

Assessment of The Federally Endangered Small's Milkpea (*Galactia smallii*) and Candidate Sand Flax (*Linum arenicola*) at The Homestead Air Reserve Base, Homestead, Florida

Project 22242965.56520.03000

Contract W91278-11-D-0054

Task Order No. 0003

Craig van der Heiden and James Johnson

November 21, 2013



**Submitted by:
The Institute for Regional Conservation
100 E. Linton Blvd, Suite 302B
Delray Beach, FL 33483
George D. Gann, Executive Director**



**Submitted to:
Kaye Sigmon
URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237**

Table of Contents

| | |
|--|------------|
| List of Acronyms and Abbreviations | iii |
| List of Tables | iv |
| List of Figures..... | v |
| Introduction..... | 1 |
| Methods | 1 |
| Results | 2 |
| Table 4. Quick reference table listing polygons with population estimates and habitat quality | 32 |
| Management Recommendations..... | 33 |
| Acknowledgements | 35 |
| Figures..... | 36 |

List of Acronyms and Abbreviations

| | |
|----------------|--|
| HARB | Homestead Air Reserve Base |
| HAFB | Homestead Air Force Base |
| ESA | Endangered Species Act |
| SE | Standard Error |
| SD | Standard Deviation |
| FID | Feature Identification |
| ESRI | Environmental Systems Research Institute |
| PVC | Polyvinyl Chloride |
| m | Meter(s) |
| m ² | Square Meter(s) |
| cm | Centimeter(s) |

List of Tables

| | |
|---|----|
| Table 1. State-listed Endangered, Threatened, and Commercially Exploited Plant Species found on Homestead Air Reserve Base..... | 3 |
| Table 2. List of common native species encountered..... | 4 |
| Table 3. List of common exotic species encountered..... | 5 |
| Table 4. Quick reference table listing polygons with population estimates and habitat quality... | 32 |

List of Figures

| | |
|---|----|
| Figure 1. Homestead Air Reserve Base..... | 36 |
| Figure 2. Map showing survey polygon locations..... | 37 |
| Figure 3. Map showing survey polygon locations..... | 38 |
| Figure 4. Map showing survey polygon locations..... | 39 |
| Figure 5. Map showing survey polygon locations..... | 40 |
| Figure 6. Map showing survey polygon locations..... | 41 |
| Figure 7. Map showing survey polygon locations..... | 42 |
| Figure 8. Map showing survey polygon locations..... | 43 |
| Figure 9. Map showing survey polygon locations..... | 44 |
| Figure 10. Map showing locations of Small’s milkpea: Polygon 0 showing populations 0, 1, 2, 3, 4, 5, 6 159; Polygon 111 has a single population 18; Polygon 112 has a single large population; Polygon 200 has population 8..... | 45 |
| Figure 11. Polygon 7 showing Small’s milkpea populations 15, 16, and 17..... | 46 |
| Figure 12. Map showing locations of Small’s milkpea: Polygon 99 showing populations 22 and 23; Polygon 101 showing population 24. Polygon 126 showing population 20 and 21..... | 47 |
| Figure 13. Map showing locations of Small’s milkpea: Polygon 201 containing populations 8, 9, 11, 12; polygon 202 containing population 10..... | 48 |
| Figure 14. Map showing locations of Small’s milkpea: Polygon 203 contains population 13.... | 49 |
| Figure 15. Map showing locations of Small’s milkpea: Polygon 210 showing populations 35, 36, 37; Polygon 211 showing populations 26..... | 50 |
| Figure 16. Map showing locations of Small’s milkpea: Polygon 204 containing populations 46 and 48; Polygon 205 containing populations 49, 50, 160; Polygon 206 showing populations 158 and 47. Polygon 213 showing populations 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 68, 74, 76, 77, 78, 79, 80, 81, 86, 87, 88, 89, 90; Polygon 226 showing population 66; Polygon 226 showing population 66; Polygon 227 showing population 67; Polygon 228 showing population 51; Polygon 253 showing populations 69, 70, 73; Polygon 254 showing population 71; Polygon 255 showing population 72; Polygon 256 showing population 75..... | 51 |

| | |
|---|-----------|
| Figure 17. Map showing locations of Small's milkpea: Polygon 214 showing population 92; Polygon 216 showing population 91..... | 52 |
| Figure 18. Map showing locations of Small's milkpea. Polygon 260 showing populations 93, 94, 95, 96, 97, 98, 100, 101; Polygon 261 showing populations 82, 83, 84, 85; Polygon 262 showing population 161..... | 53 |
| Figure 19. Map showing locations of Small's milkpea. Polygon 260 showing population 99; Polygon 294 showing populations 102, 103, 104..... | 54 |
| Figure 20. Map showing locations of Small's milkpea: Polygon 207 showing populations 41 and 42; Polygon 208 showing populations 38, 39, 40, 43; Polygon 209 showing populations 44 and 45. Polygon 229 showing population 52; Polygon 252 showing populations 53, 54; Polygon 307 showing populations 140, 141; Polygon 344 showing populations 30, 31..... | 55 |
| Figure 21. Map showing locations of Small's milkpea: Polygon 280 showing populations 130, 131, 132 1333, 134, 135, 136, 137, 138, 139, 142, 143, 144; Polygon 281 showing populations 145, 146; Polygon 291 showing populations 105, 106, 107, 108,109, 110, 111, 112, 113, 114; Polygon 296 showing populations 115, 116,117..... | 56 |
| Figure 22. Map showing locations of Small's milkpea: Polygon 281 showing populations 145, 146; Polygon 282 showing populations 147, 148, 149,150, 151, 152 153, 155; Polygon 296 showing populations 118; Polygon 304 showing population 119..... | 57 |
| Figure 23. Map showing locations of Small's milkpea: Polygon 281 showing populations 154, 155, 156, 157..... | 58 |
| Figure 24. Map showing locations of Small's milkpea: Polygon 289 showing population 121; Polygon 304 showing population 120..... | 59 |
| Figure 25. Map showing locations of Small's milkpea: Polygon 25 has a single population 25; Polygon 194 with populations 27, 28 29; Polygon 226 showing population 66; Polygon 230 showing populations 33,34; Polygon 277 showing population 32..... | 60 |
| Figure 26. Map showing locations of Small's milkpea: Polygon 325 showing population 122; Polygon 327 showing populations 123, 162; Polygon 329 showing populations 124, 125, 126, 127; Polygon 330 showing populations 128, 129..... | 61 |
| Figure 27. Map showing locations of sand flax: Polygon 0 showing populations 0 and 30; Polygon 112 contains population 5 and 6; Polygon 200 showing populations 31, 32 33; Polygon 202 containing population 2..... | 62 |

Figure 28. Map showing locations of sand flax: Polygon 203 showing populations 3 and 4.....**63**

Figure 29. Map showing locations of sand flax: Polygon 203 showing populations 3 and 4;
 Polygon 204 showing populations 7, 8, 10, 11, 12, 13; Polygon 205 showing populations
 15, 37, 16; Polygon 206 showing populations 14 and 29; Polygon 212 showing
 population 9; Polygon 213 showing populations 17, 18, 19, 23; Polygon 228 showing
 population 20.....**64**

Figure 30. Map showing locations of sand flax: Polygon 260 showing population 27; Polygon
 262 showing populations 24, 25, 26, 36; Polygon 294 showing population 28.....**65**

Figure 31. Map showing locations of sand flax: Polygon 252 showing populations 21, 22.....**66**

Figure 32. Map showing locations of sand flax: Polygon 214 showing populations 35.....**67**

Introduction

The Homestead Air Reserve Base (HARB) is located in Miami-Dade County in southern Florida. The cantonment covers approximately 1,953 acres and is surrounded by agricultural lands to the northeast, east and south and by residential housing developments to the northwest and west of HARB.

Pine rocklands once dominated south Florida's coastal ridge. Pine rocklands are savanna-like forests dominated by a single canopy tree, slash pine (*Pinus elliottii*), with a diverse hardwood and palm subcanopy. A rich herbaceous layer contains many endemic species. The pine rockland habitat is considered a fire climax community. Fire helps maintains pine rockland plant communities by controlling the amount of vertical structure, invasion and growth of hardwoods, species composition, and allows light to reach the understory and herbaceous plants. Anthropogenic habitat destruction has resulted in the loss of much of this habitat leaving only remnant patches of habitat making it one of the rarest habitats in the world.

In Miami-Dade County, the pine rocklands are associated with the Miami Rock Ridge, a formation of oolitic limestone. Pine rocklands occur on relatively flat limestone rock that is at or near the surface. Soils often accumulate in depressions and rock cavities and consist of sand, marl, and organic material.

The HAFB (Homestead Air Force Base) was built on the Miami Rock Ridge. The HARB (a portion of the original HAFB) contains some areas of the existing pine rockland fragments that could have populations of federally endangered species. The survey of the HARB cantonment area revealing the presence of two rare plant species, Small's milkpea (*Galactia smallii*) which is listed as endangered under the Endangered Species Act (ESA), and sand flax (*Linum arenicola*) which is a candidate for listing under the ESA. These species were found in many parts of HARB, at varying densities. The two species were growing in relictual pine rockland habitats that had formerly been cleared for the construction of the air base.

Methods

The scope of this project was to perform a baseline assessment of the Federally endangered Small's milkpea and federal candidate sand flax on the approximately 1000 acres of modified pine rockland habitat at the time of the study. The boundaries and polygons for HARB were obtained as ESRI ArcMap shape files from Christopher Mareska, GIS specialist. Polygons were numbered according to their feature identification (FID), which were created and labeled within ArcMap prior to obtaining the shapefiles and were used as references for our survey areas. The polygons are used solely for reference purposes which will enable land managers to find the areas where populations of Small's milkpea and sand flax are located. The entire parcel was walked to determine suitable habitat and to identify population locations.

Following the initial surveys to determine where the populations of Small's milkpea and sand flax were located, we returned to HARB to quantify the densities of the different populations. In areas where the populations were small (less than 10 meters (m) x 10 m), randomly placed 1 m x 1 m portable plots made of polyvinyl chloride (PVC) were utilized within the population of plants to determine population size. In larger areas (greater than or equal to 10 m x 10 m), each species was quantified (Small's milkpea and sand flax) using randomly placed belt transects 1 m x 10 m up to 1 m x 50 m. Estimates of total population densities were derived from these data.

The quality of habitat for each of the polygons where either Small's milkpea and/or sand flax were found was determined. Habitat quality was recorded as poor, medium, or high. This was a qualitative assessment based on previous experience The Institution for Regional Conservation has had from working in various pine rockland ecosystems. Factors that were considered in assessing habitat quality were dominance of pine rockland plant species versus exotic or native weedy plant species (indicating a degraded natural habitat) and diversity of pine rockland plant species. The three habitat classes are defined as follows:

- Poor quality habitat: dominated by the exotic grasses St. Augustine grass (*Stenotaphrum secundatum*) and Mascarene templegrass (*Zoysia tenuifolia*), which were originally planted as turf grasses on the base.
- Medium quality habitat: low dominance of pine rockland species with native weedy plants and smaller amounts of exotic grasses (St. Augustine and Mascarene templegrass)
- High quality habitat: high dominance of endemic pine rockland species and other native species, lacking exotic grasses.

It should, however, be noted that Small's milkpea is often found growing in high densities within areas dominated by the exotic grass Mascarene templegrass. As this is an exotic grass species, this habitat is recorded as poor despite high densities of Small's milkpea. These turf grasses are exotic grasses which do not occur naturally within pine rockland ecosystems, and have an overall negative effect on the quality of the habitat.

Populations of Small's milkpea and sand flax, within the larger polygons, were created from data generated during the initial surveys and density quantifications. A trace density of either Small's milkpea and sand flax was determined when a species found during initial surveys was not found when quantifying the plants. In one instance where Small's milkpea was found in the initial survey, we returned to find the entire area freshly re-sodded with St. Augustine grass. Sand flax is a small thin plant, which can be very difficult to locate without its flower, therefore even though it may have been found during the initial survey, re-locating the plant may not be possible in all instances (especially in areas of very low abundance).

Results

During the surveys no other species considered as Endangered, Threatened, or Candidates by the United States Fish and Wildlife Service were found other than Small's milkpea and sand flax. A total of 24 species listed by the State of Florida Department of Agriculture and Consumer Services as Endangered, Threatened, or Commercially Exploited were found on the property (Table 1). These species are typical components of pine rocklands throughout southern Florida. Lists of all other native and exotic species (Table 2 and 3 respectively) are provided as a

reference for species mentioned in the results section of this report. The United States Department of Agriculture was referenced for plant listings.

Table 1: State-listed Endangered, Threatened, and Commercially Exploited Plant Species found on Homestead Air Reserve Base.

| Scientific Name | Common Name | Listing |
|--|-----------------------------|----------------|
| <i>Angadenia berteroi</i> | Pineland golden trumpet | Threatened |
| <i>Bletia purpurea</i> | Pinepink | Threatened |
| <i>Byrsonima lucida</i> | Locust berry | Threatened |
| <i>Chaptalia albicans</i> | White sunbonnets | Threatened |
| <i>Coccothrinax argentata</i> | Florida silver palm | Threatened |
| <i>Crossopetalum ilicifolium</i> | Quail berry | Threatened |
| <i>Cynanchum blodgettii</i> | Blodgett's swallowwort | Threatened |
| <i>Galactia Smallii</i> | Small's milkpea | Endangered |
| <i>Ipomoea microdactyla</i> | Man-in-the-ground | Endangered |
| <i>Jacquemontia curtisii</i> | Pineland cluster vine | Threatened |
| <i>Lantana depressa</i> | Rockland shrub verbena | Endangered |
| <i>Linum arenicola</i> | Sand flax | Endangered |
| <i>Melanthera parvifolia</i> | Pineland black anthers | Threatened |
| <i>Odontosoria clavata</i> | Wedgelet fern | Endangered |
| <i>Phyla stoechadifolia</i> | Southern fogfruit | Endangered |
| <i>Psidium longipes</i> | Long stalked stopper | Threatened |
| <i>Pteris bahamensis</i> | Bahama ladder brake | Threatened |
| <i>Rhynchosia parvifolia</i> | Small-leaf snoutbean | Threatened |
| <i>Scutellaria havanensis</i> | Havana scullcap | Endangered |
| <i>Selaginella armata var. eatonii</i> | Eaton's spike-moss | Endangered |
| <i>Senna mexicana var. chapmanii</i> | Bahama senna | Threatened |
| <i>Smilax havanensis</i> | Everglades greenbrier | Threatened |
| <i>Spermacoce terminalis</i> | Everglades false buttonweed | Threatened |
| <i>Stylosanthes calcicola</i> | Everglades key pencilflower | Endangered |
| <i>Tetrazygia bicolor</i> | West Indian-lilac | Threatened |

Table 2: List of common native species encountered

| Scientific Name | Common Name | Listing |
|--|----------------------------------|----------------|
| <i>Acalypha chamaedrifolia</i> | Three-seeded mercury | Native |
| <i>Andropogon longiberbi</i> | Hairy bluestem | Native |
| <i>Anemia adiantifolia</i> | Pine fern | Native |
| <i>Aristida purpurascens</i> | Arrowfeather threeawn | Native |
| <i>Bidens alba</i> var. <i>radiata</i> | Spanish-needles | Native |
| <i>Centrosema virginianum</i> | Spurred butterfly-pea | Native |
| <i>Crotolaria pumila</i> | Low rattlebox | Native |
| <i>Dyschoriste angusta</i> | Rockland twinflower | Native |
| <i>Eragrostis elliotii</i> | Elliott's love grass | Native |
| <i>Ernodea littoralis</i> | Beach-creeper | Native |
| <i>Eustachys petraea</i> | Common fingergrass | Native |
| <i>Flaveria linearis</i> | Narrowleaf yellowtops | Native |
| <i>Galactia volubilis</i> | Downy milkpea | Native |
| <i>Heliotropium polyphyllum</i> | Pineland heliotrope | Native |
| <i>Indigofera miniata</i> var. <i>florida</i> | Florida coastal indigo | Native |
| <i>Morinda royoc</i> | Yellowroot | Native |
| <i>Muhlenbergia capillaris</i> | Muhlygrass | Native |
| <i>Paspalum caespitosum</i> | Blue paspalum | Native |
| <i>Paspalum setaceum</i> | Thin paspalum | Native |
| <i>Phyla nodiflora</i> | Frogfruit | Native |
| <i>Phyllanthus pentaphyllus</i> var. <i>floridanus</i> | Florida five-petalled leafflower | Native |
| <i>Rhynchospora colorata</i> | Starrush whitetop | Native |
| <i>Rhynchospora floridensis</i> | Florida whitetop | Native |
| <i>Schizachyrium gracile</i> | Wire bluestem | Native |
| <i>Schizachyrium rhizomatum</i> | Rhizomatous bluestem | Native |
| <i>Schizachyrium sanguineum</i> | Crimson bluestem | Native |
| <i>Setaria parviflora</i> | Knotroot foxtail | Native |
| <i>Sida acuta</i> | Common wireweed | Native |
| <i>Stachytarpheta jamaicensis</i> | Blue porterweed | Native |
| <i>Vernonia blodgettii</i> | Florida ironweed | Native |
| <i>Vigna luteola</i> | Cow-pea | Native |

Table 3: List of common exotic species encountered

| Scientific Name | Common Name | Listing |
|---------------------------------|-----------------------|---------|
| <i>Casuarina equisetifolia</i> | Australian pine | Exotic |
| <i>Eremochloa ophiuroides</i> | Centipede grass | Exotic |
| <i>Fimbristylis cymosa</i> | Hurricane sedge | Exotic |
| <i>Paspalum notatum</i> | Bahiagrass | Exotic |
| <i>Pteris vittata</i> | China brake | Exotic |
| <i>Schinus terebinthifolius</i> | Brazilian peppertree | Exotic |
| <i>Stenotaphrum secundatum</i> | St. Augustine grass | Exotic |
| <i>Wedelia trilobata</i> | Creeping wedelia | Exotic |
| <i>Zoysia tenuifolia</i> | Mascarene templegrass | Exotic |

A total of 56 populations of Small’s milkpea were mapped and quantified. Small’s milkpea was found in varying quantities throughout the base with the lowest average density of 0.008/ square meter (m²) and highest density of 3.12/ m². The average density is 0.379 ± 0.051 standard error (SE)/m². The total population on HARB is estimated at 404,779±7,442 standard deviation (SD).

