the Division of Forestry Duty Officer sees when they issue or deny an official authorization. However, the Smoke Screening Tool does not authorize a burn, and an individual must still contact the appropriate Division of Forestry District Office to obtain a burn authorization.



Disney Wilderness Preserve with Critical Smoke Dispersal Areas.

Photo Courtesy of The Nature Conservancy

## FIRE IN THE SUBURBS: ECOLOGICAL IMPACTS OF PRESCRIBED FIRE IN SMALL REMNANTS OF LONGLEAF PINE SANDHILL

Logging, fire suppression, and urbanization have all contributed to the serious decline and fragmentation of the longleaf pine ecosystems in Florida and the southeastern United States. Management practices (or lack thereof) have led to replacement of many longleaf pine savannas by closed-canopy forests dominated by oaks and other hardwoods. Effective management of the remaining patches of these fire adapted communities must incorporate periodic low-intensity fires, even where they are located on private lands in populated urban and suburban areas. Research has demonstrated that prescribed fire can be used for restoration and management of small remnants of longleaf pine sandhill in suburban neighborhoods. It is also clear that although a single prescribed burn can be effective, it will take more than one burn to attain desired restoration goals in degraded longleaf remnants.

Approximately 75 percent of the remaining longleaf pine lands occur in stands less than 100 acres; about one-third are less than or equal to 20 acres. Most remaining longleaf pine habitats are on private lands. Many of these areas are in ecological decline and are being lost in suburban settings, partially because people are uninformed about how longleaf pine ecosystems can be maintained. One conservation option is to work to preserve or restore the multitude of small fragments that remain. Although it is comparatively easier to maintain the ecological integrity of larger tracts of forest, these small habitat "islands" can provide effective demonstrations the benefits of restoration and management of natural ecosystems. Small habitat remnants, even in highly fragmented areas, can play critical roles in the preservation of biological diversity though management plans are needed for these longleaf pine remnants

Photo Courtesy of Ginger L. Corbin, U.S. Fish & Wildlife Service



located within suburban areas.

These areas are small and are likely to require labor-intensive management to maintain or enhance sandhill species' population sizes and diversity, reduce hardwood densities, and prevent further invasion of native hardwoods and exotic species. Prescribed fire is a cost-effective and ecologically beneficial tool that can be used to achieve these objectives. Where longleaf pine ecosystem restoration is the goal, herbicide and mechanical treatments in addition to prescribed burns are the standard treatments used to reduce dense hardwood midstories that occur as a result of fire suppression. Although herbicides and mechanical treatments are effective in eliminating unwanted plants, each can be significantly more costly than prescribed burning. Furthermore, herbicides can be toxic to wildlife, and wiregrass, a keystone component of longleaf pine ecosys-

tems, is adversely affected by mechanical treatments.

Research shows that prescribed fire can be a viable and effective land management tool in small habitat remnants. However, it is also evident that after many years of fire prevention it will take more than one prescribed burn before a degraded remnant of a fire adapted ecosystem can be "restored." Multiple prescribed burns may be necessary to achieve this goal. The impacts of additional fires can be enhanced by selective removal or thinning of dense areas of hardwoods; many degraded sandhills will likely require the use of multiple management tools.

Source: *Fire in the Suburbs: Ecological Impacts of Prescribed Fire in Small Remnants of Longleaf Pine (Pinus palustris) Sandhill*. By, Kimberly A. Heubergerand and Francis E. Putz, University of Florida, Gainesville, Florida, 2003.

