

### THREE SOURCES OF FLORIDA GRASSHOPPER SPARROW MORTALITY

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The Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*) is an isolated sedentary subspecies endemic to dry prairies of south central Florida (Delany 1996, Vickery 1996). It was listed as endangered because of its restricted distribution and population decline caused by extensive conversion of dry prairies to unsuitable habitats, especially bahiagrass (*Paspalum notatum*) pastures (Federal Register 1986, Delany 1996). Breeding aggregations are known currently from only Avon Park Air Force Range (APAFR) in Highlands and Polk counties, Kissimmee Prairie State Preserve in Okeechobee County, and Three Lakes Wildlife Management Area in Osceola County (Delany et al. 1999). A small population at Ordway-Whittell Kissimmee Prairie Sanctuary in Okeechobee County apparently was extirpated by spring 1999 (P. Gray pers. comm.). The total population of Florida Grasshopper Sparrows likely is fewer than 1000 birds (Delany et al. 1999).

Delany et al. (1993) did not identify sources of mortality of adults at APAFR. Predators of Florida Grasshopper Sparrow eggs and nestlings identified by Nicholson (1936) were snakes, spotted (*Spilogale putorius*) and striped (*Mephitis mephitis*) skunks, and feral hogs (*Sus scrofa*). Flooding likely causes nesting failure (Vickery 1996), but is undescribed. Information identifying these and other sources of mortality are needed before Florida Grasshopper Sparrow recovery efforts can be developed fully (USFWS 1988). Here I describe three newly reported sources of Florida Grasshopper Sparrow mortality: predation by a Loggerhead Shrike (*Lanius ludovicianus*), nesting failure caused by flooding, and collision with a motor vehicle. Mortalities occurred in the 800 ha OQ Range/Delta Trail Area in the Highlands County portion of APAFR.

*Shrike predation.*—I discovered the remains of an adult Florida Grasshopper Sparrow impaled on a barbed-wire fence in OQ Range at 0730 hr on 22 July 1998. The remains consisted of the front part of the head, including both mandibles, the forehead, the left lower jaw, and both eyes. The head was impaled from behind, with the barb penetrating the front of the skull. Remaining feathering included pale nares, yellow lores, and a black forehead with the frontal pattern of the whitish median crown stripe. A few buffy body feathers also were attached to the barbed-wire. No remains were found on the ground below the fence. I salvaged the head and feathers (Florida Museum of Natural History UF40245).

*Nest flooding.*—M. Scheuerell (pers. comm.) discovered a Florida Grasshopper Sparrow nest in the Delta Trail Area at 0800 hr on 3 July 1997. The nest, built in a clump of wiregrass (*Aristida beyrichiana*) and dwarf live oak (*Quercus minima*), contained one egg and three nestlings that had just hatched. On 4 and 5 July respectively, 27 mm (1.06 in) and 29 mm (1.12 in) of rain fell 2 km west of the nest site (APAFR data). On 6 July I checked the nest at noon. No adults were observed. Habitat surrounding the nest was flooded with  $\leq 25$  mm of water; the inside of the nest cup contained 15 mm of water. Only two nestlings remained, and the waterline was close to or over their nostrils. One nestling had died recently and was salvaged (Florida Museum of Natural History,

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necropsy performed, carcass discarded but the stomach retained, contents uncatalogued, M. F. Delany pers. comm.). I placed the head of the remaining nestling, which was close to death, on the rim of the nest cup above the waterline. At 1850 the same day, the nestling was gone.

I discovered a Florida Grasshopper Sparrow nest in OQ Range at 0900 hr on 30 June 1999. The nest was built in a clump of wiregrass shielded by bluestem (*Andropogon* spp.) and contained four eggs. The four eggs were still present on 2 July. On 4 July, 68.3 mm (2.69 in) of rain fell 2.5 km west of the nest site (APAFR data). Local thunderstorms occurred on 5 July, but almost no rain was recorded at the weather station. The nest was empty at 1930 hr on 5 July, when the surrounding prairie was inundated with  $\leq 25$  mm of water. The inside of the nest cup contained 10 mm of water.

*Vehicle collision.*—S. Van Hook (pers. comm.) found a freshly-killed juvenile Florida Grasshopper Sparrow on Kissimmee Road about 2 km east of OQ Road at 0930 hr on 2 July 1996. Kissimmee Road is a single-lane, paved road that bisects the OQ Range/Delta Trail Area. The maximum posted speed limit on the road is 64 kph (40 mph), but vehicle speeds appear to often exceed 80 kph (pers. obs.). The sparrow was missing its tail and had numerous broken bones and torn skin, but was salvaged (Florida Museum of Natural History UF39366).

*Discussion.*—Florida Grasshopper Sparrow nests are built on the ground, often at the base of grass clumps, and are concealed by grasses, forbs, or dwarf live oaks (Delany 1996, Vickery 1996, pers. obs.). The nest cup is built in a slight depression ( $\leq 3.2$  cm; Delany and Linda 1998) in the sand substrate, so that the contents of the nest usually are at, or slightly below, ground level. Florida Grasshopper Sparrow egg dates range from 2 April (Stevenson and Anderson 1994) to 21 August (pers. obs.), which results in a nesting cycle that may begin in late March and may extend into early September. Flooding associated with intense rainfall events from June to August may be an important source of Florida Grasshopper Sparrow nesting failure.

Loggerhead Shrikes are rare in regularly burned, unfenced Florida dry prairies, probably because of the scarcity of suitable nesting and impaling substrates. Prairies that are burned lightly or infrequently often are invaded by oaks (e.g., *Quercus virginianus* and *Q. laurifolia*) especially along roadways and fencelines, and may then support shrikes (pers. obs.). Barbed-wire fencing may also encourage shrikes to move into prairies. Since 1996, three or four resident pairs of Loggerhead Shrikes occur in the OQ Range/Delta Trail Area, all in overgrown areas along roads and barbed-wire fencelines. Although shrikes probably pose only a small threat to sparrow populations, land managers should consider removing barbed-wire fencing and shrike nesting substrates (e.g., oaks) from prairies occupied by Florida Grasshopper Sparrows. At APAFR, T. Dean (*in* Vickery 1996) observed wintering Eastern Grasshopper Sparrows (*A. s. pratensis*) that had been impaled on barbed-wire fencing, and also observed a shrike pursuing but failing to catch a juvenile Florida Grasshopper Sparrow.

Mortality from motor vehicles may occur more frequently than has been documented within the OQ Range/Delta Trail Area Florida Grasshopper Sparrow population, but likely has only a minimal impact. All other currently known populations of sparrows are found in areas with only sand roads (pers. obs.), so vehicle mortality may not occur elsewhere.

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