Fewer populations of sand flax were found on HARB. Nineteen populations were found with varying average densities; the lowest density 0.006/ m² and the highest 2.0/ m². The average density of sand flax is 0.213 ± 0.058 (SE)/m². The population estimate for sand flax on HARB is estimated at 31,399±2,271 (SD) plants.

Reference polygons with FID numbers are highlighted in beige (Figures 2-9) and only polygons containing small’s milkpea and sand flax are discussed in the results. Within each polygon, Small’s milkpea and sand flax populations are outlined, numbered, and shaded purple for Small’s milkpea and yellow for sand flax. Habitat descriptions are describing entire Polygons and are not specific to individual populations unless otherwise stated.

Polygon 0. (Figure 2) Area: 14.3 acres Small’s milkpea: 3,132 sand flax: 3,985

Habitat description: Medium quality habitat along the northern and western boundary. The interior of the polygon contains some small populations of Small’s milkpea. Polygon 0 has native grasses (*Schizachyrium sanguineum*, *Paspalum caespitosum*) intermingled with Mascarene templegrass. Other native species associated with this polygon are *Stylosanthes calcicola*, *Jacquemontia curtisii*, *Psidium longipes*, *Scutellaria havanensis*, *Spermacoce terminalis*, *Tetrazygia bicolor*.

Management recommendations: continue mowing height and frequency; managing the height of weed whacking; spot treat Mascarene templegrass.

Figure 10.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 0 | 1.141 | 0.462 | 0.45 | 2,063 |
| 1 | 0.316 | 0.128 | 0.30 | 384 |
| 2 | 0.141 | 0.057 | 0.03 | 18 |
| 3 | 0.011 | 0.005 | 0.07 | 3 |
| 4 | 0.007 | 0.003 | 0.26 | 7 |
| 5 | 0.008 | 0.003 | 0.15 | 5 |
| 159 | 1.140 | 0.461 | 0.14 | 646 |
| 6 | 0.007 | 0.003 | 0.20 | 6 |
| Total | | | | 3,132 |

Figure 27.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 0 | 1.13 | 0.458 | 0.75 | 3,439 |
| 30 | 1.18 | 0.481 | 0.11 | 545 |
| Total | | | | 3,985 |

Polygon 6. (Figure 2) Area: 1.4 acres Small's milkpea: 240 sand flax: Trace

Habitat description: A narrow band of medium quality habitat. Sand flax occurs as a trace in this polygon. Other plants found are St. Augustine, *Psidium longipes*, *Scutellaria havanensis*, *Smilax havanensis*, *Pteris bahamensis*, *Crossopetalum ilicifolium*, *Lantana depressa*, *Angadenia berteroi*, *Spermacoce terminalis*.

Management recommendations: Continue mowing frequency. St. Augustine is not yet growing within the populations of Small's milkpea and sand flax and should therefore be kept from encroaching into the areas containing Small's milkpea and sand flax.

Figure 10.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 7 | 0.148 | 0.060 | 0.40 | 240 |
| Total | | | | 240 |

Polygon 7. (Figure 2) Area: 8.8 acres Small's milkpea: 347 sand flax: 0

Habitat description: An area of poor quality habitat dominated by the exotic Mascarene templegrass, with two small populations of Small's milkpea and a larger population north of the tennis courts.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 11.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 15 | 0.119 | 0.048 | 0.09 | 43 |
| 16 | 0.295 | 0.119 | 0.25 | 298 |
| 17 | 0.016 | 0.006 | 0.08 | 5 |
| Total | | | | 347 |

Polygon 99. (Figure 3) Area: 7.8 acres Small's milkpea: 2,366 sand flax: 0

Habitat description: Area with poor quality habitat dominated by Mascarene templegrass. Population 22 was covered over with St. Augustine sod and no plants were found when quantifying the population.

Management recommendations: Continue mowing height and frequency. Prevent the spread of St. Augustine into the populations as there are large patches to the south and west of the Small's milkpea.

Figure 12.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 22 | 0.194 | 0.079 | | |
| 23 | 1.193 | 0.483 | 0.49 | 2,366 |
| Total | | | | 2,366 |

Polygon 101. (Figure 3) Area: 7.8 acres Small's milkpea: 2,391 sand flax: 0

Habitat description: Medium quality habitat. Habitat dominated by Mascarene templegrass with some native grasses, *Schizachyrium sanguineum*, *Schizachyrium gracile* and *Paspalum* spp. The population has high densities of Small's milkpea. This polygon has the potential for expansion of the Small's milkpea population throughout the area. Although the extent of population was 0.5 acres it could expand throughout this polygon. Other species found are *Anemia adiantifolia*, *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. Treat exotic grasses.

Figure 12.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 24 | 0.568 | 0.230 | 1.04 | 2,391 |
| Total | | | | 2,391 |

Polygon 111. (Figure 2) Area: 1.5 acres Small's milkpea: 27 sand flax: 0

Habitat description: The habitat quality is medium. A very small population of Small's milkpea occurs in this polygon. Small's milkpea could potentially grow throughout this polygon and it could potentially be an area where sand flax could grow on the exposed limestone that traverse this polygon. This polygon has *Jacquemontia curtisii*, *Crossopetalum ilicifolium*, *Scutellaria havanensis*, Mascarene templegrass, *Stachytarpheta jamaicensis*, *Phyllanthus pentaphyllus* var. *floridanus*, *Acalypha chamaedrifolia*, *Rhynchospora floridensis*, *Crossopetalum ilicifolium*, *Heliotropium polyphyllum*.

Management recommendations: Continue mowing height and frequency. Treat exotic grasses.

Figure 10.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 18 | 0.039 | 0.016 | 0.17 | 27 |
| Total | | | | 27 |

Polygon 112. (Figure 2) Area: 2.4 acres Small's milkpea: 2,902 sand flax: 123

Habitat description: Variable quality habitat. The peripheral edges have St. Augustine sod but improves towards the center of the polygon with medium quality habitat. Dominated by Mascarene templegrass with some native grasses *Paspalum caespitosum* and *Schizachyrium* spp. Other species in the polygon *Psidium longipes*, *Angadenia berteroi*, *Scutellaria havanensis*, *Crossopetalum ilicifolium*, sand flax, *Spermacoce terminalis*, *Pteris bahamensis*, *Smilax havanensis*, *Jacquemontia curtisii*, *Galactia volubilis*, *Phyla stoechadifolia*.

Management recommendations: Continue mowing height and frequency. Eliminate spreading of St. Augustine sod and Treat exotic grasses.. Weed whacking the canal edge down to the ground is not advisable and could potentially reduce the sand flax population.

Figure 10.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 19 | 1.793 | 0.725 | 0.40 | 2,902 |
| Total | | | | 2,902 |

Figure 27.

| sand flax | Acres | Hectares | Density per m ² | Estimated Density |
|-----------|-------|----------|----------------------------|-------------------|
| 5 | 0.146 | 0.059 | 0.07 | 43 |
| 6 | 0.493 | 0.199 | 0.04 | 80 |
| Total | | | | 123 |

Polygon 126. (Figure 2) Area: 7.9 acres Small's milkpea: 618 sand flax: 0

Habitat description: Poor quality habitat along the periphery where St. Augustine is dominant around structures and center of this polygon is dominated by Mascarene templegrass. Other species found include *Stachytarpheta jamaicensis* and *Setaria parviflora*.

Management recommendations: Continue mowing height and frequency. Eliminate spreading of St. Augustine sod and Mascarene templegrass.

Figure 12.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 20 | 0.143 | 0.058 | 0.13 | 77 |
| 21 | 0.558 | 0.226 | 0.24 | 542 |
| Total | | | | 618 |

Polygon 191. (Figure 3) Area: 1.9 acres Small's milkpea: 68 sand flax: Trace

Habitat description: Poor quality habitat along the periphery and around structures where St. Augustine is dominant, to medium quality habitat towards the center and west of the polygon. Small's milkpea is found growing in Mascarene templegrass with some native grasses *Paspalum spp.* and *Schizachyrium spp.*

Management recommendations: Continue mowing height and frequency. Eliminate spreading of St. Augustine sod and treat Mascarene templegrass.

Figure 25.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 25 | 0.063 | 0.026 | 0.27 | 68 |
| Total | | | | 68 |

Polygon 194. (Figure 4) Area: 5.3 acres Small's milkpea: 2,711 sand flax: 0

Habitat description: Medium quality habitat. Small's milkpea growing in Mascarene templegrass some native grasses *Paspalum spp.* and *Schizachyrium spp.* This population could expand from its current location throughout the polygon. Other species found *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. Treat exotic Mascarene templegrass.

Figure 25.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 27 | 0.799 | 0.323 | 0.64 | 2,700 |
| 28 | 0.028 | 0.011 | 0.06 | 7 |
| 29 | 0.019 | 0.008 | 0.05 | 4 |
| Total | | | | 2,711 |

Polygon 200. (Figure 2) Area: 2.9 acres Small's milkpea: 1,848 sand flax: 190

Habitat description: Medium quality habitat. The interior of the polygon contains populations of Small's milkpea and sparse populations of sand flax. The edges of the canal hold populations of sand flax. The polygon is dominated by native grasses (*Schizachyrium sanguineum*, *Paspalum caespitosum*) and Mascarene templegrass. Other species found are; *Psidium longipes*, *Angadenia berteroi*, *Scutellaria havanensis*, *Crossopetalum ilicifolium*, *Spermacoce terminalis*, *Pteris bahamensis*, *Vernonia blodgettii*, *Galactia volubilis*, *Selaginella armata var. eatonii*, *Odontosoria clavata*, *Anemia adiantifolia*, *Pteris bahamensis*, *Smilax havanensis*, *Bletia purpurea*.

Management recommendations: Continue mowing height and frequency. Weed whacking the canal edge down to the ground or too frequently is not advisable and could potentially reduce the sand flax population. Treat Mascarene templegrass

Figure 10.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 8 | 1.825 | 0.739 | 0.25 | 1,848 |
| Total | | | | 1,848 |

Figure 27.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 31 | 0.189 | 0.076 | 0.15 | 111 |
| 32 | 0.071 | 0.029 | 0.16 | 46 |
| 33 | 0.989 | 0.4 | 0.01 | 33 |
| Total | | | | 190 |

Polygon 201. (Figure 2) Area: 11.3 acres Small's milkpea: 9,694 sand flax: 3,379

Habitat description: Medium quality habitat. The north and western edges of the polygon contains populations of Small's milkpea and populations of sand flax. The edges of the canals are high quality habitat for sand flax due to the scarcity of exotic grasses and patchiness of exposed rock. The polygon has native grasses (*Schizachyrium* spp. and *Paspalum* spp.) and Mascarene templegrass. Other species found are; *Casuarina*

equisetifolia, *Angadenia berteroi*, *Psidium longipes*, *Chaptalia albicans*, *Pteris bahamensis*, *Smilax havanensis*, *Stylosanthes calcicola*, *Crossopetalum ilicifolium*, *Vernonia blodgettii*, *Byrsonima lucida*, *Jacquemontia curtisii*, *Spermacoce terminalis*, *Wedelia trilobata*, *Odontosoria clavata*, *Selaginella armata var. depressa*, *Scutallaria havanensis*.

Management recommendations: Continue mowing height and frequency. Managing the timing of mowing and weed whacking when sand flax is not flowering and setting seed would help this population. Weed whacking the canal edge down to the ground or too frequently is not advisable and could potentially reduce the sand flax population. Remove the exotic *Casuarina equisetifolia*. Currently the HARB ground maintenance subcontractor stores equipment at the north west corner this is very close to good quality sand flax habitat and should perhaps be moved to a different area to avoid any accidental damage to this population. Spot treat Mascarene templegrass.

Figure 13.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 8 | 1.825 | 0.739 | 1.01 | 7,460 |
| 9 | 0.021 | 0.008 | 0.03 | 3 |
| 11 | 1.325 | 0.536 | 0.39 | 2,090 |
| 12 | 0.248 | 0.100 | 0.39 | 140 |
| Total | | | | 9,694 |

Figure 27.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 34 | 0.918 | 0.371 | 0.82 | 3,046 |
| 1 | 2.055 | 0.832 | 0.04 | 333 |
| Total | | | | 3,379 |

Polygon 202. (Figure 2) Area: 0.75 acres Small's milkpea: 11 sand flax: 944

Habitat description: Medium quality habitat. A small patch of Small's milkpea grows in the south east corner of the polygon. Sand flax is growing throughout this polygon with high densities near the canal edge. Other species; *Angadenia berteroi*, *Psidium longipes*, *Pteris bahamensis*, *Chaptalia albicans*, *Smilax havanensis*, *Byrsonima lucida*, *Tetrazygia bicolor*, *Senna mexicana var. chapmanii*, *Crotolaria linearis*, Mascarene templegrass.

Management recommendations: Continue mowing height and frequency. Weed whacking the canal edge down to the ground or too frequently is not advisable and could potentially reduce the sand flax population. Treat Mascarene templegrass.

Figure 13.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 10 | 0.013 | 0.005 | 0.22 | 11 |
| Total | | | | 11 |

Figure 27.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------|-------|----------|-------------------------------|----------------------|
| 2 | 0.729 | 0.295 | 0.32 | 944 |
| Total | | | | 944 |

Polygon 203. (Figures 2 and 5) Area: 7.6 acres Small's milkpea: 58 sand flax: 85

Habitat description: Medium quality habitat. Polygon 203 has areas of Mascarene templegrass with native grasses (*Schizachyrium* spp. and *Paspalum* spp.). Other species include; *Phyla stoechadifolia*, *Trema lamarkiana*, *Angadenia berteroi*, and the exotic *Casuarina equisetifolia*.

Management recommendations: Continue mowing height and frequency. Weed whacking the canal edge down to the ground or too frequently is not advisable. Remove the exotic *Casuarina equisetifolia* and spot treat Mascarene templegrass.

Figure 14.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 13 | 0.229 | 0.093 | 0.06 | 58 |
| Total | | | | 58 |

Figure 28.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------|-------|----------|-------------------------------|----------------------|
| 3 | 0.101 | 0.041 | 0.20 | 82 |
| 4 | 0.010 | 0.004 | 0.07 | 3 |
| Total | | | | 85 |

Polygon 204. (Figures 4 and 5) Area: 3.1 acres Small's milkpea: 80 sand flax: 194

Habitat description: Medium quality habitat. There is a small population of Small's milkpea. This polygon is intermingled with *Paspalum caespitosum*, *Paspalum setaceum*, *Schizachyrium sanguineum* and the exotic Mascarene templegrass. *Chaptalia albicans* are also found in the polygon.

Management recommendations: Continue mowing height and frequency. Spot treat Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 46 | 0.004 | 0.002 | 0.35 | 6 |
| 48 | 0.073 | 0.029 | 0.25 | 74 |
| | | | Total | 80 |

Figure 29

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 7 | 0.224 | 0.090 | 0.10 | 90 |
| 8 | 0.073 | 0.030 | 0.20 | 59 |
| 10 | 0.051 | 0.021 | 0.15 | 31 |
| 11 | 0.013 | 0.005 | 0.09 | 5 |
| 12 | 0.156 | 0.063 | 0.01 | 6 |
| 13 | 0.008 | 0.003 | 0.06 | 2 |
| | | | Total | 194 |

Polygon 205. (Figure 5) Area: 4.5 acres Small's milkpea: 110 sand flax: 898

Habitat description: Medium quality habitat. Strong populations of sand flax cover most of this polygon. Several small population of Small's milkpea grow throughout the area. This polygon is intermingled with *Paspalum caespitosum*, *Paspalum setaceum*, *Schizachyrium sanguineum* and the exotic Mascarene templegrass. *Chaptalia albicans*, *Stylosanthes calcicola* are also found in the polygon.

Management recommendations: Continue mowing height and frequency. Spot treat Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 49 | 0.072 | 0.029 | 0.35 | 102 |
| 50 | 0.009 | 0.004 | 0.13 | 5 |
| 160 | 0.003 | 0.001 | 0.26 | 3 |
| | | | Total | 110 |

Figure 29.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 15 | 1.090 | 0.444 | 0.10 | 444 |

| | | | | |
|-------|-------|-------|------|-----|
| 37 | 0.550 | 0.255 | 0.20 | 445 |
| 16 | 0.036 | 0.015 | 0.06 | 9 |
| Total | | | | 898 |

Polygon 206. (Figure 4) Area: 31.7 acres Small’s milkpea: 44,284 sand flax: 13,074

Habitat description: Medium quality habitat. Both species are found throughout the polygon. Polygon 206 is dominated by *Paspalum caespitosum*, *Paspalum setaceum*, *Schizachyrium sanguineum* with sparse areas of exotic Mascarene templegrass. Small areas with St. Augustine sod. Other species found here are; *Ipomoea microdactyla*, *Spermacoce terminalis*, *Scutellaria havanensis*, *Jacquemontia curtisii*, *Chaptalia albicans*, *Psidium longipes*, *Crossopetalum ilicifolium*, *Stylosanthes calcicola*, and *Angadenia berteroi*.

Management recommendations: Continue mowing height and frequency. Managing the height of weed whacking will help sand flax population. Spot treat Mascarene templegrass.

