

Fragrant Prickly-Apple (*Harrisia fragrans*)
Annual Monitoring and Mapping,
Interim Report

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INTRODUCTION

Harrisia fragrans is an endemic shrubby cactus listed as endangered by the U.S. Fish and Wildlife Service and the State of Florida. It historically occurred in several coastal central Florida counties including Volusia, Brevard, Indian River and St. Lucie (Wunderlin et al. 2000). It has also been reported for Big Pine Key and the Flamingo area of Monroe County (Benson 1982). Today, all known occurrences are located in St. Lucie County in or around Savannas State Reserve (FNAI 1997, Rae 1996). According to Small (1933) this species was historically found in hammocks on high sand-dunes, kitchenmiddens, and coquina ledges. Institute for Regional Conservation reports *H. fragrans* as being frequent in scrub and xeric hammock at the Savannas State Reserve, and rare (three plants) in xeric hammock in the St. Lucie County-owned Walton Scrub, which is located adjacent to Savannas State Reserve (Bradley et al. 1999). The entire Savannas population is confined to an area approximately ten miles long and ½ mile wide. The population is dissected by a Florida East Coast Railway railroad line. The Savannas State Reserve is located on the western side of the railroad line, and Walton Scrub on the eastern side of the railroad line. Most of the plants occur on the western side of the railroad line in the Savannas State Reserve and its inholdings.

Between 1988 and 1996 populations of *H. fragrans* in and around the Savannas State Reserve were monitored by John Rae (Rae 1996). Rae reported that in 1996 there were an estimated 321 plants present in 11 sub-populations on both private and public lands. He studied the demography of two sub-populations each summer between 1988 and 1996 recording mortality, plant size, fruiting, and flowering. His results indicated that both sub-populations had suffered serious decline; one sub-population declined by 63.8% and the other by 64.4%. Rae hypothesized that excessive shading as well as overexposure were responsible for such a high decline, theorizing that *H. fragrans* apparently prefers partially shaded conditions.

In 1998 preliminary monitoring of the entire population at the Savannas State Reserve and adjacent Walton Scrub was initiated by The Institute for Regional Conservation (IRC) and Florida Department of Environmental Protection (FDEP). This study began in the Fall of 1998 under the encouragement of FDEP biologist J.B. Miller while IRC was conducting a larger study of scrub habitats for the U.S. Fish and Wildlife Service (Bradley et al. 1999). During this preliminary census 802 plants were recorded.

While Rae reported the population decline of *H. fragrans*, it was unclear if it was truly in decline or not. IRC and FDEP showed that a much larger population existed than Rae had estimated. A follow-up monitoring program was clearly needed to determine the long-term population trend of this species. Part of the problem may have been the technology used by Rae (sketch maps and aluminum tags), and possibly a lack of vigorous surveys to determine if new sub-populations of *H. fragrans* were being established while the two sub-populations were in decline. Based on the above, IRC proposed a continuation of annual monitoring for four full years to determine the long term population trends of this species.

OBJECTIVES

1. Establish a long-term (five year) monitoring program for occurrences of *H. fragrans* populations at Savannas State Reserve (including its inholdings), and Walton Scrub Preserve in St. Lucie County;
2. Determine population trends of *H. fragrans* within the study area over a five year period (1998-2002);
3. Examine the effect of canopy cover on the demographics of *H. fragrans*.

METHODS

- Re-monitor individual *H. fragrans* plants.
- Record all plants using an accurate GPS device (accurate to the decimeter).
- Record Rae's old tags, and place new tags were placed on all individual *H. fragrans* by using stainless steel pre-numbered tags attached to the plants using braided steel wire (Adams and Lima 1994).
- Record flowering and fruiting activity, including number of fruits and flowers on each plant.
- Record individual plant size by measuring the length of the longest stem.
- Record the number of stems per plant was be recorded.
- Record canopy cover (full shade, partial shade, or full sun).

RESULTS & DISCUSSION OF 1999 DATA COLLECTION

Data was collected between September 29 and October 20, 1999. A total of 836 plants were mapped and tagged, 121 more than were mapped in 1998. This may not be the result of a growing population, but in more complete surveys. Because of a lack of resources, plants were not tagged in the 1998 study. This 1998 data should be treated as preliminary, and is difficult to compare to data collected in 1999.

Because plants were not tagged in 1998 it is impossible to say how many new plants were recorded, and how many had died in the past year. These data however will be available after continued annual surveys between 2000 and 2003. It is expected that some previously missed plants will be found in successive surveys. Because plants were tagged in 1999 and can be relocated using the GPS coordinates that were collected, we will now be able to track mortality very accurately. Seedlings will also be distinguished from more mature plants that may have been overlooked the previous year.

Plants were found nearly throughout the Savannas State Reserve. Colonies often occur in distinct clusters. Nine colonies of plants have been identified (Maps 1-8). The colony at Walton scrub is not shown in the attached maps because of a data error.

The data show that average plant size did increase from 1998 to 1999. This increase may be the result of inconsistencies in methodologies across the two years. In the preliminary 1998 census plant height was estimated visually to the closest decimeter. In 1999 plant

height was measured to the closest centimeter with a meter stick. Because of this difference in methodologies, a test for statistical difference was not performed.

The average number of stems decreased slightly from 3.1 per plant to 2.9 but there was no significant difference between the two years (t-test, $p=0.45$).

Average plant height increases with amount of shading. Plants in full sun average 6.5 dm in height, in partial shade 7.8 dm, and 8.0 dm in full shade. In successive years survivorship will be analyzed among different degrees of shading.

The data also shows that plant stature (erect vs. prostrate) changed from 13% of plants prostrate to only 5% of plants. We do not know the cause of this change.

Summary of <i>Harrisia fragrans</i> data		
	Fall 1998	Fall 1999:
Number of Plants Mapped:	802	923
Average Height:	8.5 dm	7.6 dm
Average # Stems:	3.1	2.9
Number in Shade:	NA	347(38%)
Number in Sun:	NA	177(19%)
Number in Partial Shade:	NA	399(43%)
Number in Fruit:	13 (2%)	208(23%)
Number in Flower:	14 (2%)	3(0.003%)
Erect:	695 (87%)	874(95%)
Prostrate:	103 (13%)	49(5%)

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