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## Management and Design Factors

*Light pollution has several forms. "Astronomical light pollution" obscures the view of the stars, planets, and other features of the night sky, while "ecological light pollution" alters natural light regimes in terrestrial and aquatic ecosystems, affecting the behavior of plants and animals.*

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**Wildlife-Friendly Lighting** – Light pollution has several forms. "Astronomical light pollution" obscures the view of the stars, planets, and other features of the night sky, while "ecological light pollution" alters natural light regimes in terrestrial and aquatic ecosystems, affecting the behavior of plants and animals. Ecological light pollution is a pervasive problem for wildlife. The introduction of artificial light into wildlife habitat represents a rapidly expanding form of human encroachment. Many animals are nocturnal and thus most active for feeding and mating during the low light or nighttime portions of the day. Ecological light pollution has demonstrable effects on the behavioral and population ecology of organisms in natural settings. As a whole, these effects on the biological community derive from changes in orientation, disorientation, or mis-orientation, and attraction or repulsion from the altered light environment. These responses in turn may change habitat quality, disrupt biological rhythms related to foraging, reproduction, migration, and communication, and disrupt inter species specific interactions evolved under natural patterns of light and dark. Light-induced changes may have serious implications for wildlife sustainability.

**Impacts on Wildlife** – Here in Florida, sea turtle populations have received attention as they are affected by extensive shoreline lighting that disorients and disrupts egg-laying adults and hatchling sea turtles on their natal beaches. Disorientation due to artificial lighting causes thousands of turtle hatchling deaths each year. Thanks to ongoing marine turtle conservation efforts, most coastal counties have responded by adopting some form of dark sky ordinance along the beaches.

In addition to sea turtles, many other animals are also affected by stray light intruding into their night world. The detrimental effect of light pollution from our communities is pervasive with light spillage affecting many habitats and exacerbated by increases in the use of security and garden lighting. The problems penetrate deep into the heart of rural landscapes and are not just limited to

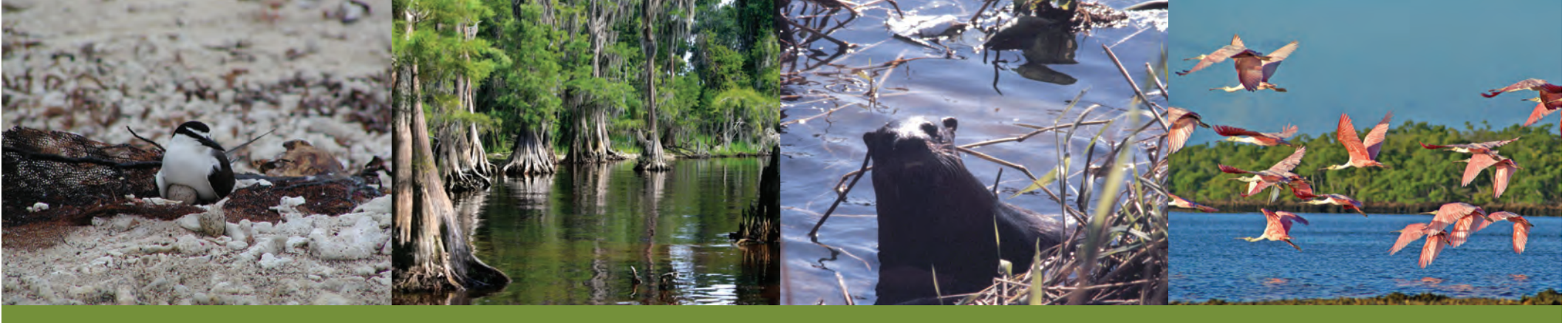


Photo Courtesy of Josh Best

urban or highly suburban areas. Some of the consequences of light for certain taxonomic groups are well known, such as the deaths of migratory birds around tall lighted structures. Birds are known to circle lights until they drop from exhaustion. Others, disoriented, fly directly into the buildings at full speed, either at night or at daybreak, mistaking clear glass for an endless blue sky. Scores of birds lured by the bright lights of developed areas could be saved from a skull-crushing death if lights were simply turned off at night or toned down.