Figure 16.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|--------|----------|----------------------------|-------------------|
| 158 | 29.300 | 11.857 | 0.37 | 44,267 |
| 47 | 0.033 | 0.013 | 0.13 | 17 |
| Total | | | | 44,284 |

Figure 29.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|--------|----------|----------------------------|-------------------|
| 14 | 0.039 | 0.016 | 0.02 | 3 |
| 29 | 26.917 | 10.893 | 0.12 | 13,071 |
| Total | | | | 13,074 |

Polygon 207. (Figure 4) Area: 1.7 acres Small’s milkpea: 8 sand flax: 0

Habitat description: Poor quality habitat. Populations are close to the road in areas with the exotic Mascarene templegrass. Though small, these populations should persist and grow. Other plants found are; *Angadenia berteroi*, and *Spermacoce terminalis*.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 20.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
|-----------------------------|-------|----------|----------------------------|-------------------|

| | | | | |
|----|-------|-------|--------------|----------|
| 41 | 0.010 | 0.004 | 0.05 | 2 |
| 42 | 0.011 | 0.004 | 0.14 | 6 |
| | | | <u>Total</u> | <u>8</u> |

Polygon 208. (Figure 4) Area: 1.4 acres Small's milkpea: 79 sand flax: 0

Habitat description: Poor quality habitat. Several low density populations throughout the polygon associated with the exotic Mascarene templegrass. Though small, these populations should persist and grow.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Density |
|-----------------------------|-------|----------|----------------------------|-----------|
| 38 | 0.124 | 0.050 | 0.14 | 70 |
| 39 | 0.009 | 0.004 | 0.14 | 5 |
| 40 | 0.009 | 0.004 | 0.06 | 2 |
| 43 | 0.003 | 0.001 | 0.15 | 2 |
| | | | <u>Total</u> | <u>79</u> |

Polygon 209. (Figure 4) Area: 1.1 acres Small's milkpea: 86 sand flax: 0

Habitat description: Poor quality habitat. Two low density populations associated with the exotic Mascarene templegrass. These small populations should persist and grow. *Spermacoce terminalis* is also found in this polygon.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 44 | 0.003 | 0.001 | 0.75 | 8 |
| 45 | 0.055 | 0.022 | 0.35 | 78 |
| | | | <u>Total</u> | <u>86</u> |

Polygon 210. (Figure 4) Area: 1.5 acres Small's milkpea: 39 sand flax: 0

Habitat description: Poor quality habitat. Three small populations found close to the canal associated with the exotic Mascarene templegrass. Other plants found are; *Pteris bahamensis*, and *Selaginella armata* var. *eatonii*.

Management recommendations: Continue mowing height and frequency. St. Augustine sod is found at several locations in the polygon 210 and could pose a threat to Small's milkpea population 35. Treat St. Augustine and Mascarene templegrass.

Figure 15.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 35 | 0.020 | 0.008 | 0.27 | 22 |
| 36 | 0.012 | 0.005 | 0.25 | 12 |
| 37 | 0.005 | 0.002 | 0.26 | 5 |
| Total | | | | 39 |

Polygon 211. (Figure 4) Area: 1.4 acres Small's milkpea: 919 sand flax: 0

Habitat description: Poor quality habitat. Polygon 211 is mostly Mascarene templegrass with some native grasses (*Schizachyrium* spp. and *Paspalum* spp.) and sparse St. Augustine sod.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 15.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 26 | 0.379 | 0.153 | 0.60 | 919 |
| Total | | | | 919 |

Polygon 212. (Figure 5) Area: 0.2 acres Small's milkpea: 0 sand flax: 12

Habitat description: Medium quality habitat. This is a small population of sand flax but it should persist and grow as it is surrounded by other populations in adjacent polygons. This polygon is intermingled with *Paspalum caespitosum*, *Paspalum setaceum*, *Schizachyrium sanguineum* and the exotic Mascarene templegrass. Other plants found; *Psidium longipes*, *Angadenia berteroi*, *Scutellaria havanensis*, *Crossopetalum ilicifolium*, *Spermacoce terminalis*, *Phyla stoechadifolia*, *Crossopetalum ilicifolium*, *Scutellaria havanensis*, and *Jacquemontia curtisii*.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 29.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 9 | 0.043 | 0.017 | 0.07 | 12 |

Polygon 213. (Figure 5) Area: 113.4 acres Small’s milkpea: 172,552 sand flax: 583

Habitat description: Varied habitat quality, mostly poor habitat, though in the south of the polygon the habitat is classified as medium. The polygon is mostly dominated with the exotic Mascarene templegrass but the periphery also has natives *Paspalum caespitosum*, *Paspalum setaceum*, *Schizachyrium sanguineum*. Several small scattered populations of sand flax occur to the north and one larger population to the north east of the polygon. All populations have low densities of sand flax. The whole of Polygon 213 is potential habitat for Small’s milkpea except in areas with St. Augustine sod often associated with the structures in this polygon. Densities of Small’s milkpea do vary throughout the polygon but there are large populations. Other plants found; *Pteris bahamensis*, *Spermacoce terminalis*, *Crossopetalum ilicifolium*, *Cynanchum blodgettii*, *Byrsonima lucida*, *Chaptalia albicans*, *Psidium longipes*, *Angadenia berteroi*, *Smilax havanensis*, *Jacquemontia curtisii*, *Bletia purpurea*, *Stylosanthes calcicola*, *Ipomoea microdactyla*, *Tetrazygia bicolor*, *Selaginella armata var. eatonii*, *Pteris vittata*, *Senna mexicana var. chapmanii*, *Ernodea littoralis*, *Vernonia blodgettii*, and *Bletia purpurea*.

Management recommendations: Continue mowing height and frequency. Eliminate spreading of St. Augustine sod. Managing the height of weed whacking for sand flax. Due to the high amount of pine rockland species this is a good area to preserve however there are also large areas of the exotic Mascarene templegrass and St. Augustine sod, and given the use of the land (ammunition storage) it could be difficult to restore. Treat St. Augustine and Mascarene templegrass.

Figure 16.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 55 | 8.190 | 3.315 | 0.39 | 12,761 |
| 56 | 0.021 | 0.008 | 0.52 | 43 |
| 57 | 1.296 | 0.525 | 0.20 | 1,049 |
| 58 | 2.037 | 0.824 | 0.38 | 3,133 |
| 59 | 5.873 | 2.377 | 0.90 | 21,390 |
| 60 | 3.364 | 1.361 | 0.22 | 2,995 |
| 61 | 0.061 | 0.024 | 0.24 | 59 |
| 62 | 0.036 | 0.015 | 0.34 | 50 |
| 63 | 2.853 | 1.155 | 0.20 | 2,309 |
| 64 | 0.016 | 0.006 | 1.51 | 97 |
| 65 | 7.598 | 3.075 | 0.85 | 26,137 |
| 68 | 0.048 | 0.020 | 0.37 | 72 |
| 74 | 0.015 | 0.006 | 0.18 | 11 |
| 76 | 7.913 | 3.202 | 0.70 | 22,416 |

| | | | | |
|----|-------|-------|--------------|----------------|
| 77 | 4.822 | 1.951 | 0.59 | 11,513 |
| 78 | 0.644 | 0.260 | 0.31 | 808 |
| 79 | 0.018 | 0.007 | 1.45 | 104 |
| 80 | 3.327 | 1.346 | 0.91 | 12,251 |
| 81 | 0.120 | 0.049 | 1.12 | 543 |
| 86 | 6.225 | 2.519 | 1.54 | 38,797 |
| 87 | 0.051 | 0.021 | 0.63 | 130 |
| 88 | 4.217 | 1.707 | 0.81 | 13,824 |
| 89 | 1.467 | 0.594 | 0.30 | 1,781 |
| 90 | 0.275 | 0.111 | 0.25 | 278 |
| | | | <u>Total</u> | <u>172,552</u> |

Figure 29.
sand flax
populations

| | | | | |
|----|-------|-------|--------------|------------|
| 17 | 0.209 | 0.085 | 0.05 | 45 |
| 18 | 0.542 | 0.219 | 0.03 | 65 |
| 19 | 0.384 | 0.156 | 0.02 | 29 |
| 23 | 2.741 | 1.109 | 0.04 | 444 |
| | | | <u>Total</u> | <u>583</u> |

Polygon 214. (Figure 5 and 6) Area: 16.9 acres Small’s milkpea: 875 sand flax: 2

Habitat description: Poor quality habitat. Only the northern part of Polygon 214 is suitable for Small’s milkpea and sand flax. A very small population of sand flax exists in the northern part of the polygon while Small’s milkpea is found sparsely but scattered throughout this area. Ground cover is a mixture of *Muhlenbergia capillaris*, *Eragrostis elliottii*, *Andropogon longiberbis*, *Aristida purpurascens*, and Mascarene templegrass. Other species found; *Chaptalia albicans*, *Vernonia blodgettii*, *Cyanchum blodgettii*, *Senna mexicana var. chapmanii*, *Angadenia berteroi*, *Phyla nodiflora*, and *Pteris bahamensis*.

Management recommendations: Continue mowing height and frequency. Prevent the spread of shrubs and canopy trees from spreading further into the north of this polygon. Spot treat Mascarene templegrass.

Figure 17.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 92 | 0.901 | 0.365 | 0.24 | 875 |
| | | | <u>Total</u> | <u>875</u> |

Figure 32.
sand flax
populations

| | | | | |
|----|-------|-------|--------------|----------|
| 35 | 0.006 | 0.003 | 0.08 | 2 |
| | | | <u>Total</u> | <u>2</u> |

Polygon 216. (Figure 5 and 6) Area: 7.2 acres Small’s milkpea: 813 sand flax: Trace

Habitat description: Medium quality habitat. This polygon has a mixture of *Muhlenbergia capillaris*, *Eragrostis elliottii*, *Andropogon longiberbis*, *Aristida purpurascens*, and the exotic Mascarene templegrass. Other species found; *Pteris bahamensis*, *Chaptalia albicans*, and *Vernonia blodgettii*.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 17.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 91 | 1.004 | 0.406 | 0.20 | 813 |
| | | | <u>Total</u> | <u>813</u> |

Polygon 226. (Figure 5) Area: 9.9 acres Small’s milkpea: 40,112 sand flax: 0

Habitat description: Poor quality habitat. Small’s milkpea associated with the exotic Mascarene templegrass and occurs in high densities. Other species also found are *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. St. Augustine grows around the storage areas and should be kept from expanding into the Small’s milkpea population. Treat St. Augustine and Mascarene templegrass.

Figure 16.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 66 | 7.288 | 2.949 | 1.36 | 40,112 |
| | | | <u>Total</u> | <u>40,112</u> |

Polygon 227. (Figure 5) Area: 14 acres Small’s milkpea: 17,334 sand flax: 0

Habitat description: Poor quality habitat. Small’s milkpea associated with the exotic Mascarene templegrass. The majority of the polygon has potential for Small’s milkpea to occur. Other species also found are; *Chaptalia albicans*, *Angadenia berteroi*, *Psidium longipes*, *Spermacoce terminalis*, and *Pteris bahamensis*.

Management recommendations: Continue mowing height and frequency. St. Augustine grows around the storage areas and should be kept from expanding into the Small's milkpea population. Treat St. Augustine and Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 67 | 7.260 | 2.938 | 0.59 | 17,334 |
| Total | | | | 17,334 |

Polygon 228. (Figure 4) Area: 5.8 acres Small's milkpea: 8,056 sand flax: 1,406

Habitat description: Medium quality habitat. This polygon has a mixture of native grasses *Schizachyrium sanguineum*, *Muhlenbergia capillaris*, *Aristida purpurascens*, *Andropogon longiberbis*, *Paspalum caespitosum* and the exotic Mascarene templegrass and *Eremochloa ophiuroides*. Other species found in this polygon are *Ipomoea microdactyla*, *Crossopetalum ilicifolium*, *Stylosanthes calcicola*, *Chaptalia albicans*, *Jacquemontia curtisii*, and *Scutellaria havanensis*.

Management recommendations: Continue mowing height and frequency. Treat St. Augustine and Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 51 | 3.828 | 1.549 | 0.52 | 8,056 |
| Total | | | | 8,056 |

Figure 29.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 20 | 4.342 | 1.757 | 0.08 | 1,406 |
| Total | | | | 1,406 |

Polygon 229. (Figure 4) Area: 3.3 acres Small's milkpea: 2,363 sand flax: 0

Habitat description: Varied habitat with medium habitat in the south and poor habitat in the North of the polygon. There is a mixture native grasses *Schizachyrium sanguineum*, *Aristida purpurascens*, *Andropogon longiberbis*, *Paspalum caespitosum* and the exotic Mascarene templegrass and *Eremochloa ophiuroides* in the southern part of the polygon. In the northern part of the polygon Mascarene templegrass becomes more dominant.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 52 | 2.246 | 0.909 | 0.26 | 2,363 |
| Total | | | | 2,363 |

Polygon 230. (Figure 4) Area: 1.7 acres Small's milkpea: 2,392 sand flax: 0

Habitat description: Poor quality habitat for both Small's milkpea and sand flax. Polygon 230 is dominated by Mascarene templegrass.

Management recommendations: Continue mowing height and frequency. Control and treat any spreading of exotic St. Augustine sod and *Wedelia trilobata* which is an excluder and will out compete Small's milkpea when it grows thick and in dense mats.

Figure 25.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 33 | 0.683 | 0.276 | 0.86 | 2,377 |
| 34 | 0.066 | 0.027 | 0.06 | 15 |
| Total | | | | 2,392 |

Polygon 252. (Figure 7) Area: 9.8 acres Small's milkpea: 3,847 sand flax: 499

Habitat description: Medium quality habitat. Sand flax populations are sparse in the south of the polygon on an area slightly raised and with more native grasses. The Polygon is mixed native grasses *Andropogon longiberbis*, *Eustachys petraea* and *Paspalum caespitosum* with a drainage ditch running through the middle in an east-west direction with sparse Mascarene templegrass. Other species include *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. Spot treat *Zyosia tenuifolia*.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 53 | 4.188 | 1.695 | 0.16 | 2,712 |
| 54 | 2.806 | 1.135 | 0.10 | 1,135 |
| Total | | | | 3,847 |

Figure 31.
sand flax
populations

| | | | | |
|----|-------|-------|-------|-----|
| 21 | 0.184 | 0.075 | 0.07 | 50 |
| 22 | 1.850 | 0.749 | 0.06 | 449 |
| | | | Total | 499 |

Polygon 253. (Figure 6) Area: 4.0 acres Small's milkpea: 5,523 sand flax: 0

Habitat description: Poor quality habitat. Most of Polygon 253 is covered by Mascarene templegrass. Other species found are *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. Control spread and treat St. Augustine sod and Mascarene templegrass from around bunkers and structures.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 69 | 0.291 | 0.118 | 3.12 | 3,676 |
| 70 | 1.047 | 0.424 | 0.25 | 1,059 |
| 73 | 0.260 | 0.105 | 0.75 | 789 |
| | | | Total | 5,523 |

Polygon 254. (Figure 6) Area: 1.0 acres Small's milkpea: 5,693 sand flax: 0

Habitat description: Poor quality habitat. Polygon 254 is covered by Mascarene templegrass. Other species found are *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 71 | 1.005 | 0.407 | 1.40 | 5,693 |
| | | | Total | 5,693 |

Polygon 255. (Figure 6) Area: 5.1 acres Small's milkpea: 37,649 sand flax: 0

Habitat description: Poor quality habitat. Polygon 255 is dominated by the exotic Mascarene templegrass. Other species found are *Chaptalia albicans*.

Management recommendations: Continue mowing height and frequency. There are several large areas of St. Augustine sod in the north and east of the polygon. Control spread and treat St. Augustine sod and Mascarene templegrass from these areas.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 72 | 3.813 | 1.543 | 2.44 | 37,649 |
| Total | | | | 37,649 |

Polygon 256. (Figure 6) Area: 3.5 acres Small's milkpea: 9,378 sand flax: 0

Habitat description: Poor quality habitat. The polygon is covered by the exotic Mascarene templegrass. Other species found are *Spermacoce terminalis*.

Management recommendations: Continue mowing height and frequency. Control spread of St. Augustine sod which occurs around the building and parking lot in the north-east and east of the polygon. Treat St. Augustine and Mascarene templegrass.

Figure 16.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 75 | 2.107 | 0.853 | 1.10 | 9,378 |
| Total | | | | 9,378 |

Polygon 260. (Figure 6) Area: 47.2 acres Small's milkpea: 11,727 sand flax: 4,306

Habitat description: Varied habitat with poor habitat near the runway and medium quality habitat in the south-east. This polygon has native grasses *Schizachyrium sanguineum*, *Schizachyrium gracile*, *Andropogon longiberbis*, *Paspalum caespitosum* and the exotic Mascarene templegrass. Other rare and threatened species found; *Bletia purpurea*, *Selaginella armata var. eatonii*, *Byrsonima lucida*, *Jacquemontia curtisii*, *Crossopetalum ilicifolium*, *Psidium longipes*, *Stylosanthes calcicola*, *Smilax havanensis*, *Spermacoce terminalis*, *Cynanchum blodgettii*, *Tetrazygia bicolor*, *Chaptalia albicans*, *Pteris bahamensis*, *Angadenia berteroi*, *Vernonia blodgettii*, *Senna mexicana var. chapmanii*, and *Melanthera parvifolia*.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 18 and 19.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
|-----------------------------|-------|----------|----------------------------|-------------------|

| | | | | |
|-----|-------|-------|--------------|---------------|
| 93 | 0.054 | 0.022 | 0.01 | 3 |
| 94 | 0.138 | 0.056 | 0.01 | 5 |
| 95 | 0.311 | 0.126 | 0.02 | 20 |
| 96 | 0.114 | 0.046 | 0.03 | 15 |
| 97 | 0.570 | 0.230 | 0.16 | 369 |
| 98 | 0.063 | 0.025 | 0.01 | 3 |
| 99 | 0.878 | 0.355 | 0.46 | 1,635 |
| 100 | 2.094 | 0.847 | 1.14 | 9,658 |
| 101 | 0.208 | 0.084 | 0.02 | 19 |
| | | | <u>Total</u> | <u>11,727</u> |

Figure 30.
sand flax
populations

| | | | | |
|----|-------|-------|--------------|--------------|
| 27 | 2.128 | 0.861 | 0.50 | 4,306 |
| | | | <u>Total</u> | <u>4,306</u> |

Polygon 261. (Figure 6) Area: 16.9 acres Small’s milkpea: 36 sand flax: 0

Habitat description: Varied habitat with poor quality habitat in the east and south, and medium quality habitat in the west of the Polygon. The major part of the polygon (East and south) has dense stands of exotic grasses *Pennisetum purpureum* and *Paspalum notatum* (bahia grass). Small’s milkpea is found in several small populations scattered throughout the Polygon. Other rare and threatened species found (mainly in the eastern part of the polygon); *Selaginella armata* var. *eatonii*, *Pteris bahamensis*, *Byrsonima lucida*, *Senna mexicana* var. *chapmanii*, *Crossopetalum ilicifolium*.

