

**WILDLIFE CROSSING DESIGNS AND USE BY
FLORIDA PANTHERS AND OTHER WILDLIFE
IN SOUTHWEST FLORIDA**

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INTRODUCTION

Highway mortality is one of the most visible sources of mortality for many wildlife species. Wildlife populations often can absorb this unnatural mortality without suffering declines, but for endangered large mammals like the Florida panther, additional sources of mortality could imperil their existence. A contiguous system of wild lands is necessary to accommodate the spatial needs of the panther population. Adult male and female panthers maintain home ranges of >500 km² and >190 km², respectively, with limited overlap among males (Maehr et al. 1991a). These home ranges often include many miles of improved roads that are regularly traversed. Road-kill mortality can be expected among panthers as a result of the interspersion of roads within panther habitat (Maehr et al 1991b)(Fig. 1).

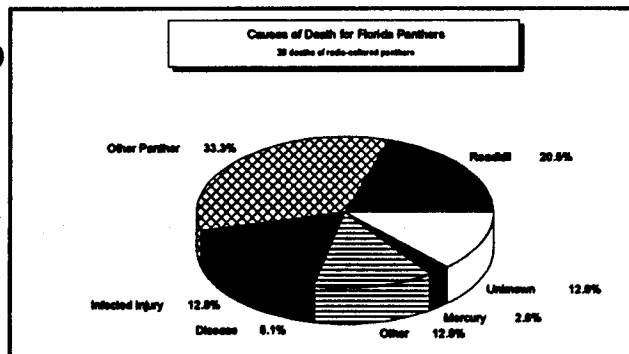


Figure 1

Efforts to reduce this unnatural source of mortality have included the creation of nighttime speed reduction zones, installation of special roadside headlight reflectors, and adding "rumble" strips to the highway surface. A more ambitious project was completed when State Road 84 was converted to Interstate 75.

Locations of previous road-kills and knowledge of where radio-instrumented panthers crossed this busy highway were used to incorporate 24 wildlife underpasses into the highway conversion design. These strategically-placed structures offer safe passage to wildlife that is beneath the flow of traffic. Use of these underpasses was encouraged by erecting a 3.4 m chain-link fence topped with 3 strands of outrigged barbed wire along the 65 km stretch of interstate that runs through panther habitat. A second wildlife crossing design was developed for State Road (SR) 29, a 2-lane highway running through panther habitat, and was installed at 2 critical areas.

Our objectives were to evaluate the effectiveness of the new underpass design installed on State Road 29 and to compare use to the I-75 wildlife crossings. Wildlife use of this new underpass design needs to be documented in order that design changes can be made, if necessary, before it is applied in other areas prone to wildlife/vehicle collisions.

STUDY AREA

The study area was in central Collier County, Florida, along a 6.4 km segment of the SR 29 corridor north of I-75 as well as a 15 km stretch along I-75 extending west from SR 29. These roads cross through Fakahatachee Strand State Preserve (FSSP), the Florida Panther National Wildlife Refuge (FPNWR), and the Big Cypress National Preserve (BCNP). There are 9 crossings on I-75 west of SR 29, two of which were monitored as a comparison to the new wildlife crossing design employed on SR 29.

Wildlife crossing #8 was located 5.3 km west of SR 29 on I-75. The crossing was situated on an old north-south railroad tram through FSSP and the FPNWR. Crossing #2 was 12.3 km west of SR 29. An old road once led to an oil pad from this location. Both crossings were monitored by Foster and Humphrey (1995) in an earlier study. These areas encompass habitats ranging from seasonally flooded mixed swamp lands to dry pine lands.

An I-75 wildlife crossing is 21.2-25.8 m wide by 48.5 m long including the open median separating the 2 bridges that elevated traffic 3-4 m above the ground (Foster and Humphrey 1995). Chain link fencing 3.4 m in height with a 1 m overhang of barbed wire enclosed the highway to help direct animals to the underpasses and deter crossings in areas with no underpasses.

The 6.4 km section of roadway on SR 29 where crossings were built separated FPNWR to the west from the Bear Island Unit of BCNP to the east. The SR 29 wildlife crossings were located 1.4 km and 4.5 km north of I-75.

The crossings on SR 29 consisted of a pre-formed box culvert 2.4 m high, 7.3 m wide, and 14.6 m long. These culverts rested at ground level and the roadway gradually rose over the structures. The crossings also included a concrete span that formed a bridge across the adjacent canal. The surface of the span contained a layer of soil to support growth of natural vegetation. The SR 29 corridor with the installed crossings was fenced similarly to I-75.

