

**Florida Department of Transportation Initiatives
Related to Wildlife Mortality**

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Introduction

As required in the Florida Department of Transportation's Environmental Policy (Topic No. 000-635-001-d), the Department will "cooperate in the State's efforts to avoid fragmentation of habitat and wildlife corridors through a comprehensive Greenways Program of land acquisition and management with the identification and prioritization of important habitat connections." The policy also requires that "consideration of habitat connectivity and wildlife crossings will take place on existing facilities as well as in the development of planned projects." This policy is implemented through procedures as required in the Project Development and Environment Manual in the chapter on Wildlife and Habitat Impacts. Detailed in the chapter are the analysis and conservation opportunities as related to wildlife habitat and wildlife mortality. The chapter requires that other state and federal programs be considered when addressing these impacts.

Among the programs which the Department is trying to support while carrying out the transportation program are the Department of Environmental Protection's Greenways Program, Conservation and Recreational Lands Program, and the Florida Game and Fresh Water Fish Commission Program toward "Closing the Gaps in Florida's Wildlife Habitat Conservation System" as well as the recommendations of the Governor's Commission for a Sustainable South Florida. This has led to some very innovative approaches to facilitate both the engineering and environmental aspects of Department programs and projects.

Further, since transportation needs are identified in the Comprehensive Planning Process as presented through the Metropolitan Planning Organizations in a transportation plan, it is necessary that environmental factors related to habitat loss and wildlife mortality be considered as early in this process as possible. The need for involvement of the general public and advocacy groups is being communicated through the Department's public involvement programs early in the planning process. It is important that habitat and wildlife issues are better defined and considered at this stage.

After moving through the early planning process to the transportation plan, projects are studied in the Project Development and Environmental Phases for compliance with the National Environmental Policy Act. Historically, habitat and wildlife impacts were principally addressed for compliance with the Threatened and Endangered Species Act of 1973, as amended. Initial habitat and wildlife activities by the Department were the result of the Section 7 consultation requirements of the act. The result was coordination on federally listed threatened and

endangered species and identified critical habitats for these species. The required analysis and coordination are reported in a Threatened and Endangered Species Biological Assessment. Other habitat and wildlife impacts are evaluated in the categorical exclusion or NEPA process. More recently the effort has been to go beyond these requirements and address the impacts in broader terms including consideration of state initiatives toward sustaining habitat and wildlife for future generations. This has resulted in extensive coordination with both federal and state programs toward this end result. Early in the Project Development process, it is necessary to open lines of communication with outside agencies and advocacy groups to coordinate the habitat and wildlife aspects. Innovative approaches and partnerships have resulted in the Department commitments which are presented in this paper.

Case Studies

Ecosystem management principles are guiding what the Department does in the areas of habitat and wildlife conservation. Initiatives at the state and federal level lead the Department to conduct a task team analysis of how ecosystem management applies department-wide. Principle themes identified by the team were environmental education, the need for partnering, rights-of-way vegetation management, habitat protection through innovative wetland and upland mitigation, compatibility of rights-of-way management with adjacent public land management, maintaining connectivity of habitats and supporting other state and federal programs. These principles are present in the following activities of the Department.

The foundation of any program to conserve habitat and wildlife is environmental education. Education concerning wildlife mortality and habitat impacts was necessary both within the Department and outside the Department and includes the motoring public. All environmental training within the Department will include ecosystem management relationships to help everyone in the Department understand the importance of these principles. The Department also coordinates with the State Committee on Environmental Education which is an interagency committee dealing with environmental education on a statewide basis. Strong partnerships to educate the public on environmental matters are developed through this committee. Such items as environmental education brochures about the Florida Panther to give motorists at the toll booths on Alligator Alley were developed in cooperation with the committee. An environmental kiosk describing important ecological features of Florida for display in the Capitol area was also developed by the committee. Another kiosk for motorist education at the rest area on I-75 crossing the Everglades is being coordinated through this committee. In the area of motorist education the Department has developed a number of signs to alert the motorist to the fact that they are entering panther habitat and therefore need to drive carefully. Similar signs were placed in important areas for bears, key deer and white-tailed deer.

Reduced speed limits are another measure the Department has taken in targeted areas to reduce highway wildlife mortality. This has been done for the Florida Panther on SR-29; for the Key Deer on US-1, for the Least Terns on the bridge approaches for the St. George Island and Keys Bridges. Speed limit reduction is also being done for a variety of wildlife at Sebastian Inlet State

Park where a study of a combination of educational signs, speed limit reductions and law enforcement is being conducted to determine the effectiveness of these measures. Permanent speed monitoring stations have been placed in two locations in the park to document motorist response to a series of measures. First, educational signs notifying the motorist that they are entering wildlife habitat necessitating additional caution were placed in the area and speeds monitored for response. Next, the speed limit will be reduced from 55 mph to 45 mph and motorist response will be documented. Finally, local law enforcement will be active in the area of the study to observe the response of the motorist to reduced speed limit with law enforcement in the area. This study will be completed in approximately two years and published by the Environmental Management Office when completed.