Management recommendations: mowing is currently too high. This area has large areas of exotics grasses that should be controlled.

Figure 18.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 82 | 0.031 | 0.013 | 0.02 | 3 |
| 83 | 0.317 | 0.128 | 0.02 | 24 |
| 84 | 0.021 | 0.009 | 0.02 | 2 |
| 85 | 0.044 | 0.018 | 0.04 | 7 |
| | | | <u>Total</u> | <u>36</u> |

Polygon 262. (Figure 6) Area: 20.9 acres Small’s milkpea: 3,530 sand flax: 1,717

Habitat description: Variable quality habitat with the majority of the polygon poor habitat however medium quality habitat in the eastern part of the Polygon. The polygon

ground cover is mainly the exotic grasses Mascarene templegrass, *Pennisetum purpureum*, *Paspalum notatum*. The eastern part of the polygon has more native species like *Schizachyrium rhizomatum*, *Paspalum caespitosum*, *Rhynchospora colorata*, *Morinda royoc*, *Flaveria linearis*, and *Eragrostis elliottii*. Other rare and threatened species found; *Selaginella armata* var. *eatonii*, *Pteris bahamensis*, *Bletia purpurea*, sand flax, *Senna mexicana* var. *chapmanii*, *Angadenia berterori*, *Bletia purpurea*, *Crossopetalum ilicifolium*, *Psidium longipes*, *Spermacoce terminalis*, *Stylosanthes calcicola*, *Jacquemontia curtisii*, *Byrsonima lucida*, *Cynanchum blodgettii*, *Smilax havanensis*, and *Chaptalia albicans*.

Management recommendations: The eastern part of the polygon where both Small’s milkpea and sand flax populations exist should be continued to be mowed at the same frequency and a reduced mowing height. Managing the timing of mowing and weed whacking especially along canals to times when sand flax is not flowering. The exotics in this polygon should be managed to prevent infestation of the medium quality eastern area.

Figure 18.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 161 | 1.407 | 0.569 | 0.62 | 3,530 |
| Total | | | | 3,530 |

Figure 30.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------|-------|----------|----------------------------|-------------------|
| 24 | 0.073 | 0.029 | 0.35 | 103 |
| 25 | 0.008 | 0.003 | 2.00 | 66 |
| 36 | 1.224 | 0.495 | 0.30 | 1,486 |
| 26 | 0.026 | 0.010 | 0.60 | 62 |
| Total | | | | 1,717 |

Polygon 277. (Figure 9) Area: 1.2 acres Small’s milkpea: 70 sand flax: 0

Habitat description: Poor quality habitat. This polygon is dominated by exotic St. Augustine sod and *Eremochloa ophiuroides*. This population could be out competed by St. Augustine grass.

Management recommendations: Continue mowing height and frequency and remove exotic grasses.

Figure 25.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 32 | 0.070 | 0.028 | 0.25 | 70 |

Total 70

Polygon 280. (Figure 7) Area: 12.5 acres Small's milkpea: 893 sand flax: 0

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have small scattered populations of Small's milkpea. The ground cover is St. Augustine, Mascarene templegrass, *Sisyrinchium angustifolium*, *Rhynchospora colorata*, *Fimbristylis cymosa* and *Bidens alba* var. *radiata*. Other rare and threatened species found; *Chaptalia albicans*, *Scutellaria havanensis*, *Angadenia berteroi*.

Management recommendations: Continue mowing height and frequency. Treat St. Augustine and Mascarene templegrass.

Figure 21.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 130 | 0.011 | 0.004 | 0.05 | 2 |
| 131 | 0.009 | 0.004 | 0.03 | 1 |
| 132 | 0.007 | 0.003 | 0.10 | 3 |
| 133 | 0.006 | 0.002 | 0.04 | 1 |
| 134 | 0.098 | 0.040 | 0.12 | 49 |
| 135 | 0.053 | 0.021 | 0.06 | 12 |
| 136 | 0.009 | 0.004 | 0.08 | 3 |
| 137 | 0.010 | 0.004 | 0.05 | 2 |
| 138 | 0.015 | 0.006 | 0.18 | 11 |
| 139 | 1.297 | 0.525 | 0.14 | 735 |
| 142 | 0.009 | 0.004 | 0.08 | 3 |
| 143 | 0.072 | 0.029 | 0.24 | 69 |
| 144 | 0.004 | 0.001 | 0.14 | 2 |
| Total | | | | 893 |

Polygon 281. (Figure 7) Area: 16.9 acres Small's milkpea: 9,195 sand flax: 0

Habitat description: Poor quality habitat. The Small's milkpea population is found around the east, south and west of the polygon perimeter. The ground cover is Mascarene templegrass, *Stachytarpheta jamaicensis*, *Setaria parviflora*, *Rhynchospora colorata*, and *Fimbristylis cymosa*.

Management recommendations: This is a highly impacted area. Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 21 and 22.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
|-----------------------------|-------|----------|----------------------------|-------------------|

| | | | | |
|-----|-------|-------|--------------|--------------|
| 145 | 6.054 | 2.450 | 0.34 | 8'329 |
| 146 | 0.475 | 0.192 | 0.45 | 865 |
| | | | <u>Total</u> | <u>9,195</u> |

Polygon 282. (Figure 7 and 8) Area: 52.9 acres Small's milkpea: 530 sand flax: 0

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have small scattered populations of Small's milkpea. The ground cover consists of St. Augustine and Mascarene templegrass *Paspalum notatum* with some natives *Eustachys petraea*, *Eragrostis elliottii*, *Rhynchospora floridensis*, *Phyla nodiflora*, *Stachytarpheta jamaicensis*, and *Dyschoriste angusta*.

Management recommendations: This is a highly impacted area. Continue mowing height and frequency. Treat St. Augustine and Mascarene templegrass.

Figure 22 and 23.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 147 | 0.019 | 0.008 | 0.01 | 1 |
| 148 | 0.277 | 0.112 | 0.20 | 224 |
| 149 | 0.231 | 0.093 | 0.30 | 280 |
| 150 | 0.032 | 0.013 | 0.01 | 1 |
| 151 | 0.015 | 0.006 | 0.02 | 1 |
| 152 | 0.011 | 0.005 | 0.07 | 3 |
| 153 | 0.018 | 0.007 | 0.03 | 2 |
| 154 | 0.009 | 0.004 | 0.03 | 1 |
| 155 | 0.117 | 0.047 | 0.01 | 5 |
| 156 | 0.033 | 0.013 | 0.03 | 4 |
| 157 | 0.071 | 0.029 | 0.02 | 7 |
| | | | <u>Total</u> | <u>530</u> |

Polygon 289. (Figure 8) Area: 4.4 acres Small's milkpea: 11 sand flax: 0

Habitat description: Poor quality habitat containing one small population of Small's milkpea. The ground cover is mainly St. Augustine, *Paspalum notatum*, *Stachytarpheta jamaicensis*, and *Dyschoriste angusta*.

Management recommendations: This area has poor habitat and the population may persist but given the low numbers could be extirpated in the long term. Continue mowing height and frequency. Treat St. Augustine.

Figure 24.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
|-----------------------------|-------|----------|----------------------------|-------------------|

| | | | | |
|-----|-------|-------|--------------|-----------|
| 121 | 0.133 | 0.054 | 0.02 | 11 |
| | | | <u>Total</u> | <u>11</u> |

Polygon 291. (Figure 7) Area: 13.1 acres Small’s milkpea: 29 sand flax: Trace

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have small scattered populations of Small’s milkpea. The ground cover consists of Mascarene templegrass, *Setaria parviflora*, *Sida acuta*, *Phyla nodiflora*, and *Indigofera miniata* var. *florida*.

Management recommendations: This is area has poor habitat and the population may persist but given the low numbers could be extirpated in the long term. Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 21.

| Small’s milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 105 | 0.010 | 0.004 | 0.08 | 3 |
| 106 | 0.010 | 0.004 | 0.05 | 2 |
| 107 | 0.013 | 0.005 | 0.06 | 3 |
| 108 | 0.050 | 0.020 | 0.04 | 8 |
| 109 | 0.004 | 0.002 | 0.12 | 2 |
| 110 | 0.002 | 0.001 | 0.10 | 1 |
| 111 | 0.007 | 0.003 | 0.17 | 5 |
| 112 | 0.001 | 0.001 | 0.37 | 2 |
| 114 | 0.001 | 0.001 | 0.17 | 1 |
| 113 | 0.001 | 0.001 | 0.33 | 2 |
| | | | <u>Total</u> | <u>29</u> |

Polygon 294. (Figure 6 and 7) Area: 13.3 acres Small’s milkpea: 2,091 sand flax: 6

Habitat description: Poor quality habitat. The western portion of the polygon is dominated by St. Augustine, *Paspalum notatum*, and Mascarene templegrass. Small’s milkpea and sand flax are found in the east of the Polygon with native grasses *Schizachyrium sanguineum*, *Schizachyrium gracile*, *Andropogon longiberbis*, *Paspalum caespitosum* and the exotic Mascarene templegrass. Though still poor habitat, the eastern part of the polygon has more native species and is generally better than the rest of the polygon. Other rare and threatened species found; *Crossopetalum ilicifolium*, *Jacquemontia curtisii*, *Pteris bahamensis*, and *Selaginella armata* var. *eatonii*.

Management recommendations: Continue mowing frequency and reduce mowing height to prevent organic matter build up and prevent spread of exotic grasses. Treat exotic grasses.

Figure 19.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 102 | 0.328 | 0.133 | 0.02 | 29 |
| 103 | 0.059 | 0.024 | 0.02 | 4 |
| 104 | 2.119 | 0.857 | 0.24 | 2,058 |
| | | | Total | 2,091 |

Figure 30.

| sand flax populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------|-------|----------|-------------------------------|----------------------|
| 28 | 0.116 | 0.047 | 0.01 | 6 |
| | | | Total | 6 |

Polygon 296. (Figure 7) Area: 10.1 acres Small's milkpea: 37 sand flax: 0

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have small scattered populations of Small's milkpea. The ground cover consists of St. Augustine, *Paspalum s notatum*, Mascarene templegrass, *Fimbristylis cymosa*, *Eustachys petraea*, *Bidens alba* var. *radiata*, *Pennisetum purpureum*, and *Centrosema virginianum*. Other rare and threatened species found; *Chaptalia albicans*, *Ipomoea indica* var. *acuminata*.

Management recommendations: Continue mowing frequency and reduce mowing height to prevent organic matter build up. Treat exotic grasses.

Figure 21 and 22.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|--------------------------------|-------|----------|-------------------------------|----------------------|
| 115 | 0.039 | 0.016 | 0.05 | 8 |
| 116 | 0.124 | 0.050 | 0.05 | 23 |
| 117 | 0.008 | 0.003 | 0.15 | 5 |
| 118 | 0.003 | 0.001 | 0.08 | 1 |
| | | | Total | 37 |

Polygon 304. (Figure 8) Area: 1.4 acres Small's milkpea: 327 sand flax: 0

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have two small populations of Small's milkpea. The ground cover is dominated by St. Augustine, *Paspalum notatum*, Mascarene templegrass and includes *Bidens alba* var. *radiata*, *Vigna luteola*, *Stachytarpheta jamaicensis*, *Eustachys petraea*, *Schinus terebinthifolius*, and *Pennisetum purpureum*.

Management recommendations: This area has poor habitat and the population may persist. Continue mowing frequency and reduce mowing height to prevent organic matter buildup. Treat exotic grasses.

Figure 22 and 24.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 119 | 0.010 | 0.004 | 0.05 | 2 |
| 120 | 0.670 | 0.271 | 0.12 | 325 |
| Total | | | | 327 |

Polygon 307. (Figure 7) Area: 0.6 acres Small's milkpea: 4 sand flax: 0

Habitat description: Poor quality habitat. The peripheral areas of the Polygon have two small populations of Small's milkpea. The ground cover is St. Augustine, Mascarene templegrass, *Sisyrinchium angustifolium* and *Bidens alba* var. *radiata*.

Management recommendations: Continue mowing height and frequency. Treat St. Augustine, Mascarene templegrass.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 140 | 0.009 | 0.004 | 0.03 | 1 |
| 141 | 0.003 | 0.001 | 0.3 | 3 |
| Total | | | | 4 |

Polygon 325. (Figure 9) Area: 0.4 acres Small's milkpea: 13 sand flax: 0

Habitat description: Poor quality habitat. The ground cover is dominated by Mascarene templegrass. This is a small population but should persist.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 26.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 122 | 0.006 | 0.003 | 0.50 | 13 |
| Total | | | | 13 |

Polygon 327. (Figure 9) Area: 0.7 acres Small's milkpea: 14 sand flax: 0

Habitat description: Poor quality habitat. Polygon 327 is dominated by Mascarene templegrass. These are small populations with other small populations in close proximity and should persist.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 26.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 123 | 0.003 | 0.001 | 1.05 | 13 |
| 162 | 0.001 | 0.001 | 0.10 | 1 |
| <hr/> | | | | |
| Total | | | | 14 |

Polygon 329. (Figure 9) Area: 0.7 acres Small's milkpea: 47 sand flax: 0

Habitat description: Poor quality habitat. Polygon 329 is dominated by Mascarene templegrass but also contains some native grasses (*Schizachyrium* spp., *Andropogon* spp.). Several small populations should persist in this location.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 26.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 124 | 0.005 | 0.002 | 0.5 | 12 |
| 125 | 0.006 | 0.002 | 0.6 | 15 |
| 126 | 0.003 | 0.001 | 0.9 | 13 |
| 127 | 0.003 | 0.001 | 0.6 | 7 |
| <hr/> | | | | |
| Total | | | | 47 |

Polygon 330. (Figure 9) Area: 0.9 acres Small's milkpea: 27 sand flax: 0

Habitat description: Poor quality habitat. Ground cover is mainly Mascarene templegrass but also contains some native grasses (*Schizachyrium* spp., *Andropogon* spp.).

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 26.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 128 | 0.041 | 0.017 | 0.15 | 25 |

| | | | | |
|-----|-------|-------|-------|----|
| 129 | 0.003 | 0.001 | 0.2 | 2 |
| | | | Total | 27 |

Polygon 344. (Figure 9) Area: 1.1 acres Small's milkpea: 61 sand flax: 0

Habitat description: Poor quality habitat. Polygon 344 is dominated by Mascarene templegrass some and St. Augustine sod which occurs around the structures.

Management recommendations: Continue mowing height and frequency. Treat Mascarene templegrass.

Figure 20.

| Small's milkpea populations | Acres | Hectares | Density per m ² | Estimated Density |
|-----------------------------|-------|----------|----------------------------|-------------------|
| 30 | 0.041 | 0.017 | 0.35 | 58 |
| 31 | 0.001 | 0.000 | 0.67 | 3 |
| | | | Total | 61 |

Table 4. Quick reference table listing polygons with population estimates and habitat quality

| Polygon | Small's milkpea | Sand flax | Habitat quality |
|---------|-----------------|-----------|-----------------|
| 0 | 3,132 | 3,985 | Medium |
| 6 | 240 | Trace | Medium |
| 7 | 347 | 0 | Poor |
| 99 | 2,366 | 0 | Poor |
| 101 | 2,391 | 0 | Medium |
| 111 | 27 | 0 | Medium |
| 112 | 2,902 | 123 | Low-Medium |
| 126 | 618 | 0 | Poor |
| 191 | 68 | Trace | Poor-Medium |
| 194 | 2,711 | 0 | Medium |
| 200 | 1,848 | 190 | Medium |
| 201 | 9,694 | 3,379 | Medium-High |
| 202 | 11 | 944 | Medium |
| 203 | 58 | 85 | Medium |
| 204 | 80 | 194 | Medium |
| 205 | 110 | 898 | Medium |
| 206 | 44,284 | 13,074 | Medium |
| 207 | 8 | 0 | Poor |
| 208 | 79 | 0 | Poor |
| 209 | 86 | 0 | Poor |

| Polygon | Small's milkpea | Sand flax | Habitat quality |
|----------------|------------------------|------------------|------------------------|
| 210 | 39 | 0 | Poor |
| 211 | 919 | 0 | Poor |
| 212 | 0 | 12 | Medium |
| 213 | 172,552 | 583 | Poor-Medium |
| 214 | 875 | 2 | Poor |
| 216 | 813 | Trace | Medium |
| 226 | 40,112 | 0 | Poor |
| 227 | 17,334 | 0 | Poor |
| 228 | 8,056 | 1,406 | Medium |
| 229 | 2,363 | 0 | Poor-Medium |
| 230 | 2,392 | 0 | Poor |
| 252 | 3,847 | 499 | Medium |
| 253 | 5,523 | 0 | Poor |
| 254 | 5,693 | 0 | Poor |
| 255 | 37,649 | 0 | Poor |
| 256 | 9,378 | 0 | Poor |
| 260 | 11,727 | 4,306 | Poor-Medium |
| 261 | 36 | 0 | Poor-Medium |
| 262 | 3,530 | 1,717 | Poor-Medium |
| 277 | 70 | 0 | Poor |
| 280 | 893 | 0 | Poor |
| 281 | 9,195 | 0 | Poor |
| 282 | 530 | 0 | Poor |
| 289 | 11 | 0 | Poor |
| 291 | 29 | Trace | Poor |
| 294 | 2,091 | 6 | Poor |
| 296 | 37 | 0 | Poor |
| 304 | 327 | 0 | Poor |
| 307 | 4 | 0 | Poor |
| 325 | 13 | 0 | Poor |
| 327 | 14 | 0 | Poor |
| 329 | 47 | 0 | Poor |
| 330 | 27 | 0 | Poor |
| 344 | 61 | 0 | Poor |

Management Recommendations

All areas once a part of the original pine rockland ecosystem that were surveyed have been previously disturbed. They were all mechanically scraped with a blade and all understory palms

and shrubs, and all trees, were removed given the principle purpose of HARB as an active base. Following clearing, native grasses, some shrub and herbaceous species were able to persist and/or recolonize. In more natural settings, Small's milkpea and sand flax grow in full sun under a sparse canopy and are dependent on fire to keep the understory and canopy open. Several pine rockland species have managed to persist at HARB despite it being a highly managed system.