The more subtle influences of artificial night lighting on the behavior and community ecology of species are less well recognized, and constitute a new focus for research in ecology and a pressing conservation challenge. For instance, investigators exploring the effects of lights on the foraging behavior of Santa Rosa beach mice found the mice exploited fewer food patches near artificially lighted areas than in areas with little light, and harvested fewer seeds within patches near bug lights. Other researcher found that roads illuminated by white streetlamps attracted three times more foraging bats than did roads lit by





orange streetlamps or unlit roads, and that more insects flew around white lamps than around orange lamps. Further, the number of bats recorded in any section of road was positively correlated to number of white street lamps along the section.

In other experiments on the effects of light pollution on salamanders, it was found that white holiday lights strung along transects in Virginia result in salamanders staying hidden for an additional hour, affecting the amount of feeding time. These researchers also discovered that some tree frogs stop calling in brightly-lit areas, which may affect mating occurrence. Further, lab studies show that the amount of light exposure may affect DNA synthesis and the production of hormones—hormones that regulate everything from how much fat the frogs store for the winter to when they produce eggs. Other studied wildlife and light effects show:

- Panthers traveling at night avoid brightly-lit areas causing them to miss crucial landscape linkages.
- Moths may lose essential defensive behaviors when near artificial light, making them vulnerable to predators.
- Dark-adapted frogs exposed to rapid increases in illumination may be temporarily 'blinded', unable to see prey or predators until their eyes adapt to the new illumination.
- Salamanders are strongly attracted to light which could divert salamanders away from breeding sites, and make them more vulnerable to predation or road mortality during migrations.

A growing body of evidence shows that artificial light affects the behavior of wildlife and that light pollution deserves greater consideration in planning wildlife-friendly communities.

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*Photo Courtesy of: Bird on Beach – David Moynahan Photography; Undisturbed Shoreline, Lake Louisa State Park – Myrna Erlen Bradshaw and the Florida Wildlife Federation; River Otter – David Moynahan Photography; Flock of Spoonbills, Everglades National Park – Constance Mier and the Florida Wildlife Federation*



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## Management and Design Factors

*A local government can work to manage negative lighting impacts on local wildlife by adopting what is termed a “Dark Sky” ordinance that provides for wildlife-friendly lighting.*

### Management Recommendations for a Dark Skies Community

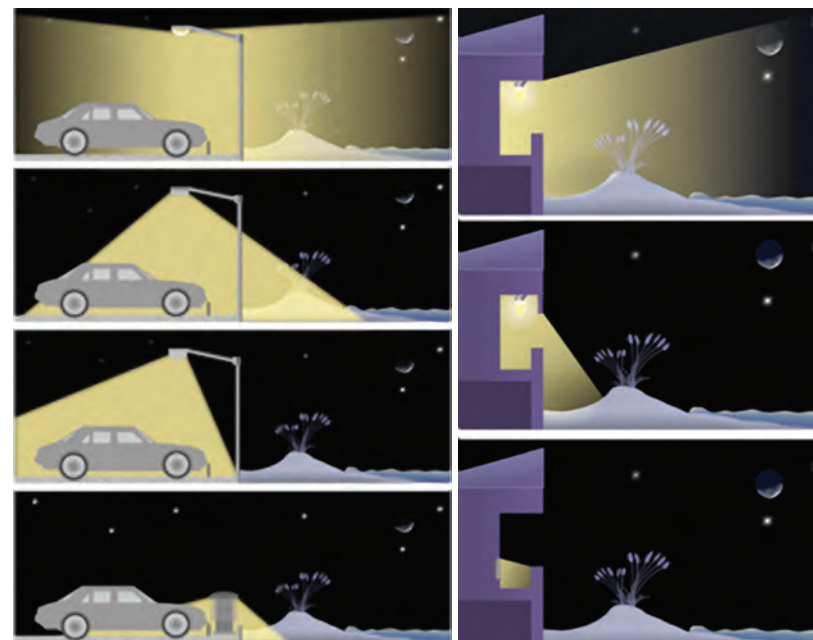
– A local government can work to manage negative lighting impacts to local wildlife by adopting what is termed a “Dark Sky” ordinance that provides for wildlife-friendly lighting:

- Keep them low (close to the ground).
- Keep them shielded, and minimize light trespass into the night

sky or adjacent areas. Exterior and road lighting should use low spillage lights that reflect light directly downward onto the area to be illuminated. A variety of products to accomplish this goal are now on the market.