Although motorist education has probably helped in several areas being managed for wildlife values, it was necessary to utilize structural measures because of continued wildlife mortality. The first wildlife crossings for the Department were placed on SR-46A in the 1950's at two locations approximately a mile apart. These were box culverts measuring 8' high and 12' wide that were placed in the area for bears. There were no fences associated with these crossings so that their effectiveness is questionable.

As a result of the presence of public lands being managed for natural values along the Alligator Alley corridor (I-75) in Collier County and the presence of the endangered Florida Panther, the use of wildlife crossings was determined to be a structural alternative along the corridor. The Florida Game and Fresh Water Fish Commission (FGFWFC) had ongoing studies of the Florida Panther in the area and had a number of cats collared with radio transmitters. The movement data obtained was superimposed over vegetation maps of the area and locations of crossing the corridor were identified using known crossing locations, known roadkill areas and habitat information obtained from the radio telemetry studies. Infra-red photography was used to determine exact crossing locations on the ground. Considering wildlife movement data and economics, it was determined that approximately a mile distance would be desirable spacing for the crossings. Twenty three crossing locations and 13 bridge extension locations were identified.

The next factor to be determined was the sizing of the crossings. Biologically, it was desirable that the crossings not give a tunnel effect when the animals were approaching. The design was to allow the animals to clearly see the habitat on the other end and not feel threatened in moving through the crossing. For the wildlife crossings on Alligator Alley, the resulting design was 8' height x 120' width bridges. The slope of the fill under the bridges resulted in an 80' to 90' effective opening for the animals moving under the crossings. The road fill section was elevated to 10' to reach the elevation of the bridge and then brought back down at the other end of the bridge. The existing bridges were extended 40' to allow for a dry land crossing under the bridges. The combination of bridge extensions and wildlife crossing resulted in 36 opportunities for animals to cross under the highway for approximately 40 miles of Alligator Alley.

Ten foot high chain link fencing was installed on both sides of the highway in this 40 miles and tied into the wildlife crossings and carried across the median. Three strands of barbed wire were

installed on outriggers on the top of the fence.

The FGFWFC was contracted to conduct a study of the effectiveness of these crossings as part of their ongoing studies funded by the Commission and US Fish and Wildlife Service (FWS). FGFWFC subcontracted the effectiveness of wildlife crossings portion of the study to the University of Florida. It was possible to document the animals using the crossings by using Trailmaster cameras which were triggered when animals moved through the crossings. Animal tracks and the radio-telemetry tracking of the animals were also used. The crossings have worked successfully for a wide variety of animals including the endangered Florida Panther. The results of the study are reported in Environmental Management Office Report - FL-ER-50-92, "Effectiveness of Wildlife Crossings in Reducing Animal/Auto Collisions on Interstate 75, Big Cypress Swamp, Florida". One of the papers at this seminar, "Florida Panthers and Wildlife Crossings in Southwest Florida" by Darrell Land, FGFWFC will further discuss this and other ongoing work in southwest Florida.

While working on the Alligator Alley wildlife mortality, the Department was also moving through a series of measures on SR-29 in Collier county which runs perpendicular to Alligator Alley between the public lands in the area. Motorist informational signing, speed limit reduction and moving the alignment on SR-29 over 30' were not satisfactorily reducing wildlife mortality on this facility. Therefore, structural alternatives were necessary. Because of the expense of the wildlife crossings on Alligator Alley, it was determined that a smaller and more cost effective design would be tried at two of the six locations identified as needing crossings on SR-29. Additionally, this prototype design would be used and studied in an area that the FGFWFC identified in their chronic bear kill study, "Chronic Road Kill Problem Areas for Black Bear in Florida" by Terry Gilbert and John Wooding, as a problem area on SR-46 in central Florida. The prototype structure to be studied was an 8' x 24' box culvert design with associated 10' chain link fence with three strands of barbed wire on outriggers. Again the FGFWFC was contracted to determine the effectiveness of the design. The commission used camera, tracking and radio-telemetry to identify the animals using the crossings. These structures were also determined to be effective as wildlife crossings. Two other papers presented in these proceedings will discuss these efforts "Chronic Black Bear Kill in Florida" by Terry Gilbert, FGFWFC and "Black Bears and SR-46" by John Wooding, FGFWFC.