METHODS

Placement of wildlife crossings was determined by examining radio-telemetry data, locations of road-kills, and habitat characteristics. Radio-instrumented Florida panthers and black bears have been monitored in the study area for 15 and 5 years, respectively. We have collected over 28,000 panther and bear locations during the past decade. These data are being analyzed with Geographic Information System software to characterize patterns of large carnivore use of the study area. This long-term monitoring yielded many observations of how these large mammals use this portion of their habitat and where they tended to cross SR 29. Important crossing areas were delineated by coupling this extensive telemetry database with locations of road kills. Exact placement of the underpasses was determined by identifying important habitat features such as forested cover or the presence of bridges across the roadside canal.

Radio-instrumented panthers and bears were located three times a week from a Cessna 172. Universal Transverse Mercator coordinates, habitat type, and activity were recorded for each animal located. Most flights were conducted between 0630 and 1030 on Monday, Wednesday and Friday. The crossing areas were searched for tracks and other sign when these animals were known to have crossed the SR 29 study area.

Monitoring of the SR 29 wildlife crossings began on 30 March and the two on I-75 began on 12 and 14 April 1995 by using TrailMaster (Goodson and Associates, Lenexa, KS) game monitors. Each monitoring unit consisted of an infrared beam transmitter and receiving unit coupled with a digital counter and automatic flash camera. When the infra-red beam was broken, a picture was taken and the date, time of day, event and frame number was recorded. The cameras were equipped with a feature which printed the date and time directly on the film. TrailMaster units and cameras were mounted on a 61 cm tall 2X4 screwed into a 40 cm square plywood base. The transmitter was attached to one stand and the other held the receiver and camera. One camera was sufficient to cover the entire span of the crossings on SR 29 but the wider crossings on I-75 (> 30 m), required two cameras. The TrailMasters were positioned so that the infra-red beam was at a height of approximately 40 cm above the ground and the camera was mounted about 61 cm from the ground.

Tracking surfaces were created at three of the underpasses to determine use, avoidance or indifference to the structures. The fourth was not conducive to making a tracking surface due to the presence of water in the crossing. The tracking surfaces were placed on either side of the crossings and checked each time the wildlife crossings were visited. Tracks found on both sides of the crossing and traveling in the same direction indicated use. Tracks that approached but did not enter the structure suggested avoidance. Tracks crossing the tracking surface but not approaching or entering the underpasses were classified as indifferent.

WILDLIFE USE OF CROSSING STRUCTURES

Both wildlife crossing designs have been used by all medium-sized to large animals that occur in southwest Florida (Fig. 2). White-tailed deer, raccoons, and bobcats were the most common species detected. Black bears were the most infrequent users of the crossings. White-tailed deer were the most frequent users of the I-75 crossing design probably because the openness encouraged growth of preferred forage. Conversely, raccoons were the most frequent users of the SR 29 design. The crossing structure created a cool, often times wet, habitat that may have attracted amphibians and other raccoon prey.

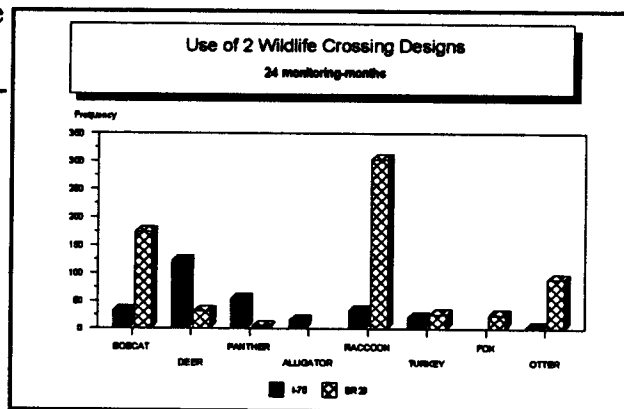


Figure 2

The pattern of wildlife use of the I-75 crossings has not changed much between the Foster and Humphrey (1995) study and our study (Fig. 3). Panther use of the crossings, however, was substantially greater than reported by Foster and Humphrey (1995). This increased use of the I-75 crossings could reflect acceptance by older, established panthers and a "learning curve" by recent additions to the panther population. Some panthers may have been reluctant to cross these highways without having natural substrates and cover available that now exist in the wildlife crossings. All panthers, whether their home range is bisected by roads or not, habitually use the same travel routes to access all parts of their home range, including preferred spots to cross highways. As established panthers learn these new, safe crossing locations and young cats enter the population, an increase in use of the wildlife crossings is not surprising.