The mowing regime at HARB has greatly assisted in maintaining the pine rockland species. Mowing has acted as a surrogate for periodic fires, a necessary disturbance for this community, and due to the height of mowing has allowed certain pine rockland species, including some woody species (e.g. *Crossopetalum ilicifolium*) to persist.

The frequency of mowing and weed whacking should be continued as it has allowed the continued persistence of both Small's milkpea and sand flax. Timing of mowing when sand flax is in flower and setting seeds could impact populations but more research is needed to confirm this. Along the canal and ditch banks the vegetation is often weed whacked to ground level and will have adverse effects on the sand flax populations growing there. Preliminary data from a different project (sand flax demography) suggests that cutting the plant too low, 2 centimeters (cm), kills the plant. Raising the cutting height of the weed whacking would benefit sand flax in these areas. We recommend that weed whacking does not go below 5 cm.

Exotic grasses are the major threat to Small's milkpea and sand flax. In areas densely covered with St. Augustine, and *Pennisetum purpureum*, Small's milkpea and sand flax did not occur. However, there was an affinity of Small's milkpea to occur with the exotic sod Mascarene templegrass. Even in dense monocultures of Mascarene templegrass, Small's milkpea occurred and thrived. Sand flax did not occur with any exotic grasses.

Pine rocklands are generally low nutrient ecosystems. Mowing too high and the extent of some exotic grasses, like *Pennisetum purpureum*, which grows rapidly, could adversely affect Small's milkpea and sand flax. This is particularly prevalent in the south western part of HARB, in Polygons 261 and 262. A controlled fire through this area would eliminate the accumulation of duff and provide better habitat for both Small's milkpea and sand flax in this area. However, we do realize that current management of grass height along the runways is to dissuade avian presence and minimize collisions and therefore may not be feasible.

It is recommended in areas where St. Augustine and *Pennisetum purpureum* occurs in proximity to Small's milkpea and sand flax populations that these exotics be controlled to avoid out-competing the populations. In order to improve the pine rockland habitat of HARB, treatment and management of Mascarene templegrass is advised where Small's milkpea grows. There are higher densities of Small's milkpea growing in some areas of Mascarene templegrass than would naturally occur in pine rocklands. The total population density may drop with treating Mascarene templegrass as Small's milkpea will be forced to compete with native grasses after the Mascarene templegrass is removed; however, given the densities on HARB this will not adversely affect the viability of the total population. We are currently restoring a pine rockland adjacent to HARB at the Special Operations Command South property where we are successfully restoring a pine rockland containing both Small's milkpea and sand flax in areas covered in Mascarene templegrass. We understand Mascarene templegrass is a cultivar species

and removing the grass would be costly and time consuming, therefore these are only our recommendations to improve the pine rockland habitat in which endemic rare plants occur.

Acknowledgements

The authors would like to acknowledge Keith Bradley and Sarah Martin for their assistance with surveying for plants at Homestead Air Reserve Base. Their assistance was invaluable. Thanks to George Gann, who reviewed the document and gave management recommendations. We would also like to thank Steve Woodmansee from management recommendations. Photographs of Small's milkpea and sand flax were taken by James Johnson.

Figures

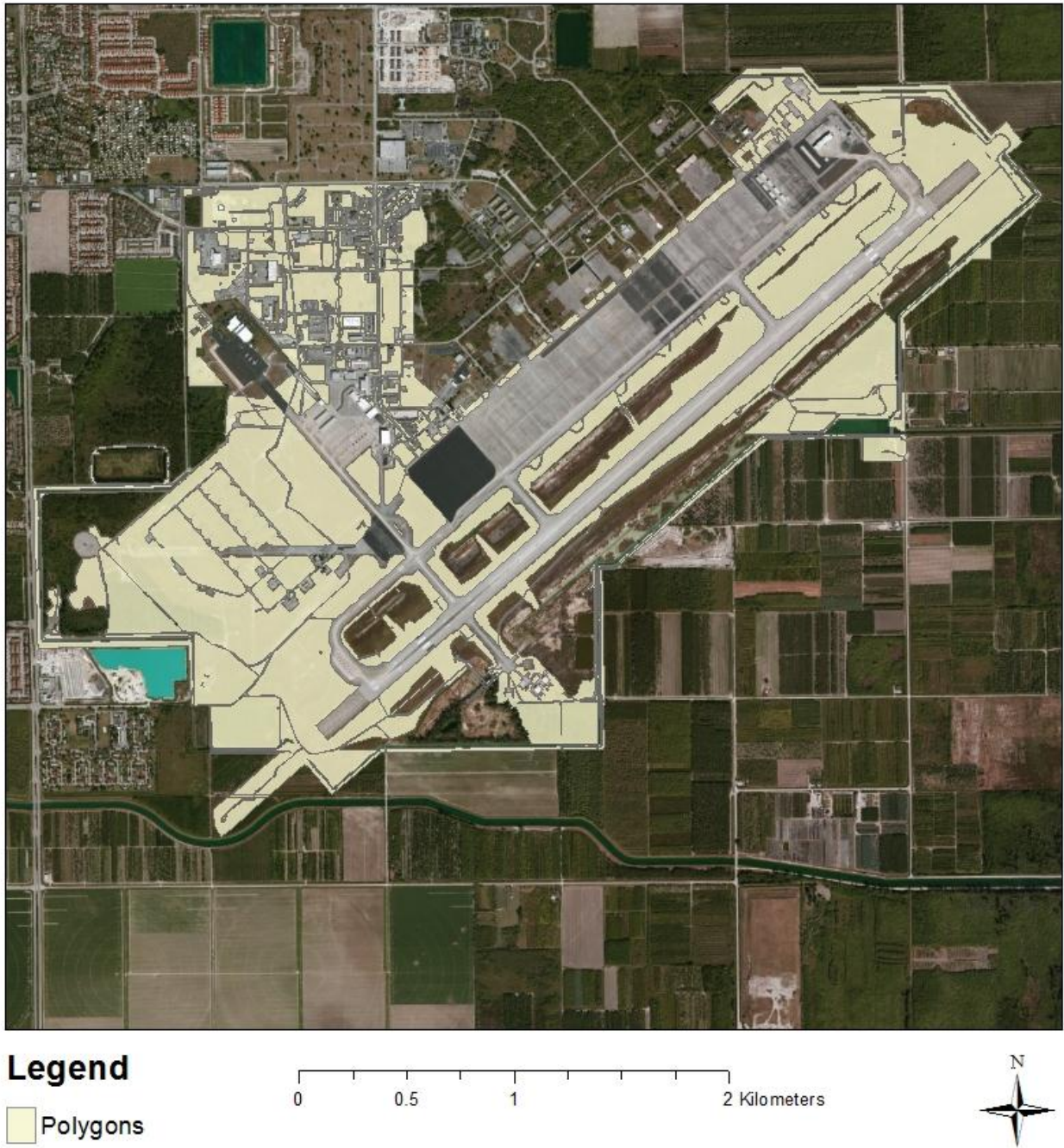
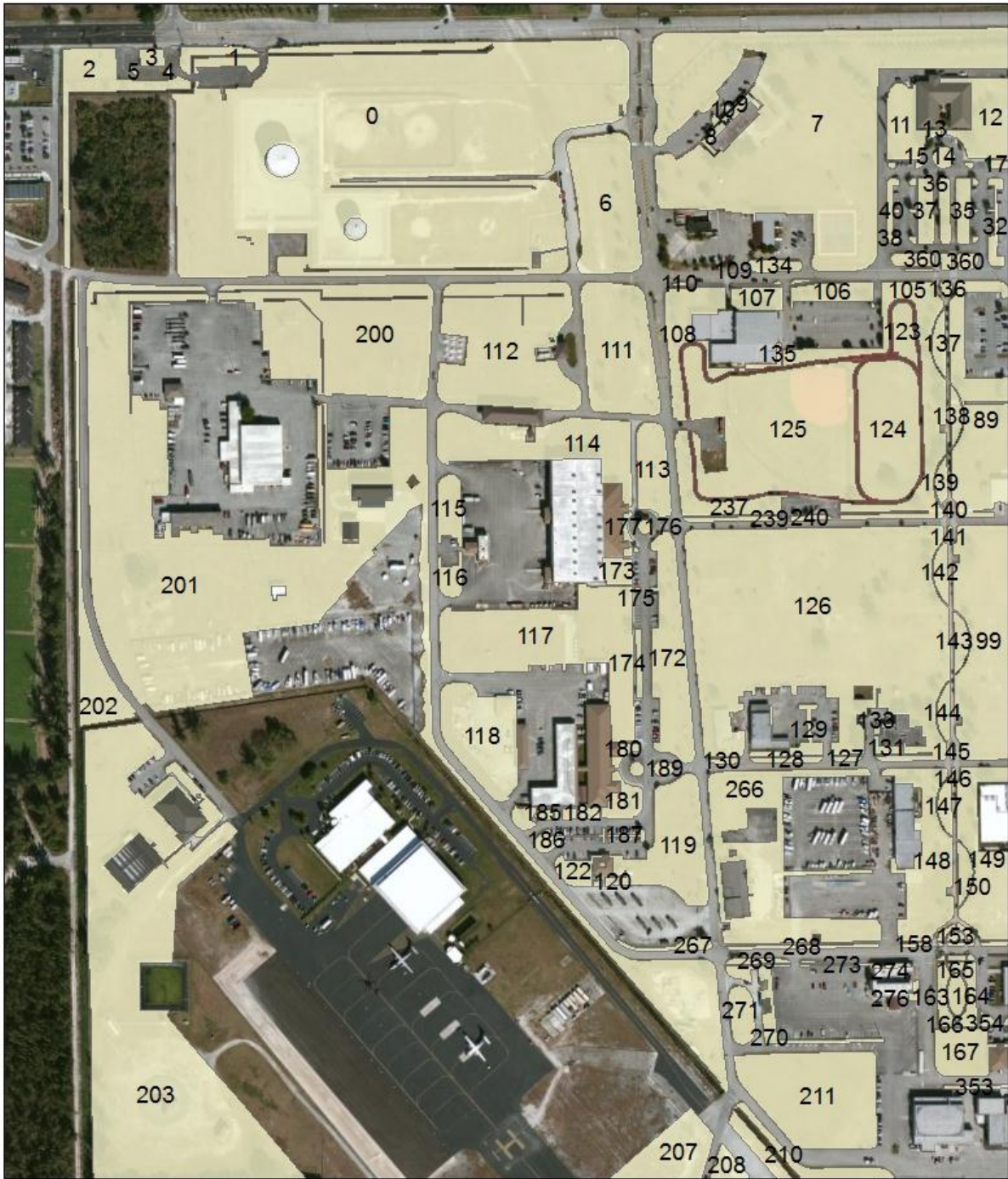


Figure 1. Homestead Air Reserve Base.



Legend

 Polygons

0 100 200 400 Meters



Figure 2. Map showing survey polygon locations.



Legend

 Polygons

0 100 200 400 Meters



Figure 3. Map showing survey polygon locations.



Legend

 Polygons

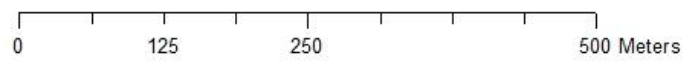


Figure 4. Map showing survey polygon locations.



Legend

 Polygons

0 200 400 800 Meters



Figure 5. Map showing survey polygon locations.



Legend

 Polygons

0 200 400 800 Meters



Figure 6. Map showing survey polygon locations.



Legend

 Polygons

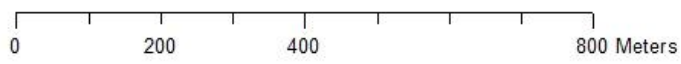
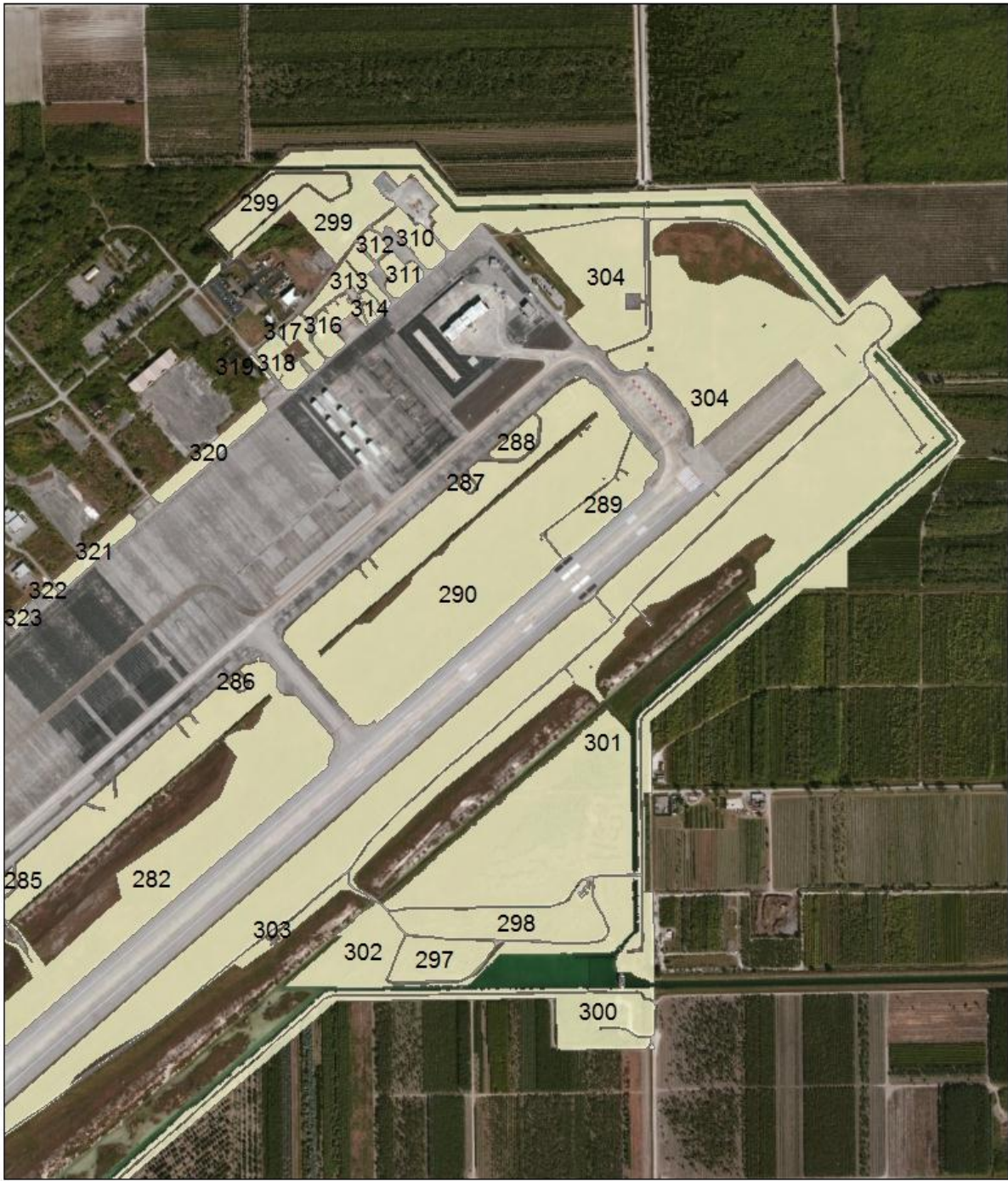


Figure 7. Map showing survey polygon locations.



Legend

 Polygons

0 250 500 1,000 Meters



Figure 8. Map showing survey polygon locations.



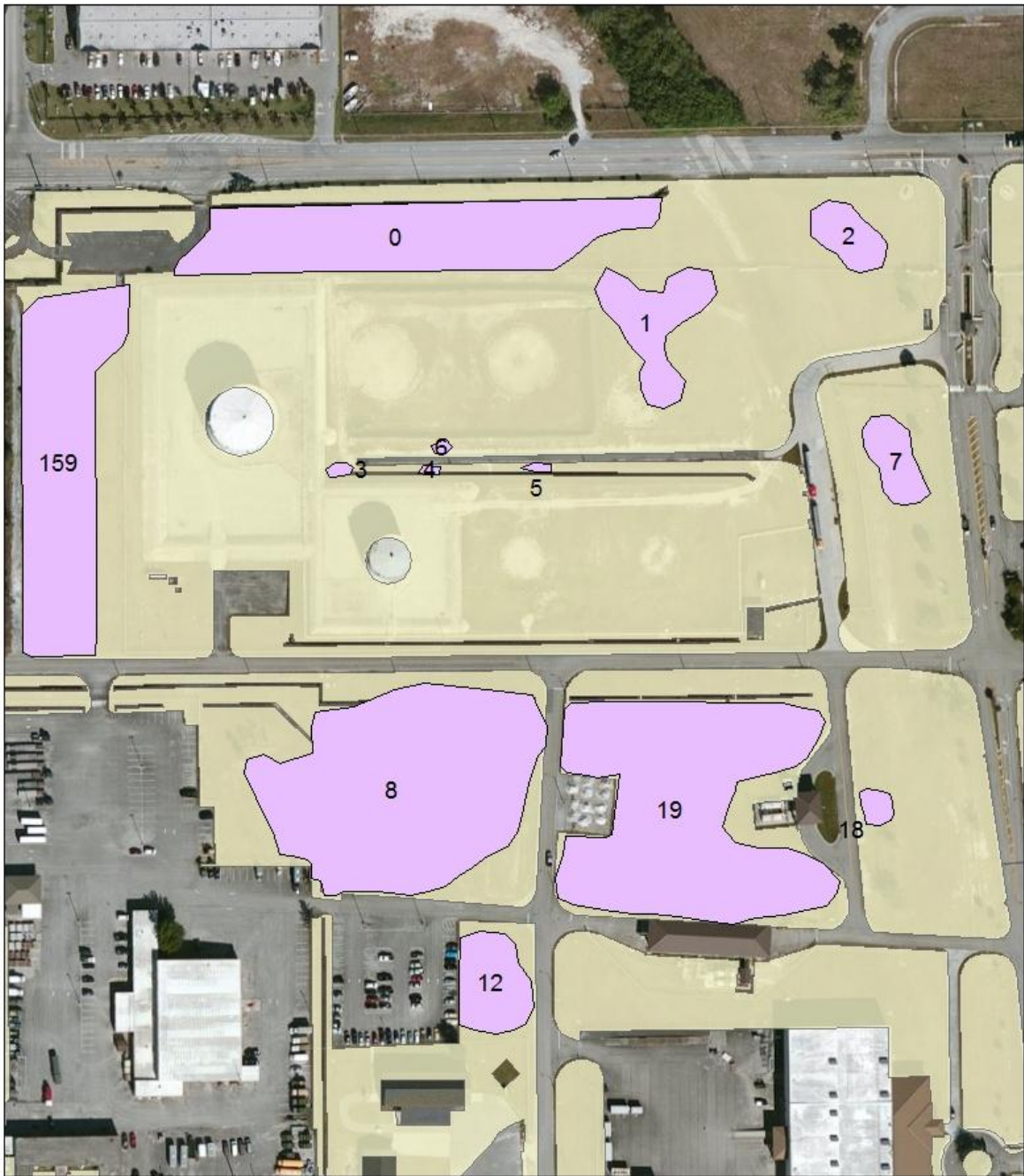
Legend

 Polygons

0 125 250 500 Meters



Figure 9. Map showing survey polygon locations.