- Use long-wavelength lighting, as studies indicate longer wavelengths are less likely to impact sea turtles and other wildlife.
- Avoid using fluorescent and mercury vapor lighting.

Photo Courtesy of Don Pennington, 1000 Friends of Florida



Progressively better lighting situations.

Illustration Courtesy of Edmond Alexander

## LIGHTING FOR CONSERVATION OF PROTECTED COASTAL SPECIES

To prevent adverse impacts to nesting and hatchling sea turtles, the nocturnal movements of beach mice, and resting shorebirds, the minimal amount of exterior lighting for human safety and security should be installed following the guidelines below.

1. Lights should not be placed within the developed footprint such that the light is visible outside the developed area.
2. Lights on dune walkovers or boardwalks should not be located seaward of the landward toe of the dune (or its equivalent).
3. The light source or any reflective surface of a light fixture should not be visible from any point beyond the developed footprint. There should be no illumination of any area outside the developed footprint, either through direct illumination, reflective illumination, or cumulative illumination.
4. Exterior wall light fixtures should be either low pressure sodium lamps or low wattage (i.e., 480 lumens or less) "bug" type florescent bulbs. The light fixtures should be completely shielded without interior reflective surfaces and directed downward. Lights may also be louvered and/or recessed, with black baffles or without interior reflective surfaces as appropriate.
5. Light fixtures should be mounted as low as feasible to provide light where it is needed (i.e. patios, balconies, pedestrian paths). This can be accomplished through the use of low bollards, ground level fixtures, or low wall mounts.
6. Lights for purely decorative or accent purposes should not be visible outside of the developed footprint and shall be limited in number and intensity. Up-lights shall not be used.
7. Roadway lighting should use shielded low pressure sodium (LPS) lamps. The height and number of fixtures should be kept to a minimum and should be positioned and mounted in a manner such that the point source of light or any reflective surface of the fixture is not visible on the development outside of the developed footprint.
8. Lighting in parking areas should use shielded low pressure sodium (LPS) lamps, have a height of 20 feet or less, and should not be visible from any point outside the developed footprint.
9. The lighting should be positioned and shielded such that the point source of light or any reflective



Photo Courtesy of Dan Pennington, 1000 Friends of Florida

Outdoor lighting can be designed to lessen light pillage into the surrounding night sky.





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## Management and Design Factors

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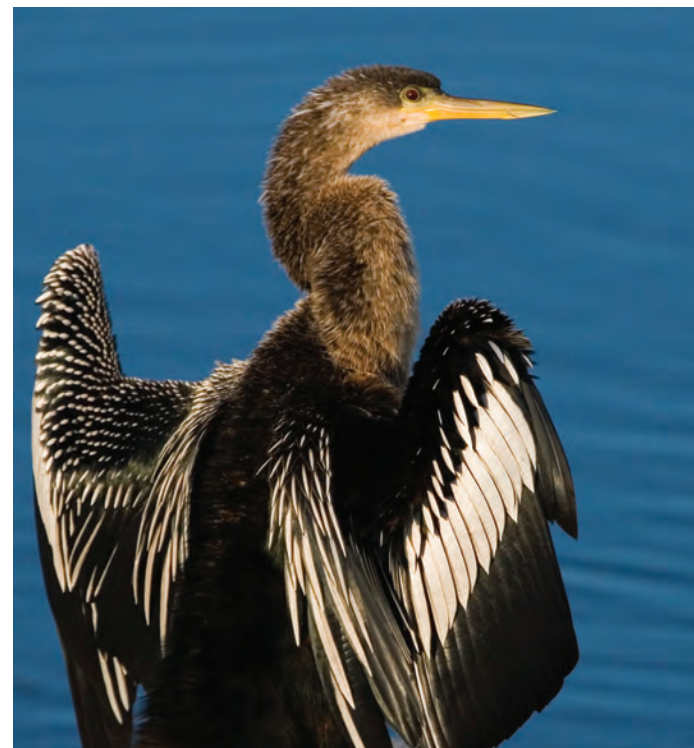
### LIGHTING FOR CONSERVATION OF PROTECTED COASTAL SPECIES (continued)

