Appendix 2-1: Annual Permit Report for the Picayune Strand Restoration Project

Permit Report (May 1, 2014–April 30, 2015)
Permit Number: 0221670

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SUMMARY

Based on Florida Department of Environmental Protection (FDEP) permit reporting guidelines, **Table 1** lists key permit-related information associated with this report. **Table 2** lists the attachments included with this report. **Table A-1** in Attachment A lists specific pages, tables, graphs, and attachments where project status and annual reporting requirements are addressed. This annual report satisfies the reporting requirements specified in the permit.

[1] Mike Duever is working under contract for the South Florida Water Management District.

Table 1. Key permit-related information.

Project Name:	Picayune Strand Restoration Project
Permit Number:	0221670-011
Issue and Expiration Dates: 0221670-010 (permit renewal): 0221670-011 (latest modification):	 Issued: 4/29/2015; Expires: 4/29/2020 Issued: 4/29/2015
Project Phase:	Post-Construction
Permit Specific Condition Requiring Annual Report:	31
Reporting Period:	May 1, 2014–April 30, 2015
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Table 2. Attachments included with this report.

Attachment	Title
A	Specific Conditions and Cross-References
B	Hydrologic Data
C	Picayune Strand Restoration Project – Annual Effectiveness Assessment Summary, November 30, 2014

PROJECT STATUS

During Water Year 2015 (WY2015) (May 1, 2014–April 30, 2015), construction of project components continued. There were no operations during the reporting period. The last remaining work around the Merritt Canal pump station was completed in January 2015, and it will become operational in June 2015. Construction of the Miller Canal pump station began in January 2014, continued throughout WY2015, and is scheduled to be completed in spring 2017. Merritt Canal plugging was completed by the end of spring 2015.

CONCLUSIONS REGARDING PROJECT SUCCESS

The backfilling and plugging of Prairie Canal has substantially restored the hydrology of lands east of the canal and more than two miles north of the east-west stair-step canal at the south end of the project. The restored hydrology and associated reduction in severity of fires is facilitating recovery of natural vegetation in this area. Final hydrologic restoration of the remaining area between Merritt and Prairie canals and more than two miles north of the east-west stair-step canal occurred when Merritt Canal was plugged and its water table drawdown effects were eliminated.

Vegetation management activities on the canal, road, logging tram, demolition, and remediation construction footprints have been very effective in controlling the invasion of most exotic vegetation and allowing natural vegetation to become established on these disturbed sites, particularly where the hydrology has been significantly restored. As hydrology is restored to more of the project area, we expect to see much greater reduction of many exotic upland plant species that have invaded the drained landscape, both on and between construction footprints.

PROBLEMS ENCOUNTERED

No problems were encountered in WY2015. However, the Picayune Strand Restoration Project, as currently projected, will exceed the congressionally authorized cost, resulting in the need to request a post-authorization change to increase the authorized project cost. If the additional funding is not authorized, the Southwestern Protection Feature, manatee mitigation feature, and plugging of Faka Union and Miller canals will not be constructed, and full restoration will not be achieved, resulting in the loss of approximately 70 percent of the hydrologic benefits, 62 percent of the biological benefits, and 100 percent of the estuarine benefits.

ACTIONS TO ADDRESS PROBLEMS

The United States Army Corps of Engineers (USACE), in conjunction with the South Florida Water Management District (SFWMD), has prepared a limited reevaluation report that details the need for the post-authorization change to increase the authorized project cost from $505.2 million [Fiscal Year 2013-2014 (October 1, 2013–September 30, 2014) price level with Section 902 adjustment] to $617.9 million (Fiscal Year 2014-2015 price levels) (USACE and SFWMD 2013). In addition, the post-authorization change request seeks confirmation that inclusion of the manatee mitigation feature is within the USACE Chief of Engineers discretionary authority. The additional funding request is necessary to complete the project and realize the ecological benefits envisioned in the 2004 final project implementation report and environmental impact statement (USACE and SFWMD 2004).

INTRODUCTION

PROJECT OVERVIEW

The Picayune Strand Restoration Project is a Comprehensive Everglades Restoration Plan (CERP) project (**Figure 1**). The objective of the project is to restore the hydrological and ecological function of the region by establishing pre-development sheet flows and hydroperiods.

Phase 1 of the Picayune Strand Restoration Project, the Prairie Canal Backfill Project consists of the elimination of channelized flow in the Prairie Canal. The project involves the construction of a number of earthen plugs in the canal, based on fill availability, to prevent discharge south through the canal and to restore natural overland flow. Source material for the plugs consists of the spoil from the original canal, and the degradation of raised roads within the project area.