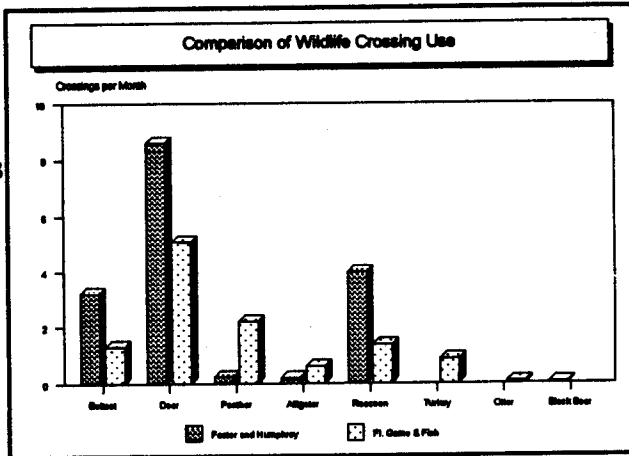


Figure 3

Three female panthers have been killed by vehicles on SR 84 prior to conversion to I-75 with wildlife crossings. The last death occurred in November 1986, and since that time, only 1 crossing by a female panther had been documented along this SR 84 - I-75 corridor. No radio-collared female panther had a home range bisected by the SR 84 corridor (Fig 4). Female panther #57, likely born after the wildlife crossings were completed, was captured in January 1995 and has a home range bisected by I-75. This cat has been documented using the crossings to travel between FSSP and FPNWR.

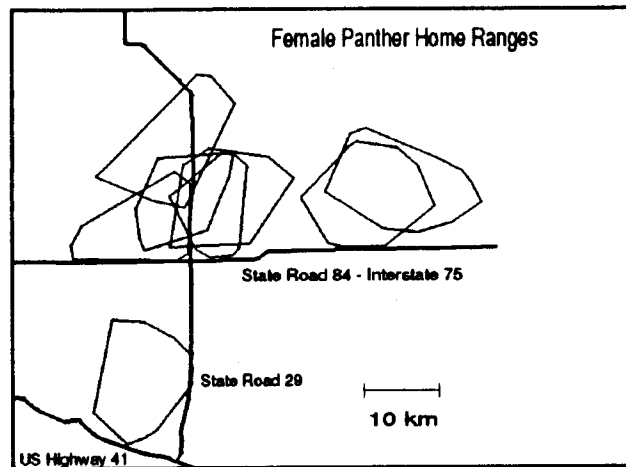


Figure 4

Panther use of the SR 29 crossings occurred prior to intensive monitoring during the early stages of construction. Female panther #32, whose normal range lies almost entirely within FPNWR, was found in Bear Island east of the southern crossing (29S) on 17 June 1994. This location was the first documented crossing of SR 29 by #32. Panther tracks showed that #32 crossed the highway 100 m N of the partially completed crossing and then travelled south along the canal until encountering the concrete and earth span across the canal. #32 walked across the span to access Bear Island. After spending a week in the Preserve, #32 returned to FPNWR via the same crossing, this time using the span and the box culvert. Male #12 was documented using the southernmost crossing on 27 July 1994. Telemetry data coupled with tracks showed the male had crossed from Bear Island to FPNWR, using both the span and culvert. This male consistently used both sides of SR 29, but in November 1994 was killed by another male panther. A female Texas cougar (*Felis concolor stanleyana*) released for genetic restoration purposes (Seal 1994) also used the south crossing on 6 May 1995.

The wildlife crossings on SR 29 were effective in permitting the safe passage of many species of wildlife across the roadway. Two individual bobcats consistently used 29S and it is likely that as more animals learn the locations of these crossings they will use them at greater frequencies.

Placing wildlife crossings at traditional places where panthers tend to cross, irrespective of design, may lead to quicker acceptance and use of the structures. This seemed to be the case with panther #12, as he used the SR 29 structure while it was still under construction. Two additional crossings have been recommended further north on SR 29. Panthers #11, #19, and #51 traditionally cross where these crossings are proposed. Panther #51 has the best opportunity to find the existing SR 29 crossings since he is shifting his home range into the area vacated by the death of #12.

No panthers have been killed by collisions with vehicles in the area protected by the wildlife crossings and fencing. Eleven panthers have been killed by vehicle since 1990, 6 of which

have died on rural county roads. Four roadkills occurred on SR 29, 1 before the crossings were installed, 1 in the area where a crossing has been proposed, and the remaining 2 in Sunniland. The last panther roadkill occurred on US 41 in Big Cypress National Preserve.

SUMMARY

Both designs of wildlife crossings have been used by Florida panthers and a host of other animal species. The I-75 wildlife crossings with their openness and creation of early successional habitat may have encouraged use by white-tailed deer. The more shaded, cooler, and damper SR 29 structures may have created ideal habitat for raccoon prey items accounting for the heavy use by these mammals. Because both designs were used by a variety of wildlife species, including Florida panthers, we feel that the design is of less importance than their location. It appears that either wildlife crossing design will be successful when placed at sites where animals habitually cross.

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