surface of the light fixture is not visible outside of the developed area. The light emanating from such fixtures may not directly or indirectly illuminate the area outside of the developed footprint.

10. Car and other vehicle parking areas should be designed or positioned such that vehicular headlights do not cast light outside the developed footprint. Native dune vegetation, and/or other ground-level barriers may be used to meet this objective.
11. Minimal temporary lighting during construction should only be used for security and safety. The lights should be completely shielded and low-mounted. Low pressure sodium lights or low wattage yellow "bug" type bulbs (480 lumens or less) should be used. The lights should not directly or indirectly illuminate any area outside the construction site.
12. Light fixtures using natural gas as the light source should not be used for fixtures unless they are fully shielded and the lighting is not visible outside the developed footprint.
13. Tinted glass or window film that meets a transmittance value of 45 percent or less (inside to outside transmittance) should be used on all windows and glass doors.
14. All ceiling-mounted light fixtures in the interior of the condominium units that could be visible from the outside should minimize the amount of exposed light bulbs.



Source: U.S. Fish and Wildlife Service,  
Panama City, Florida,  
[www.fws.gov/panamacity](http://www.fws.gov/panamacity)



Photos Courtesy of David Moynihan Photography



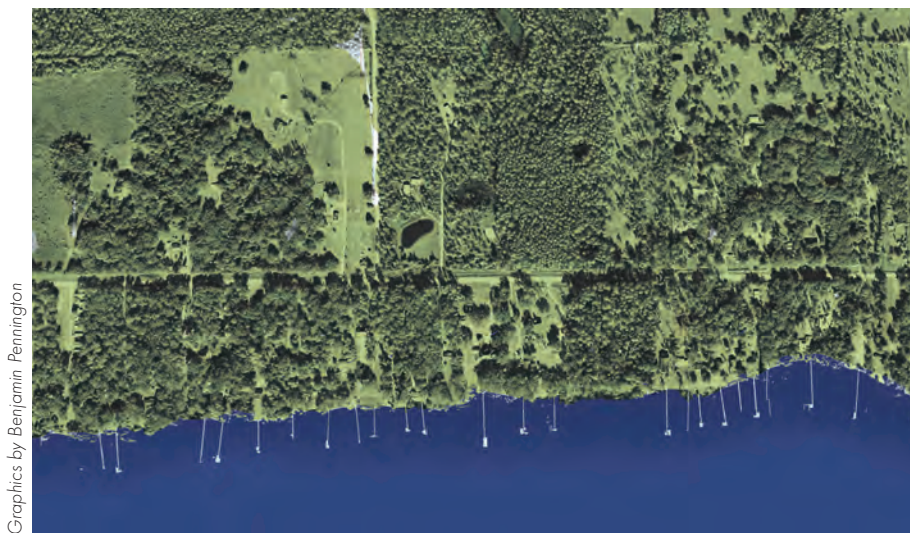
## PLANNING STORMWATER MANAGEMENT AND WATERBODY BUFFERS FOR WILDLIFE VALUE

Local watershed features – including streams, wetlands, rivers, sinkholes, and natural or man-altered drainage features – form the backbone of a community's landscape and are quite important to wildlife. Local governments, landowners and developers should examine stormwater, transportation and recreational infrastructure networks and proposed projects for wildlife integration and enhancement opportunities. These infrastructure facilities are often large budget items, which can incorporate multi-use wildlife enhancements or design features. A community should work to identify and develop cross-connections and multi-use opportunities when planning transportation, stormwater management and community recreation facilities. Public money can be saved and safety and efficiencies gained when these public facilities are integrated with community design that capture and conserve or enhance green infrastructure benefits.