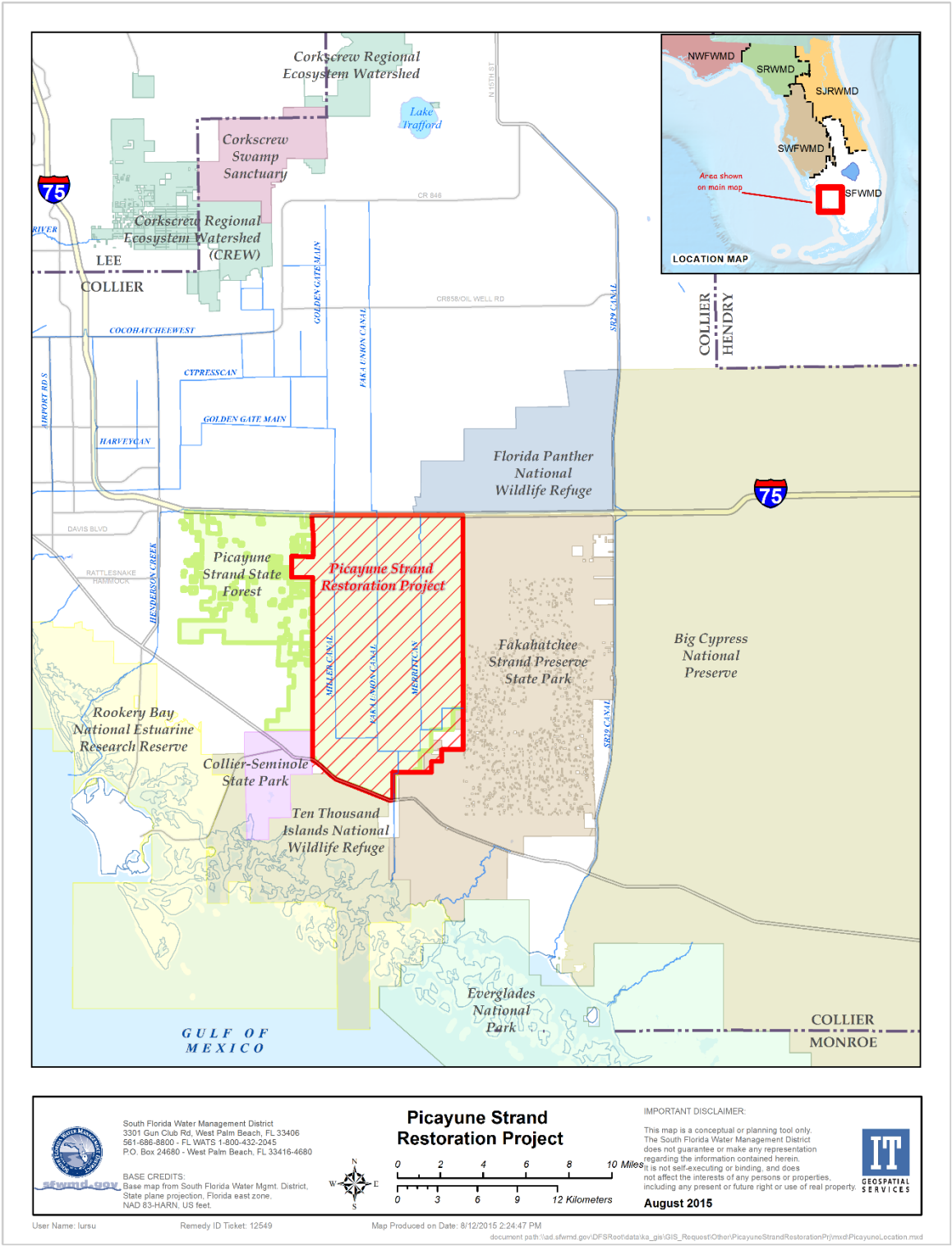

Figure 1. Picayune Strand Restoration Project area and surrounding areas.

