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MORTALITY OF THE ENDANGERED WRIGHT FISHHOOK CACTUS (*SCLEROCACTUS WRIGHTIAE*) BY AN *OPUNTIA*-BORER BEETLE (CERAMBYCIDAE: *MONEILEMA SEMIPUNCTATUM*)

Ronald J. Kass[1]

Key words: demographic monitoring, beetle, mortality, population decline.

Sclerocactus wrightiae Benson (Wright fishhook) is a small, white-flowered barrel cactus endemic to the San Rafael Swell in south central Utah. It grows in salt desert shrub and pinyon juniper communities at 1460 to 1865 m (Welsh et al. 1993). Populations are typically small, consisting of 50–100 individuals, and restricted to fine-textured soils derived from the Mancos Shale, Morrison, Summerville, Curtis, Entrada, and Carmel formations.

Sclerocactus wrightiae was listed as an endangered species by the U.S. Fish and Wildlife Service on 11 October 1979 (USFWS 1979). It was listed based on its narrow distribution, small population size, and threats from mining and natural gas development (Mutz et al. 1985). Past inventories (Welsh 1980, Neese 1987, Kass 1989) have extended its distribution from approximately Ferron in Emery County southwest to Hanksville in Wayne County, Utah (Fig. 1).

Long-term demographic monitoring plots were established throughout the range of *S. wrightiae* to assess various aspects of its life history and reproductive biology. During the 1993–2000 field seasons, a small, white beetle larva was discovered infesting cacti at all 3 plots. Upon close examination, cacti were often found with external chew marks, pronounced constrictions between growth segments, and a spongy and chlorotic appearance. These abnormalities led to decreased vigor, lower fecundity, and eventual death in the same or subsequent years. Beetle larvae were captured and reared in captivity and later identified as the *Opuntia*-borer beetle (Cerambycidae: *Moneilema semipunctatum* LeConte). This is the first published report of *M. semipunctatum* infesting the genus *Sclerocactus.*

Six species of *Moneilema* are recognized in North America and restrict feeding to the Cactaceae, preferring the genus *Opuntia* as a host (Crosswhite and Crosswhite 1985). *Moneilema semipunctatum*'s range is the Great Basin in Nevada and western Utah, south to northern Baja California, and east to the Colorado Plateau in Utah, southwestern Colorado, northwestern New Mexico, and northern Arizona (Linsley and Chemsak 1984).

Linsley and Chemsak (1984) discussed feeding and mating habits of the genus *Moneilema.* Adult beetles are large, black, nocturnal, and flightless. They become active at dusk and climb up and down the cactus stem, feeding at the base or in the stem crown. Mating occurs at night on top of the plant and may continue throughout the night. Females choose a suitable ovipositor site near the base of the plant and deposit eggs. After hatching, the larvae attempt to enter the plant, and during the second or third instar the larvae begin to tunnel into the plant. A pupal cell is constructed in the fall either in soil or within hollowed-out stems.

During the 1993–2000 monitoring period, *M. semipunctatum* accounted for 23% of the combined mortality at all 3 plots. Similar percentages have been observed throughout the remaining range of *S. wrightiae* (Kass personal observation). Size class analysis of beetle-killed stems ($n = 25$) indicated 16% mortality in size class 2 (2–4 cm wide), 44% mortality in size class 3 (4–9 cm wide), and 40% mortality in size class 4 (cacti >9 cm wide; Table 1). Beetles did not infest the smallest size class (0–2 cm wide), and so mortality in size class 1