The successful use of wildlife crossings in these applications and the need to maintain connectivity of public lands habitat have resulted in the Department including a wildlife crossing policy in the environmental policy which requires these considerations when crossing public lands being managed for wildlife and habitat values. Future projects in the work program which will include wildlife crossing structures include 4 additional crossings on SR-29, four crossings on US-1 from Florida City to Key Largo, and 13 structures for crocodiles in the area of Cross Key on the US-1 alignment in the Florida Keys.

Additionally, crossings are being considered on a number of projects in the Project Development and Environment phase. Recently, a unique involvement with a category 2 species on the FWS

list has been identified in the Apalachicola National Forest where the Department is studying the four-laning of SR-319. The striped newt (*Notophthalmus perstriatus*) has been located in some ephemeral ponds located on either side of the highway. Because the dispersal characteristics of the newt are poorly understood, the Department will be researching the biology of the newt and other species in the area to try to identify whether structures are needed in this area to allow the animals to cross the planned four-lane highway.

Another important wildlife crossing technique of the Department is to extend bridges when they are replaced or rehabilitated. This will be done on the Little Wekiva River on SR-46 bridge replacement where the bridge is being extended to provide dry land crossings under both ends of the bridge. This bridge is in the corridor of bear movement through the Little Wekiva River basin. These extensions provide the opportunity for dry land crossing under the highway on all but high flood conditions. Since wildlife use these riverine corridors for movement, this is a sound biological practice. Existing bridges on I-10 in north Florida and other highways provide a number of opportunities for wildlife to safely pass under the highway.

Because fencing is an important part of features for reducing wildlife mortality, the Department has been researching the effectiveness of fencing in their research projects. Some aspects of fences will be presented in the paper "Black Bears and SR-46" by John Wooding, FGFWFC. One of the questions that the Department is trying to address with research is the spacing of wildlife crossings. In other words, how far will an animal move along a fence to locate a crossing. The behavior of animals at the fence is also important. Are the animals turning around when they hit the fence or are they moving along the fence looking for crossing opportunities? How far does the fence need to run in either direction at single crossing installations? What type of fence is most cost-effective for what species? These are all questions that the Department is continuing to explore.

Although the initial installation cost of chain link fence may be more, the long-term maintenance costs probably are less and therefore negate any initial savings experienced with cheaper fence. Further the chain link fence provides the structural integrity needed for larger animals such as the bear and the panther. The long-term costs of fence maintenance needs to be considered when designing these projects. Keeping vegetation and fallen trees off of the fence is a full time maintenance activity to maintain the integrity of the fence. Repair of areas where erosion undermines the fence and repairing areas where motorists run into the fence have also become routine for maintenance forces. One application that has been successful in keeping animals from going under the fence in chronic erosion areas has been the use of strands of barbed wire to cover the areas caused by erosion. The dedication of maintenance forces in the areas where the Department has these structures has been important to the Department's efforts and deserves recognition.

Other Species Activities

For a number of years, the Department has been trying to deal with mortality of Florida key deer on US-1 through Big Pine Key in the Florida Keys. A progression of measures similar to those tried on S-29 were also implemented on US-1. While motorist educational signing, radio information and speed limit reduction were felt to do some good, deer continue to be killed on US-1 in unacceptable numbers. In 1994, the Department organized a multi-interest committee to look at all of the possibilities, structural and non-structural, for reducing deer kills. The Department hired a consultant, Dames and Moore, to take the information developed by the committee and bring it together in a report on possibilities. Ricardo Calvo and Nova Silvy will present their findings in the paper "Key Deer Mortality, U.S. 1 in the Florida Keys" in these proceedings. Both structural and non-structural alternatives will be necessary.

Additionally, the Department has installed Swareflex reflectors for deer and Florida Panther. Reflectors were installed for Key deer on Big Pine Key and for white-tailed deer on Cape Canaveral. No formal studies were conducted at these sites but reports by biologists at these sites indicate that at least initially mortality was reduced. The Department also installed the reflectors as an interim measure until wildlife crossings were completed on Alligator Alley in hopes that they would do some good for Florida panthers. Again, no formal studies were conducted. No panthers were killed on the Alley during the period between reflector installation and completion of the wildlife crossings.

While developing I-75 down Florida's west coast, red-cockaded woodpeckers were found on the alignment in Charlotte County. Initially, three birds, two adults and one helper, were found on the alignment. They were captured and tagged. A study of the ecology of the red-cockaded woodpecker in this part of the state was contracted with FGFWFC. The objective was to better understand the needs of the birds in the area to help make decisions on the project. The study was conducted on Cecil Webb Wildlife Management Area since there is a large concentration of birds in the area, and the habitat was similar to that on the alignment.