Legend

- Galactia Smallii
- Polygons

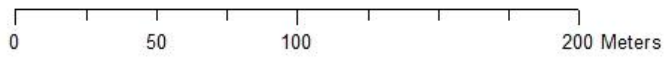




Figure 10. Map showing locations of Small's milkpea: Polygon 0 showing populations 0, 1, 2, 3, 4, 5, 6 159; Polygon 111 has population 18; Polygon 112 has a single large population 19; Polygon 200 has population 8.



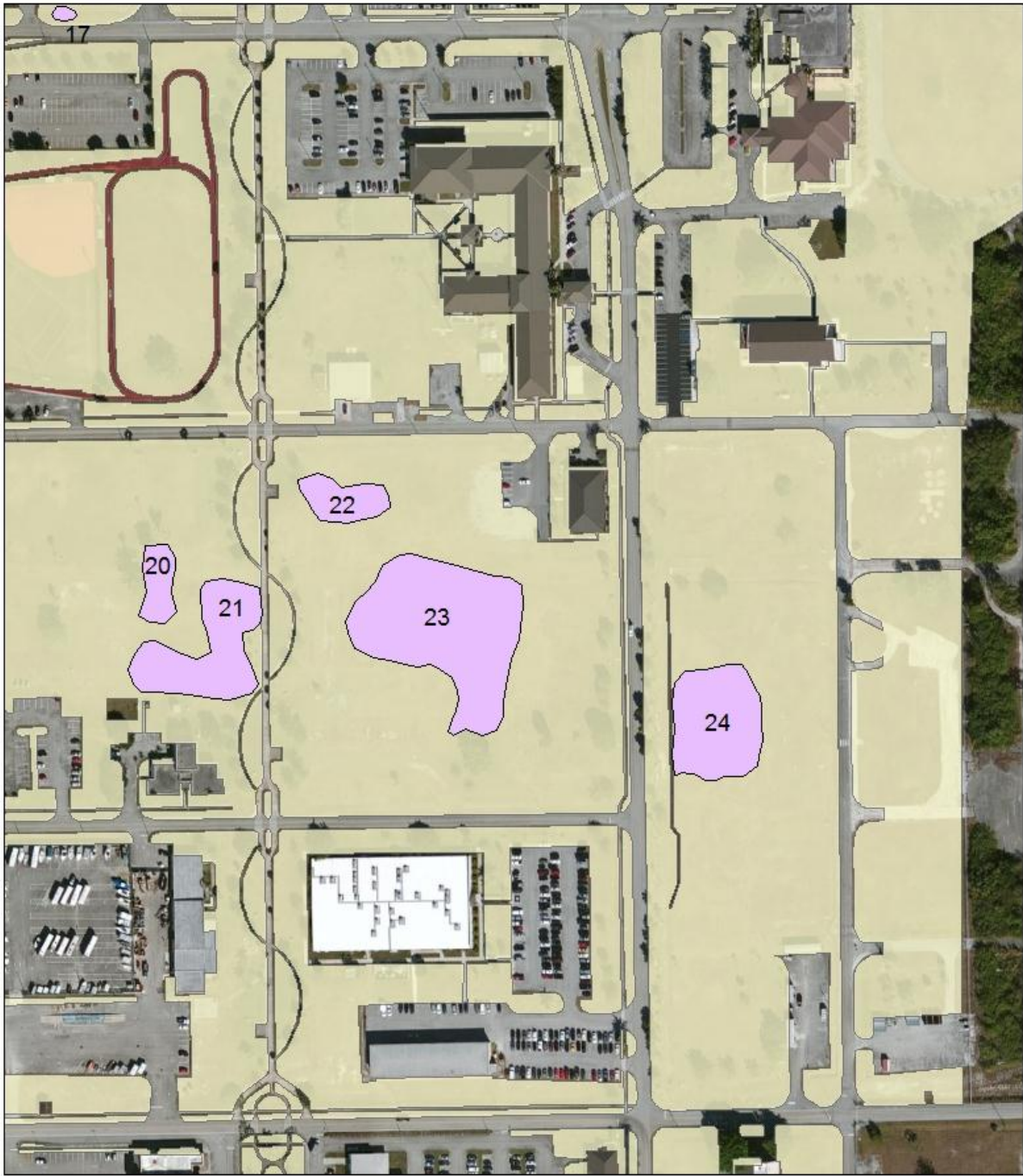
Legend

-  Galactia Smallii
-  Polygons

0 50 100 200 Meters



Figure 11. Polygon 7 showing Small's milkpea populations 15, 16, and 17.



Legend

- Galactia Smallii
- Polygons

0 60 120 240 Meters



Figure 12. Map showing locations of Small's milkpea: Polygon 99 showing populations 22 and 23; Polygon 101 showing population 24. Polygon 126 showing populations 20 and 21.



Legend

- Galactia Smallii
- Polygons

0 50 100 200 Meters



Figure 13. Map showing locations of Small's milkpea: Polygon 201 containing populations 8, 9, 11, 12; polygon 202 containing population 10.



Legend

- Galactia Smallii
- Polygons

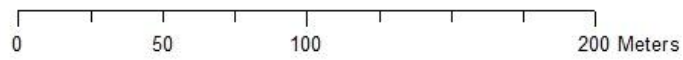


Figure 14. Map showing locations of Small's milkpea: Polygon 203 contains population 13.



Legend

- Galactia Smallii
- Polygons

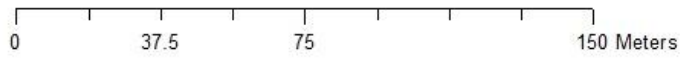
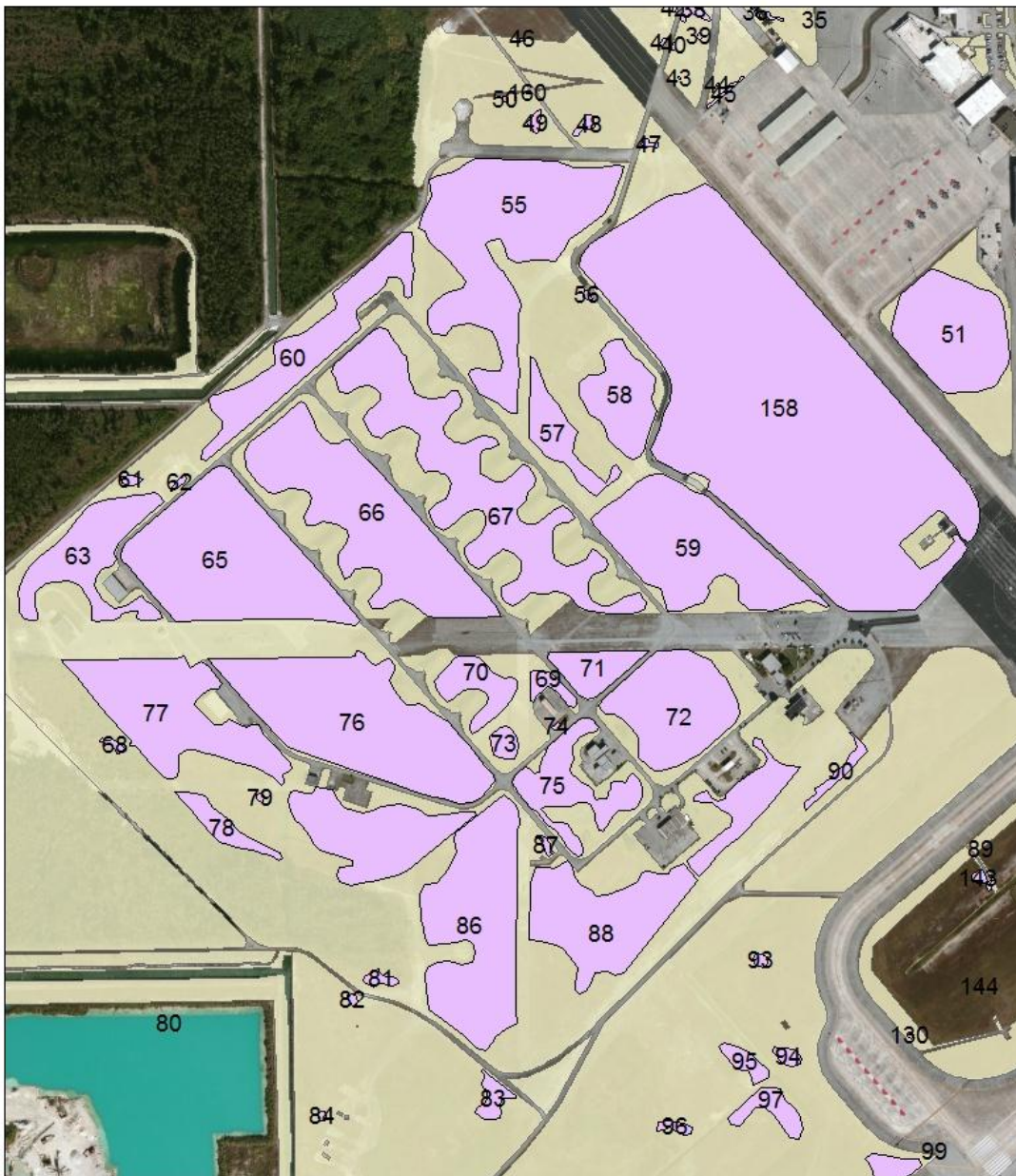


Figure 15. Map showing locations of Small's milkpea: Polygon 210 showing populations 35, 36, 37; Polygon 211 showing population 26.



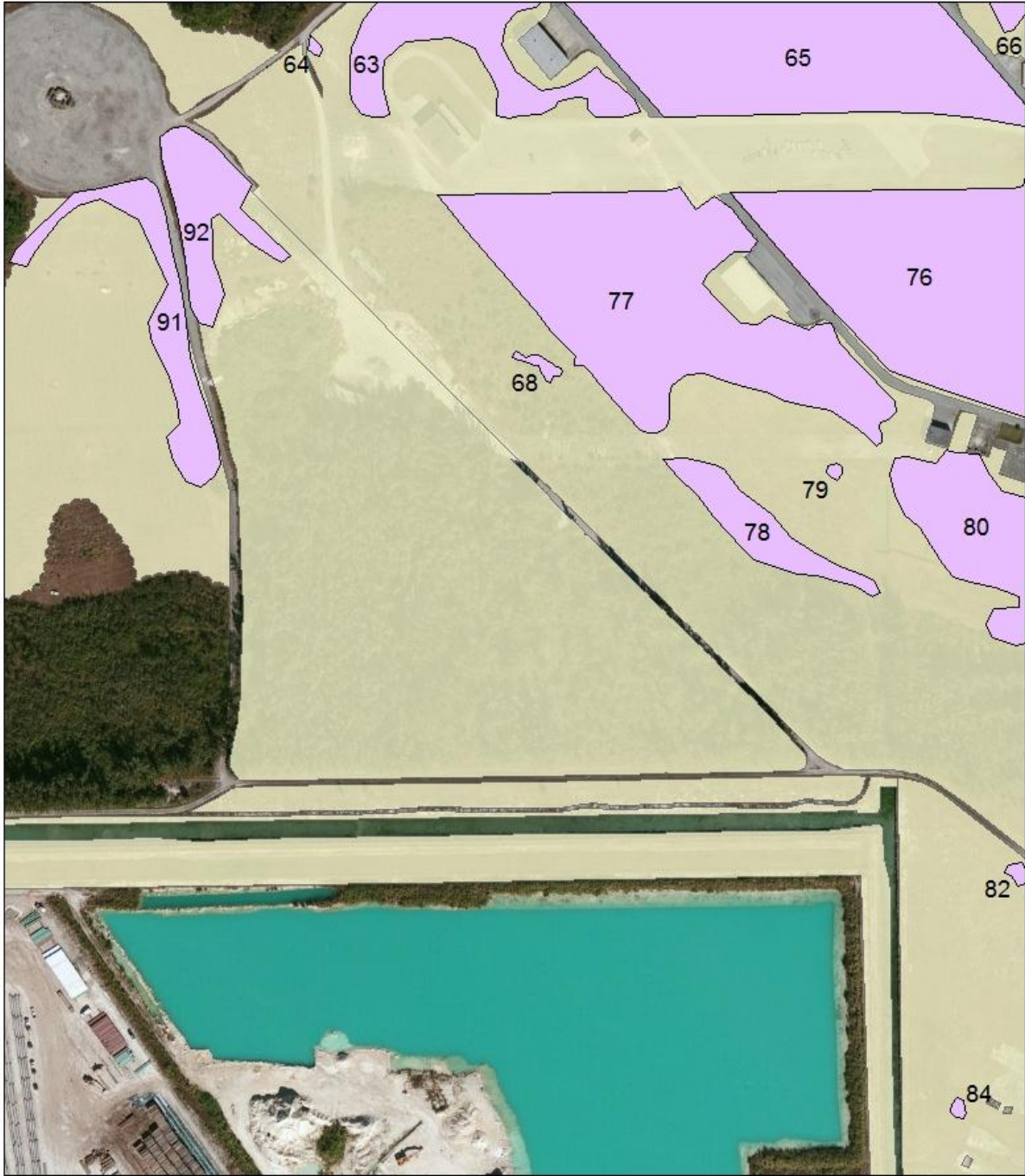
Legend

- Galactia Smallii
- Polygons

0 150 300 600 Meters



Figure 16. Map showing locations of Small’s milkpea: Polygon 204 containing populations 46 and 48; Polygon 205 containing populations 49, 50, 160; Polygon 206 showing populations 158 and 47. Polygon 213 showing populations 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 68, 74, 76, 77, 78, 79, 80, 81, 86, 87, 88, 89, 90; Polygon 226 showing population 66; Polygon 226 showing population 66; Polygon 227 showing population 67; Polygon 228 showing population 51; Polygon 253 showing populations 69, 70, 73; Polygon 254 showing population 71; Polygon 255 showing population 72; Polygon 256 showing population 75.



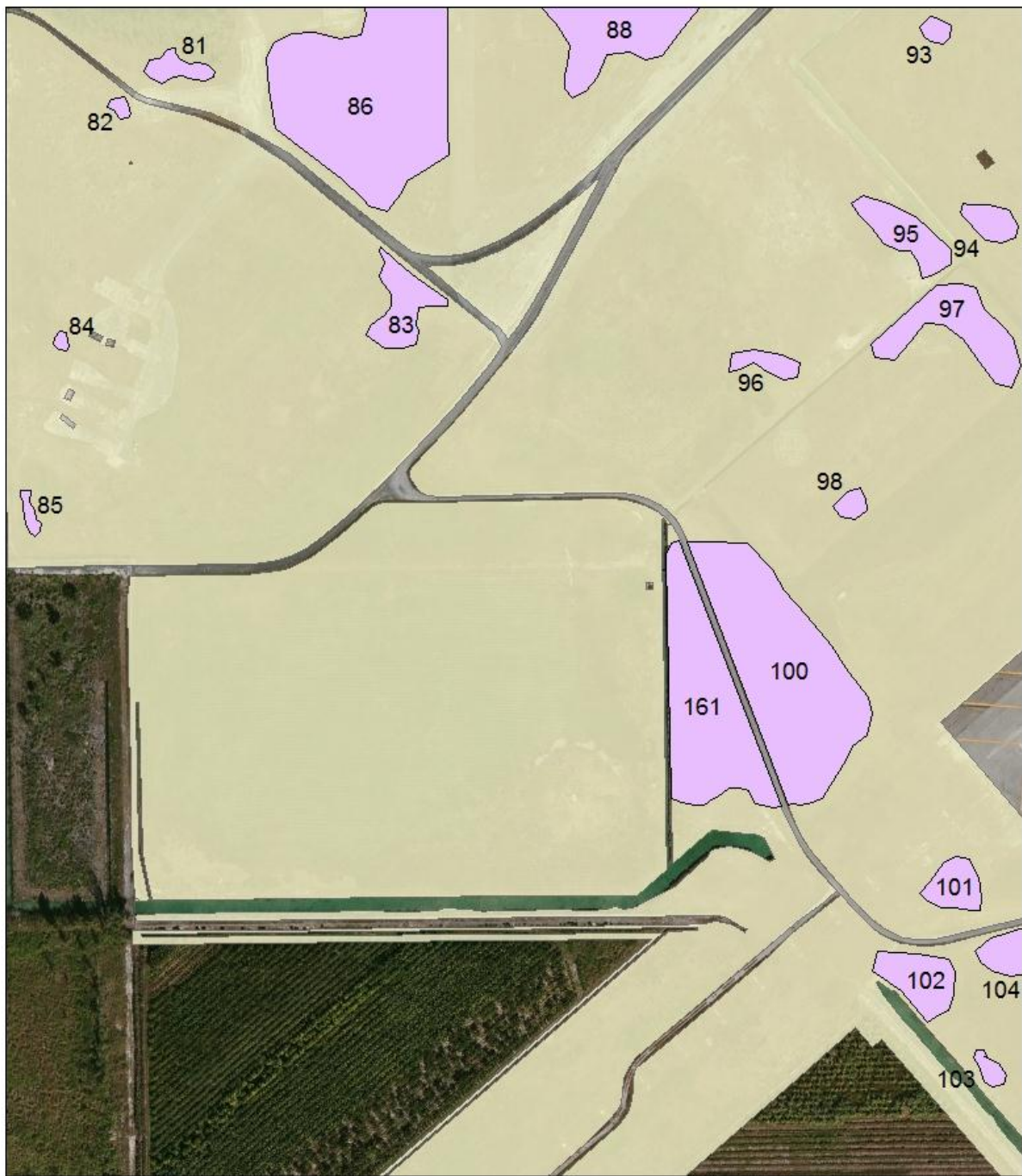
Legend

- Galactia Smallii
- Polygons

0 75 150 300 Meters



Figure 17. Map showing locations of Small's milkpea: Polygon 214 showing population 92; Polygon 216 showing population 91.