The role of the local government is to plan for and encourage conservation-oriented low impact development design:

- Use natural hydrologic functions as the integrating planning framework.
- Direct clustering of development to the more developable areas and set aside wildlife habitats and environmentally sensitive portions.
- Link density bonuses to tightly clustered development when environmentally logical.
- Provide for logical environmental links to adjacent parcels to extend the habitat, wildlife and natural functionality benefits (think connectivity).
- Integrate stormwater management early in site planning activities.
- Preserve waterbody and riverine green edges (a combined natural upland buffer and in-water littoral edge).
- Work with landowners and developers to not subdivide lots and properties to the water's edge, but instead maintain a common community shoreline corridor with wildlife habitat features.
  - Emphasize simple, nonstructural, low-tech, and low cost methods that incorporate natural landscape features and functions.
  - Create a multifunctional multi-use landscape.
  - Provide for permanent set-aside of undeveloped areas via conservation easements or other legal instruments.
  - Develop and implement reoccurring events to cross-train the jurisdiction's professional planning, engineering and related development review staff and administrators regarding linkage and integration of green infrastructure with other necessary infrastructures.

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Graphics by Benjamin Pennington

Too often shoreline habitats (upland-to-water edge and in-water near shore environments) are subdivided into multiple lots with multiple home sites, management schemes and individual piers. Leaving a common vegetated shoreline, linked to interior upland habitat and constructing one (or possible several) community piers would benefit wildlife and water quality.



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## Management and Design Factors

*Ephemeral wetlands and ponds are small landscape features that provide important wildlife rearing, feeding and life cycle opportunities for amphibians and other wildlife species. These areas contribute significantly to local biodiversity by supporting an abundance of plants, invertebrates, and vertebrates that would otherwise not occur in the landscape.*

### EPHEMERAL WETLANDS AND POND LANDSCAPES

Ephemeral wetlands and ponds are small landscape features that provide important wildlife rearing, feeding and life cycle opportunities for amphibians and other wildlife species. These areas contribute significantly to local biodiversity by supporting an abundance of plants, invertebrates, and vertebrates that would otherwise not occur in the landscape. These often fish-free ponds provide optimal breeding habitat for specialized groups of amphibians that have evolved to use these wetlands to avoid fish predation. In fact, 20 percent of Florida’s amphibians breed only in these ephemeral ponds and many others do so opportunistically. Most ephemeral wetland amphibians return to breed in the ponds where they originated and show little tendency to relocate if their breeding habitat is disturbed. Protecting ephemeral wetlands and ponds is a critical first step in conserving amphibians and the variety of other wildlife food chain linked species.

In addition to reproduction needs of amphibians, many other interesting species rely on these ponds for food, reproduction,

Photo Courtesy of Rebecca Meegan, Coastal Plains Institute and Land Conservancy



An example of an ephemeral wetland area that is so important to the life cycle of numerous wildlife species.

and other habitat needs, including carnivorous plants such as sundew and butterworts, birds such as the great blue heron, white ibis, and wood duck, reptiles like the striped mud turtle and scarlet kingsnake, and medium-to-large-sized mammals such as fox, deer, bobcat, and bear. After emerging from the relative safety of the ephemeral wetlands, frogs and salamanders provide a valuable food source for a wide variety of these forest animals. For example, researchers have found that the weight of all pond-breeding amphibians exceeded the weight of all breeding birds and small mammals in the 50-acre upland forest surrounding their study pond. The results emphasized that ephemeral wetland amphibians exert a powerful influence on the ecology of surrounding lands, up to 0.25 miles from the edge of the pond, and that the loss of individual ephemeral wetlands weakens the health of entire wildlife communities.