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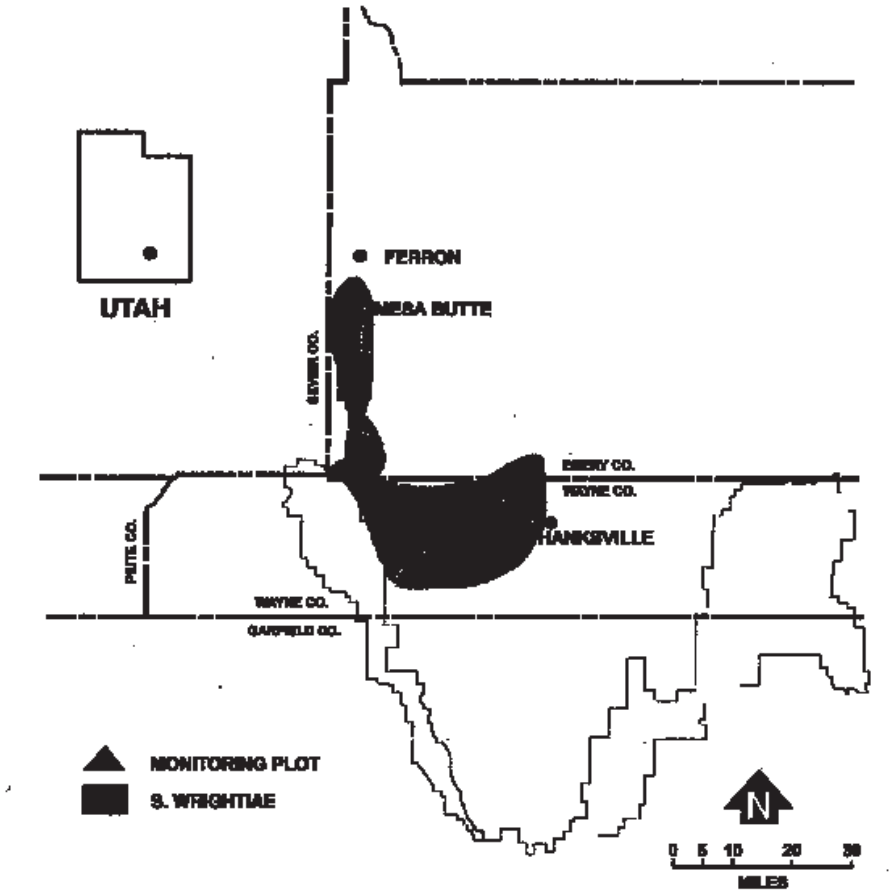

Fig. 1. Distribution of *Sclerocactus wrightiae.*

was generally the result of dessication or cattle trampling.

Other mortality sources recorded during monitoring include blister beetles (*Epicauta* sp.), Ord kangaroo rats (*Dipodomys ordii*), and white-tailed antelope ground squirrels (*Ammospermophilus leucurus*). Reports from other researchers indicate *Moneilema* infestations on the federally listed Uinta Basin hookless cactus (*Sclerocactus glaucus*) in Utah (USFWS personal communication) and Mesa Verde cactus (*Sclerocactus mesae-verde*) in Colorado and New Mexico (Naumann 1989).

Moneilema semipunctatum appears to infest larger individuals possibly because large individuals are better host plants. Additional declines in larger individuals have been observed range-wide since inventories for *S. wrightiae* began in 1986. Some of these declines are the results of amateur and commercial collecting (BLM personal communication). It is possible that continued beetle mortality may cause a shift in population structure: larger cacti with higher reproductive rates may be replaced with smaller cacti with lower reproductive rates. Kass (2000) reports a mortality-to-recruitment ratio of approximately 2.5 to 1 since monitoring began in 1993. Menges (1991) recommends that recruitment be greater than mortality per year to maintain population viability. These observed mortality rates, coupled with increasing anthropogenic threats of commercial collecting and habitat degradation, indicate a slow decline for *S. wrightiae.*

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TABLE 1. Size-specific mortality by beetles. Values indicate numbers and percent of cacti killed by beetles compared to overall percent size class distribution.

Size class	*N*	% beetle killed	% size class
1	0	0	8
2	4	16	23
3	11	44	63
4	10	40	6
TOTAL	25	100	100

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