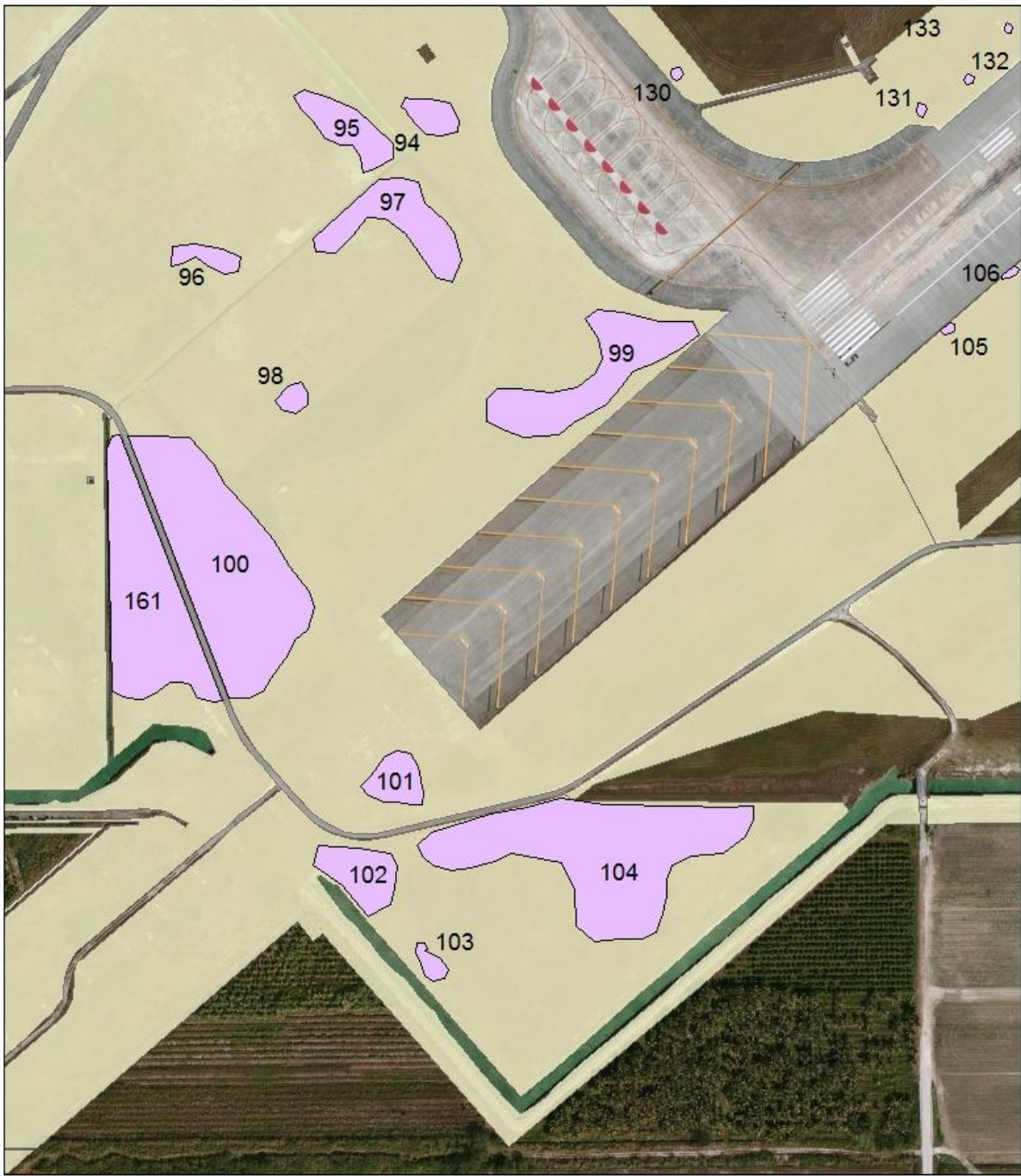
Legend

- Galactia Smallii
- Polygons

0 75 150 300 Meters



Figure 18. Map showing locations of Small's milkpea. Polygon 260 showing populations 93, 94, 95, 96, 97, 98, 100, 101; Polygon 261 showing populations 82, 83, 84, 85; Polygon 262 showing population 161.



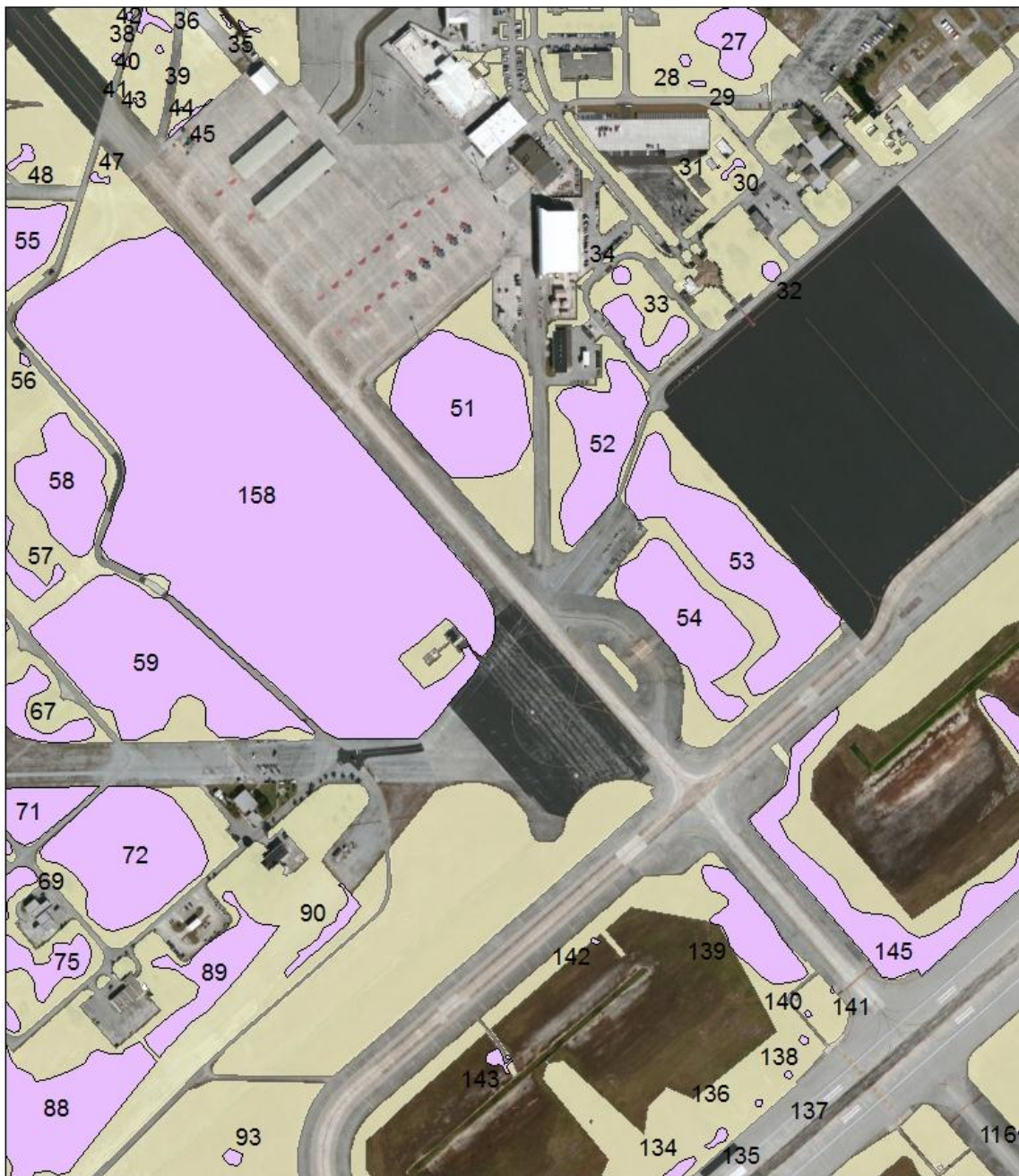
Legend

- Galactia Smallii
- Polygons

0 75 150 300 Meters



Figure 19. Map showing locations of Small's milkpea. Polygon 260 showing population 99; Polygon 294 showing populations 102, 103, 104.



Legend

- Galactia Smallii
- Polygons

0 125 250 500 Meters



Figure 20. Map showing locations of Small's milkpea: Polygon 207 showing populations 41 and 42; Polygon 208 showing populations 38, 39, 40, 43; Polygon 209 showing populations 44 and 45. Polygon 229 showing population 52; Polygon 252 showing populations 53, 54; Polygon 307 showing populations 140, 141; Polygon 344 showing populations 30 and 31.



Legend

- Galactia Smallii
- Polygons

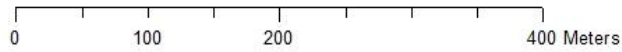
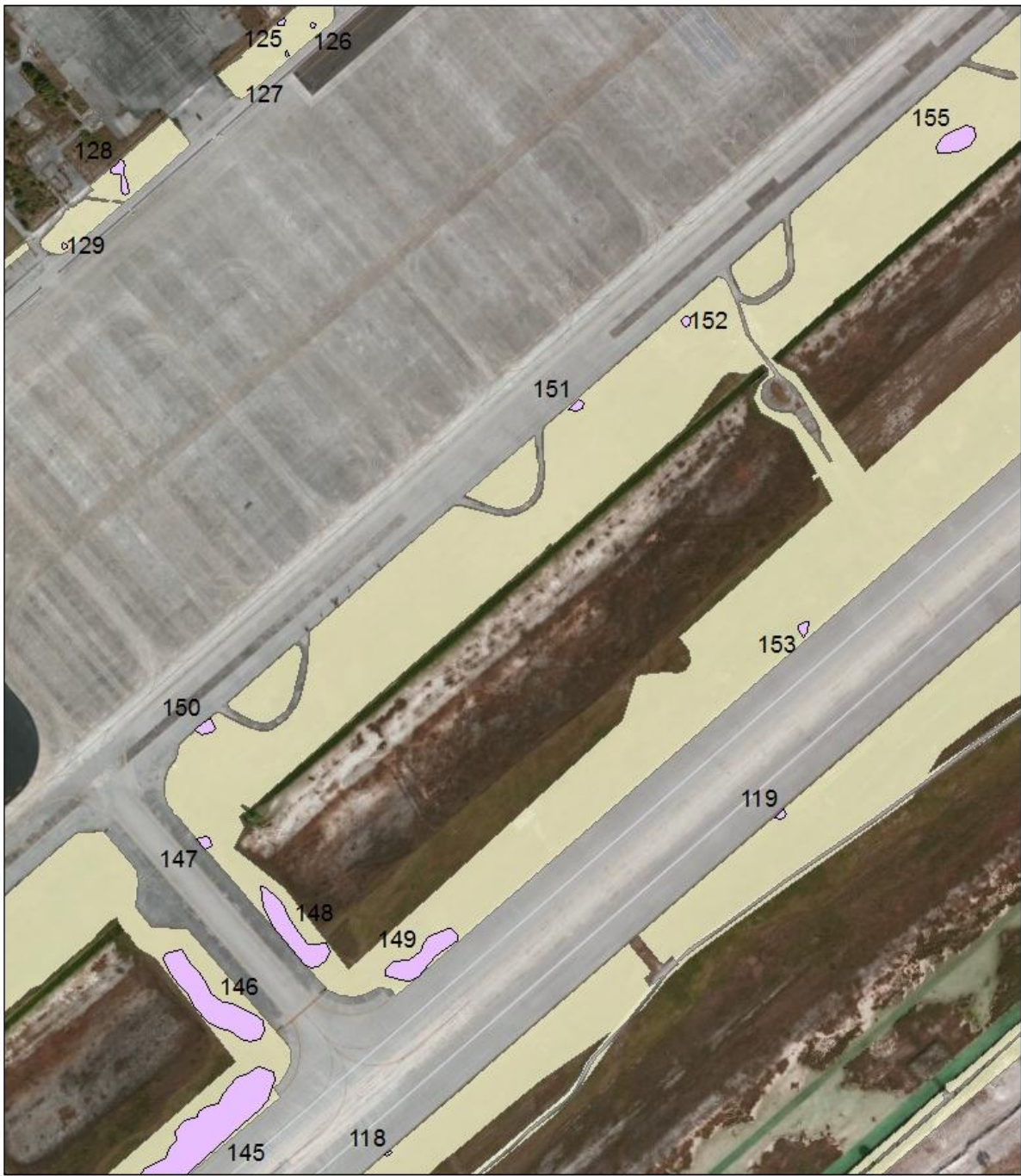


Figure 21. Map showing locations of Small’s milkpea. Polygon 280 showing populations 130, 131, 132 1333, 134, 135, 136, 137, 138, 139, 142, 143, 144; Polygon 281 showing populations 145, 146; Polygon 291 showing populations 105, 106, 107, 108,109, 110, 111, 112, 113, 114; Polygon 296 showing populations 115, 116, 117.



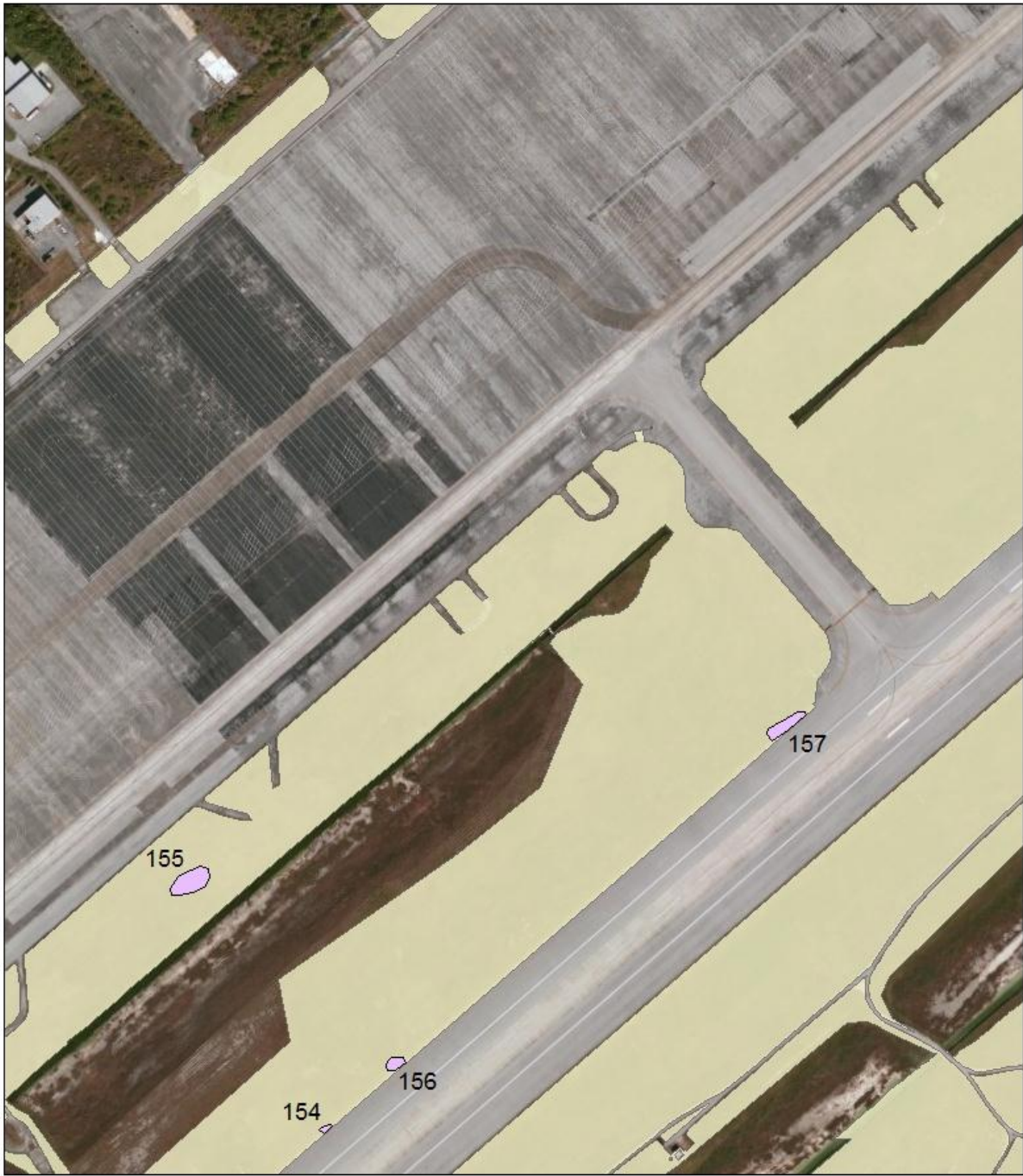
Legend

- Galactia Smallii
- Polygons

0 100 200 400 Meters



Figure 22. Map showing locations of Small's milkpea. Polygon 281 showing populations 145, 146; Polygon 282 showing populations 147, 148, 149, 150, 151, 152, 153, 155; Polygon 296 showing population 118; Polygon 304 showing population 119.