The destruction of small wetlands in the landscape increases the distances between remaining wetlands, which can fragment populations and ultimately lead to local extinctions. A unique feature of ephemeral ponds is that bigger is not necessarily better. Research in Florida repeatedly has shown that ponds smaller than 1 acre can support more than 15 amphibian species, including rarer species such as the flatwoods salamander, striped newt, and gopher frog. Additionally, wetlands that hold water for only a few months out of the year can be just as important in terms of bio-productivity as ponds that remain hydrated throughout most of a year.

Uplands and ephemeral wetlands are uniquely tied. As important as small wetlands are, preserving the uplands surrounding these landscape features is also essential for maintaining ecosystem health. Pond-breeding amphibians spend more of their life in uplands than in the wetlands; conversely, turtles that inhabit these ponds require the uplands for nesting. By creating a buffer around these ponds, developments can support an increasingly rare ecosystem in Florida while providing a unique aesthetic value to their community.

## DESIRED PLANNING, DESIGN AND MANAGEMENT FOR EPHEMERAL WETLANDS AND PONDS

Community plans and individual development plans need to exhibit cognizance and care to protect ephemeral wetlands and ponds in their land development design and management features. For example, clustering development away from ephemeral wetlands and ponds and establishing permanent conservation easements over the area is an important planning tool that can be used that not only conserves open space, but also reduces impervious surfaces and accessory infrastructures. The ephemeral nature of water in these ponds means that any pond surveys should be conducted during the rainy season, when ponds are more likely to hold water and are easier to identify. Specific planning, design and BMP considerations:

- Preserve the wetland/pond, including both canopy and understory (e.g., shrubs and herbaceous vegetation). The integrity of the habitat immediately surrounding the ephemeral wetland or pond depression is critical for maintaining water quality, providing shade (or open sun in some instances), and wildlife habitat. For example, juvenile salamanders are especially vulnerable to drying during the first months after emergence and such desiccation is much more likely where habitat elements described above are lacking.
- Avoid barriers to amphibian dispersal such as walls, high curbs and fences.
- Protect and maintain ephemeral wetland/pond hydrology, hydroperiod and water quality.
- Maintain a pesticide-free environment.
- Provide permanent easements over the land to protect these areas and their contiguous critical terrestrial

critical habitat for alteration. On subdivision projects where open space with ephemeral wetlands is reserved, a developer can convey a conservation easement to a local land trust, local government, or a conservation not-for-profit organization.

Communities may also consider overlay zones specifically designed to protect ephemeral wetlands and ponds. These zones should be surveyed and graphically depicted and adopted into the comprehensive plan, neighborhood subplans or included as a part of a separate ordinance within the local land development regulations. While leaving zoning in place, additional standards, requirements, and incentives are applied in the overlay zone. The zone could provide a mix of regulations and incentives to conserve ephemeral wetlands and pools and preserve economic equity including (but not limited to):

- Minimal lot-clearing restrictions within the zone.
- Denser clustering of development, including density bonuses for tightly clustered, conservation-oriented subdivisions.
- Reduced road width standards including cul-de-sac radii, prohibiting hard 90 degree vertical curbing.



The Orate Chorus Frog is one amphibian linked to ephemeral wetland areas.

- Establishing a transfer of development rights program where a landowner gets credits in a developable portion of the community in exchange for giving up development credits in the overlay zone.

Sources: Rebecca Meegan, *Coastal Plains Institute and Land Conservancy*; and M.A. Bailey, et al, *Habitat Management Guidelines For Amphibians And Reptiles Of The Southeastern United States, 2002*; and, Calhoun, Aram J. K. Ph.D. et al, *Best Development Practices Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States, 2002*.