At project construction, only one bird remained in the alignment. Of their own initiative, the adult birds had moved to alternative cavity trees approximately one-half mile from the project. The young male which had been associated with them remained at the project site. The decision was made to move the bird to Cecil Webb Wildlife Management Area. The bird was captured. The section of tree containing the cavity was cut out of the tree. The bird and cavity were taken to the wildlife management area. The section of tree containing the cavity was banded to a tree using the same height and direction as at the original site. A radio transmitter was placed on the bird. The bird was placed in the cavity and the hole plugged. The next morning the plug was removed and the bird vacated the cavity. After a brief orientation flight, the bird proceeded directly back to the site from which he had been taken. It subsequently utilized some alternative cavity holes in an area off of the alignment but close to the proposed highway. The study of the relocation effort is reported in Environmental Management Office Report, FL-ER-14-81, "Report of the Investigation of Red-cockaded Woodpeckers in Charlotte County, Florida" by Steve

Nesbitt, FGFWFC. The birds have been monitored annually and their progeny continue to live in the area utilizing sites on both sides of the interstate highway despite the highway traffic. This is possible because of compatible land use practices in the area - small ranchettes with minimum tree removal.

In other bird mortality situations, different strategies have been used. In a number of areas around the state, birds have utilized roadside fill for nesting. This is true in the Florida Keys and the St. George Island and Apalachicola Bay Bridge approaches where unvegetated areas are being used for nesting by least terns, black skimmers and other birds. Signs were placed in the areas to keep motorists out and the speed limit was reduced to help reduce collisions with motor vehicles. Additionally, other public lands are being managed to attract the birds to safer nesting areas.

During high winds, an unusual bird mortality situation was identified by park personnel at the bridge over Sebastian Inlet in Sebastian Inlet State Park. Birds including the listed Royal Tern and Brown Pelican were hovering over the bridge and during erratic wind conditions were dropping down into traffic. A structural alternative is being studied. The Department placed 10' high steel conduit sign poles approximately 12' apart on both sides of the bridge to give the appearance of a taller structure. This is resulting in higher flight by the birds. Biologists at the park continue to monitor bird mortality on the bridge. It is hoped that this structural alternative will reduce mortality. The results of this study will be included with a speed limit reduction study which is being conducted at the park.

At the ecosystem management level, the Department has participated in a number of activities related to wildlife and habitat conservation. On the Alligator Alley project, habitat purchase and restoration were mitigation alternatives used to provide important habitat in the area. Recently, an approximately 1700 acre parcel was purchased in Highlands County for use in a 17 county service area which includes a number of habitats and species including the Scrub jay, red-cockaded woodpecker, indigo snake and gopher tortoise. Acre credits will be used as conservation measures for project impacts in the service area. Additionally, an annual funding source for similar type projects has been established by the Department.

In an effort to make sure that the Department's program supports other programs of the state including Greenways, Conservation and Recreational Lands purchases, and FGFWFC efforts at "Closing the Gaps in Florida's Wildlife Habitat Conservation System", the Department has contracted the University of Florida to conduct research bringing the necessary information together to identify and prioritize areas of existing and potential wildlife mortality in order to address these areas in the Department's work program. The efforts in this research is presented in the paper, "Habitat and GIS Model" by Mazzotti and Smith at these proceedings.

Additionally, the Department has contracted Florida Atlantic University to research the aspect of cumulative and secondary impacts of highways. This research will include an element which addresses wildlife and habitat impacts. The objective will be to develop analytical techniques for identifying and addressing these impacts on project and program level scale.

The Department is also working toward reducing transportation related wildlife mortality by managing the rights-of-way in a manner which does not attract wildlife to the highway area. This effort was the result of an interdisciplinary ecosystem management task team which evaluated the opportunities for ecosystem management activities in all of the functional areas of the Department. The team felt that vegetation management in the rights-of-way could help reduce wildlife mortality by not attracting vulnerable wildlife to the highways. While the rights-of-way may be compatible for some species such as birds and less mobile species, it is not the place to be providing habitat for species which will get on to the highway. This has been evident in the case of the Key deer where grasses along the highway have attracted the deer to US-1.

Conclusions

The Florida Department has policies and procedures to implement an ecosystem management level program for habitat and wildlife conservation in the areas of highways. A program is in place to address habitat and wildlife impacts including wildlife mortality at a state-wide basis. Research is being conducted to better define the cumulative and secondary impacts in relation to wildlife and habitat issues. Design alternatives have been constructed and researched to help arrive at cost-effective designs for wildlife crossings and fencing. Existing facilities and new projects are considered when looking at wildlife mortality. Crossings are being planned and projects developed and constructed in a number of areas of the state to address wildlife mortality considerations. Much more remains to be done. The necessary framework is complete to make this possible. Florida Department of Transportation management support remains strong to address these issues. All that remains is to continue to use every opportunity and innovation to reduce transportation related wildlife mortality in Florida.

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