Legend

- Galactia Smallii
- Polygons



0 100 200 400 Meters

N

Figure 23. Map showing locations of Small's milkpea. Polygon 281 showing populations 154, 155, 156, 157.



Legend

-  Galactia Smallii
-  Polygons

0 100 200 400 Meters



Figure 24. Map showing locations of Small’s milkpea. Polygon 289 showing population 121; Polygon 304 showing population 120.



Legend

- Galactia Smallii
- Polygons

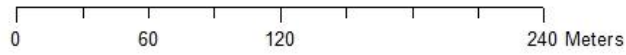


Figure 25. Map showing locations of Small’s milkpea: Polygon 25 has a single population 25; Polygon 194 with populations 27, 28 29; Polygon 226 showing population 66; Polygon 230 showing populations 33,34; Polygon 277 showing population 32.



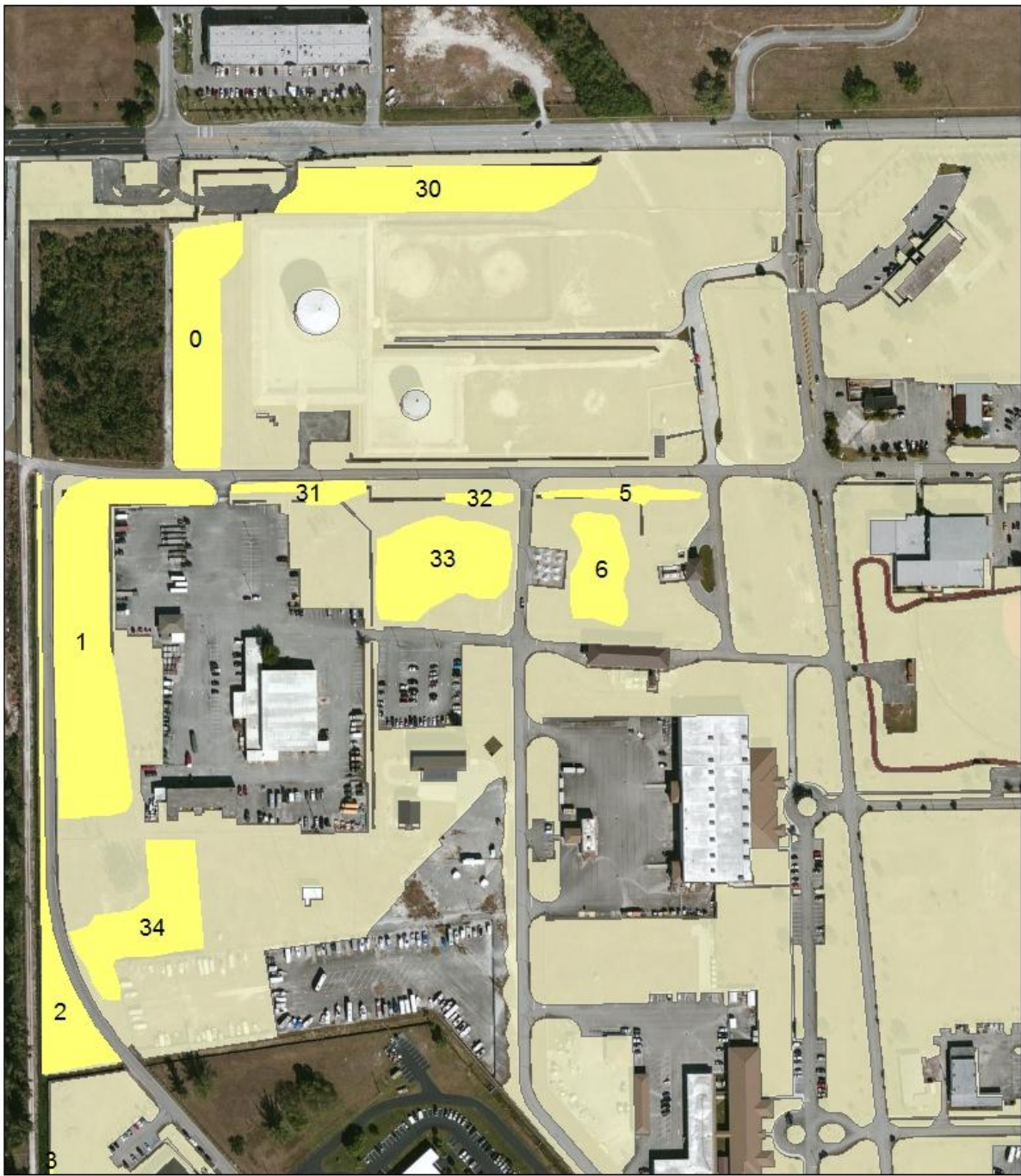
Legend

- Galactia Smallii
- Polygons

0 100 200 400 Meters



Figure 26. Map showing locations of Small's milkpea. Polygon 325 showing population 122; Polygon 327 showing populations 123, 162; Polygon 329 showing populations 124, 125, 126, 127; Polygon 330 showing populations 128, 129.



Legend

Linum arenicola

Polygons


0 75 150 300 Meters



Figure 27. Map showing locations of sand flax: Polygon 0 showing populations 0 and 30; Polygon 112 contains populations 5 and 6; Polygon 200 contains populations 31, 32 33; Polygon 202 containing population 2.



Legend

 *Linum arenicola*

 Polygons

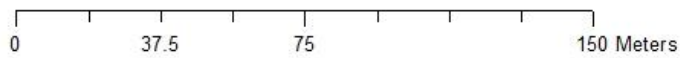


Figure 28. Map showing locations of sand flax: Polygon 203 showing populations 3 and 4.



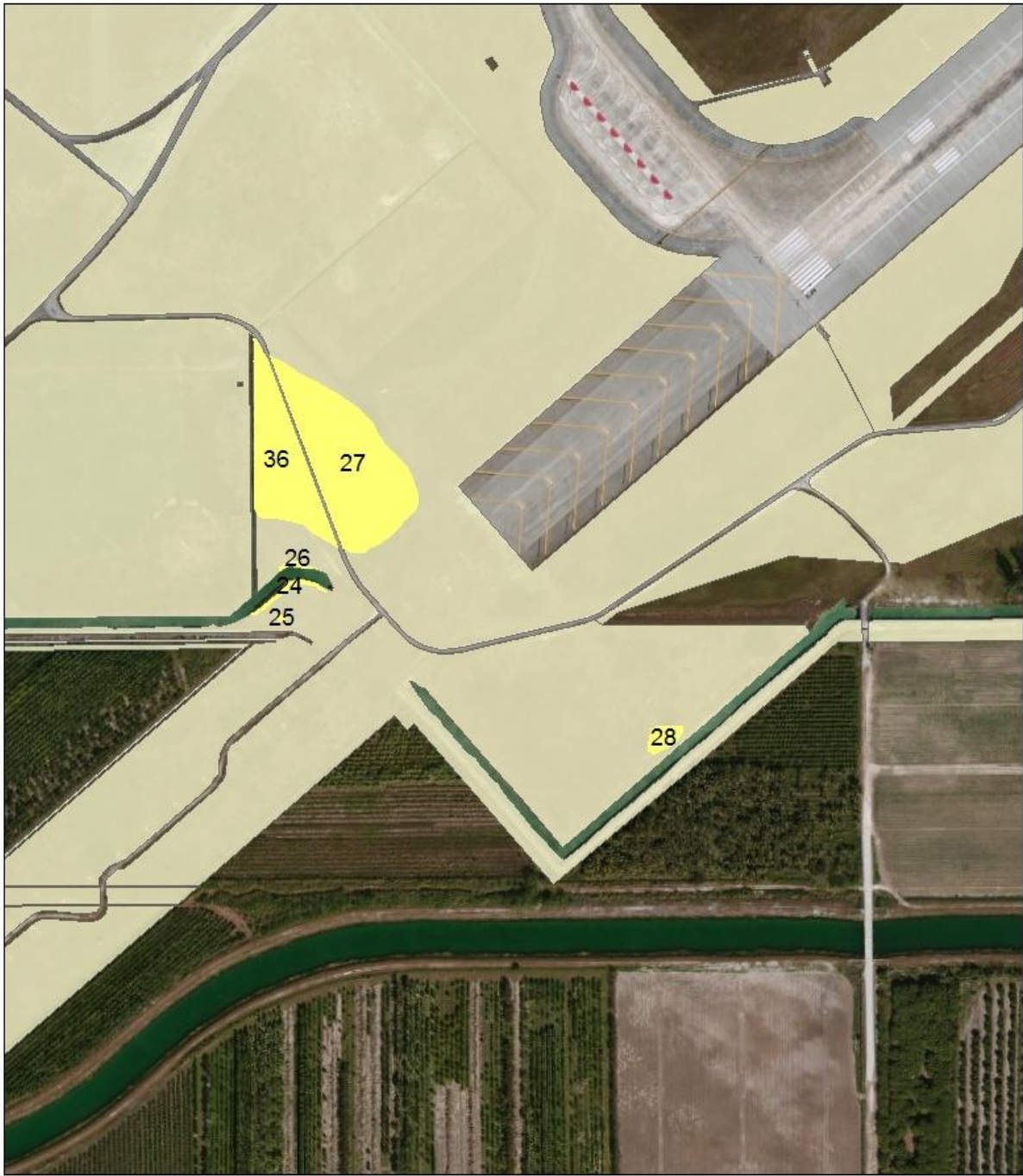
Legend

- Linum arenicola*
- Polygons

0 125 250 500 Meters



Figure 29. Map showing locations of sand flax populations: Polygon 203 showing populations 3 and 4; Polygon 204 containing populations 7, 8, 10, 11, 12, 13; Polygon 205 showing populations 15, 37, 16; Polygon 206 showing populations 14 and 29; Polygon 212 showing population 9; Polygon 213 showing populations 17, 18, 19, 23; Polygon 228 showing population 20.



Legend

- Linum arenicola*
- Polygons

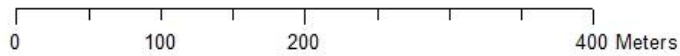
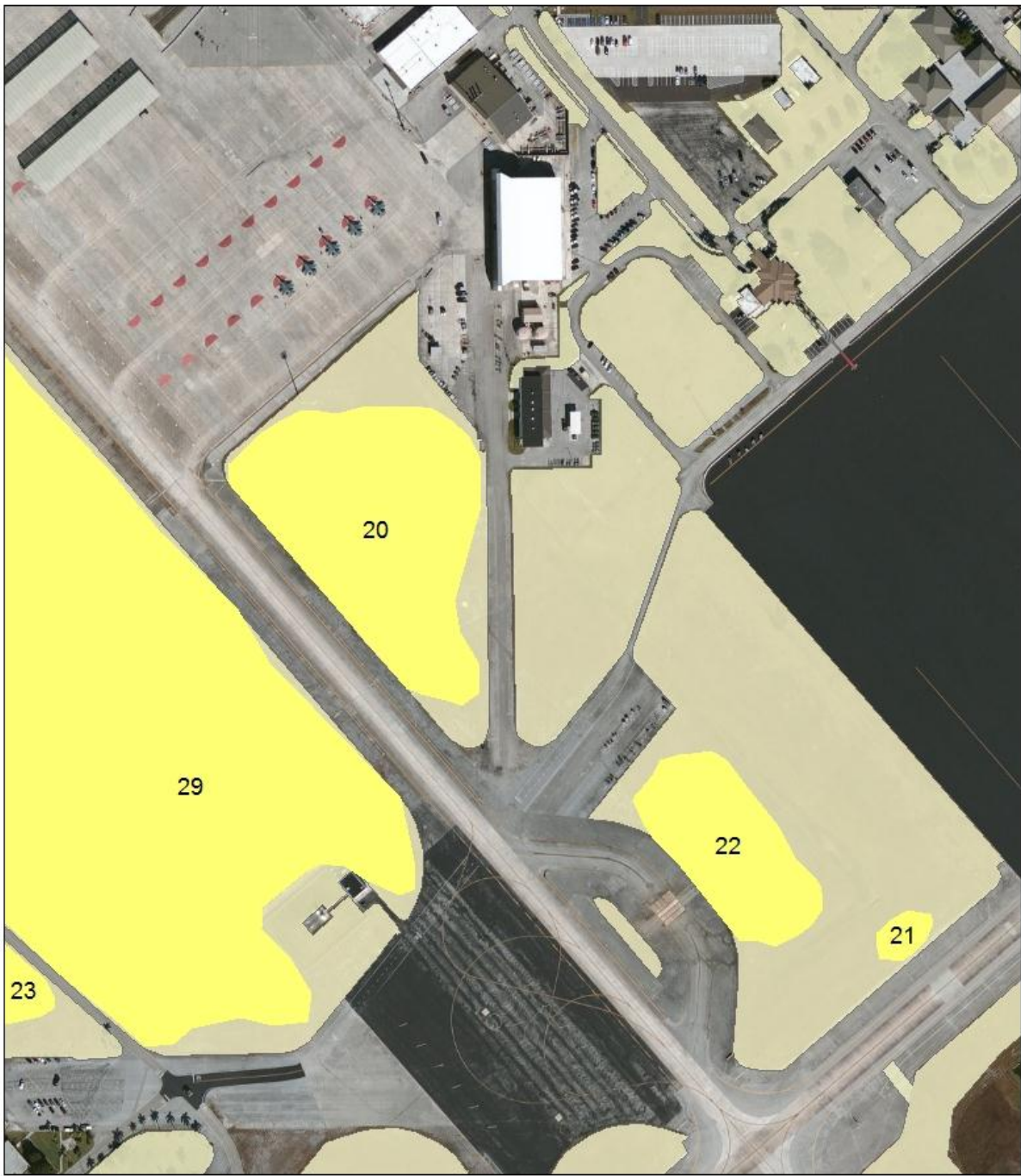


Figure 30. Map showing locations of sand flax: Polygon 260 showing population 27; Polygon 262 showing populations 24, 25, 26, 36; Polygon 294 showing population 28.



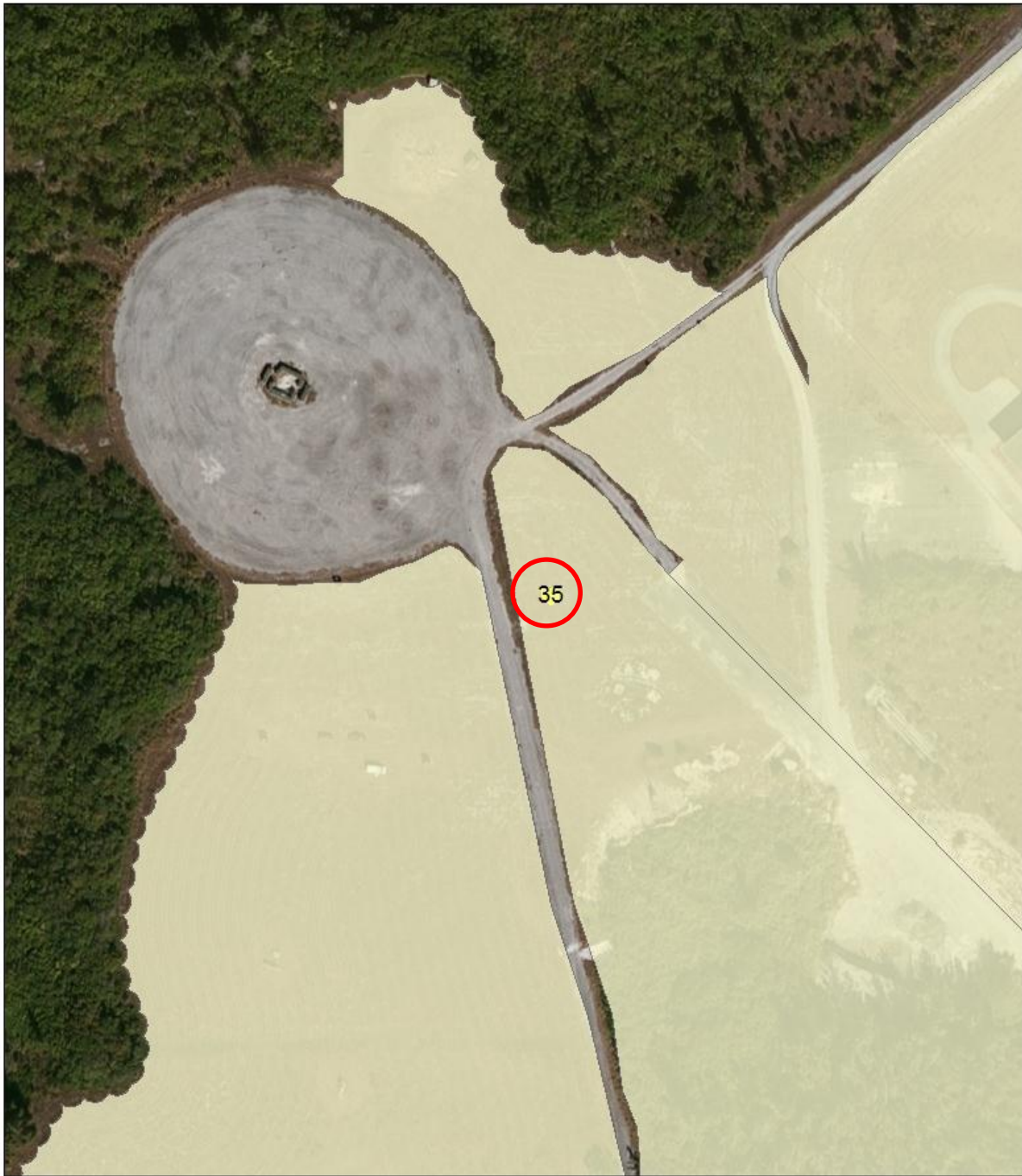
Legend

- Linum arenicola
- Polygons


0 75 150 300 Meters



Figure 31. Map showing locations of sand flax: Polygon 252 showing populations 21, 22.



Legend

 *Linum arenicola*


 Polygons



Figure 32. Map showing locations of sand flax: Polygon 214 showing population 35.