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## Management and Design Factors

*Community and homeowner understanding and buy-in are essential to the creation and sustaining a wildlife-friendly community. Although it may be a developer who originally implemented the green design, it is up to the community residents to manage and maintain many of the sustainable features.*

### PLANNING FOR SUPPORTIVE LONG-TERM BEHAVIOR IN A WILDLIFE-FRIENDLY COMMUNITY

Community and homeowner understanding and buy-in are essential to the creation and sustaining a wildlife-friendly community. Although it may be a developer who originally implemented the green design, it is up to the community residents to manage and maintain many of the sustainable features. Why is this important? Studies have indicated that homeowners living in conservation designed development often do not understand the concept of open space and are not aware of appropriate management practices to minimize impacts on wildlife (Youngentob and Hostetler, 2005; Nosieux and Hostetler, 2007).

For example, decisions made by homeowners in maintaining their own homes and yards can have drastic consequences for nearby conserved wildlife habitat. Consider the effect when a homeowner unknowingly chooses invasive exotics for their garden. That choice can have an impact on natural areas that a developer set aside during site development. The invasive plants often spread into those natural areas and have negative impacts on the habitat. Property owners need to know which plants are considered invasive exotics and avoid planting them in their yards. They also need to know how to remove any invasive that might currently be part of their gardens.

Other impacts include pets (particularly cats) that are off leash and roaming in communities. They can be significant predators on a wide variety of mammal, amphibian, reptiles and bird species. Further, even where protected patches of habitat have been designed within a community, local residents need to understand the importance of staying on designated trails and not walking through or using ATVs to traverse conserved areas. The presence of humans walking near or through

conserved areas can negatively affect wildlife. The frequent presence of humans within an area has been shown to diminish the number of breeding bird territories and nests (e.g., Miller and Hobbs 2006).

Initial community planning and design for wildlife is necessary, but management over time is key! Neighborhoods evolve: houses are sold, experienced owners leave and new owners arrive who are unfamiliar with the communities "wildlife-friendly culture." Success relies on residents being on board in terms of understanding the goals of the community and actions that help conserve specific wildlife populations and biodiversity.

Actions may include having the developer set up an educational package that consists of a brochure, a website, and kiosks (Hostetler 2006) and to include critical wildlife friendly goals, objectives and policies in the homeowner association's bylaws and covenants. Three specific elements help inform residents:



Interpretive signage can help residents know wildlife and habitat features.

Photo Courtesy of Don Pennington, 1000 Friends of Florida



- **Interpretive Kiosks:** Highly visible interpretive kiosks and signs are placed in public areas where people traffic is high or on a trail system. Each of the signs contains informative displays that discuss a particular topic, such as water, energy, or wildlife. Kiosks should be dynamic, with different informative panels being inserted throughout the year. These kiosks are not only informative and provide a place for neighbors to interact, but can they also serve as a catalyst for people to obtain more information by directing them to the website.
- **Website:** Because the kiosks and signs can give only limited information, an associated website is constructed that gives detailed environmental information and management strategies pertinent to a community.
- **Brochures:** A brochure is given to each new homeowner. This brochure highlights local natural resource issues and invites homeowners to explore the kiosks in their neighborhood and visit the website.

Wildlife information should be specific to the community and not just a general list of "good" practices—for example, the web site should not simply say it's good to plant native vegetation for wildlife, but should list which plants affect which species and where to obtain the native plants nearby. For large master-planned communities, it is also useful to have a full-time conservation manager that works for the neighborhood and to ensure that all landscaping and maintenance staff is educated on the wildlife and habitat needs. A dedicated conservation manager can serve as a local source for information and help implement newsletters, local conservation committees, and environmental activities such as bird walks and clean-ups. For an example of a community that has both an environmental education package and a conservation manager, visit [www.wec.ufl.edu/extension/gc/harmony/](http://www.wec.ufl.edu/extension/gc/harmony/).

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Photos Courtesy of David Moynahan