PERMIT HISTORY

The original Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permit and all modifications and exemptions issued to the SFWMD are as follows:

- 0221670-001-GL, issued on October 28, 2005, was the original permit from the FDEP to the SFWMD for the Prairie Canal Backfill Project.
- 0221670-002, an exemption issued on March 2, 2006, authorized geotechnical investigation activities within the project area
- 0221670-003, an exemption issued on April 4, 2006, authorized soil remediation on parcels within the project area.
- 0221670-004-GL, a modification issued on September 1, 2006, modified the Prairie Canal backfilling permit to include Phases 1-4 of road removal activities within the project area. Specific conditions 3 and 9 require that water level and water quality monitoring be conducted in accordance with the Prairie Canal Restoration Fish and Wildlife Resource Monitoring, Vegetation Monitoring, and Construction Protocol Plan, dated October 14, 2002, and amended on September 14, 2005. The monitoring plan required vegetation transect monitoring; monitoring and control of exotics in the construction footprint; sampling of macroinvertebrates, fish, amphibians, small mammals, birds, and other wildlife; and monitoring of water level and water quality.
- 0221670-005-GL, a modification issued on October 16, 2006, modified native vegetation protection during construction by removing the requirement to protect cypress trees and native hardwoods with a caliper greater than 8 inches.
- 0221670-006, an exemption issued on November 16, 2006, added additional parcel of lands for soil remediation.
- 0221670-007-EM, a modification issued on July 30, 2008, removed road removal phases 2 through 4 from the permit. These phases are being completed by the USACE as part of the larger Picayune Strand Restoration Project.
- 0221670-008-EM, a modification issued on June 11, 2010, renewed the permit until June 10, 2015, and modified the post-construction monitoring protocol to follow the Modified Prairie Canal Monitoring Plan (Version 2), which reduced monitoring requirements. In the updated monitoring plan, vegetation transect monitoring frequency was reduced, wildlife monitoring was removed, and water quality monitoring associated with the wildlife monitoring was removed (the remaining water quality and water level monitoring was retained).
- 0221670-009, permit application was withdrawn.
- 0221670-010, a modification was issued on April 29, 2015, for the construction and operation of the Manatee mitigation feature and renewed the permit until April 29, 2020.
- 0221670-011, an exemption was issued on April 29, 2015, for conducting geotechnical investigations at the 6Ls Protection feature within Picayune Strand Restoration Project.

WATER QUALITY MONITORING

Because the Prairie Canal has been backfilled, there is no water available for collecting water quality samples. Therefore, during Water Year 2015 (WY2015) (May 1, 2014–April 30, 2015), water quality monitoring was not conducted and there is no water quality data to report. Once the pump stations are constructed and begin operating, water quality will be measured at the inflow to the pumps and at the outflow in the remaining portion of Faka Union Canal.

HYDROLOGIC MONITORING

RAINFALL AND EVAPOTRANSPIRATION

Daily rainfall and wetland or potential evapotranspiration (ETp) data in the project area were retrieved from SFWMD's DBHYDRO database for rain gauge station DANHP and weather station SGGEWX (**Table 3**). Annual historical average rainfall in the Southwest Rain Area is 54.12 inches (Abtew and Ciuca 2016). The Picayune Strand area received 49.75 inches of rainfall during WY2015 (**Table 4**), 4.4 inches lower than the historical average for the area, indicating that this was a lower than average rainfall year for the area. Annual ETp for WY2015 was 52.98 inches. For seven months of the year, ETp was higher than rainfall. This mainly occurred during the dry season and in October, indicating drier than normal conditions (**Table 4** and **Figure 3**). Rainfall was below average in May, June, October, and December 2014, and in January and March 2015. Wetter than normal months included July, August, September, and November 2014, and February and March 2015. WY2015 daily rainfall is shown in **Figure 4** and daily ETp is shown in **Figure 5**. Data used for these analyses are provided in Attachment B.

Table 3. Hydrologic monitoring stations and database DBkeys.

Station Name	DBKey	Parameter
DANHP	DU537	Rainfall
SGGEWX	OR083	Evapotranspiration

Table 4. WY2015 monthly ETp, rainfall, and historical average monthly rainfall.

	Rainfall (inches)		ETp (inches)
Months	WY2015	Historical Average	WY2015
May 2014	1.48	4.03	6.05
June 2014	7.95	9.13	5.02
July 2014	10.45	8.73	4.77
August 2014	8.71	8.26	5.03
September 2014	9.85	8.20	3.66
October 2014	0.98	4.05	4.34
November 2014	3.63	1.55	3.43
December 2014	0.29	1.43	3.34
January 2015	0.41	1.92	3.40
February 2015	2.34	2.15	3.79
March 2015	0.97	2.46	5.04
April 2015	2.69	2.21	5.11
Total	49.75	54.12	52.98

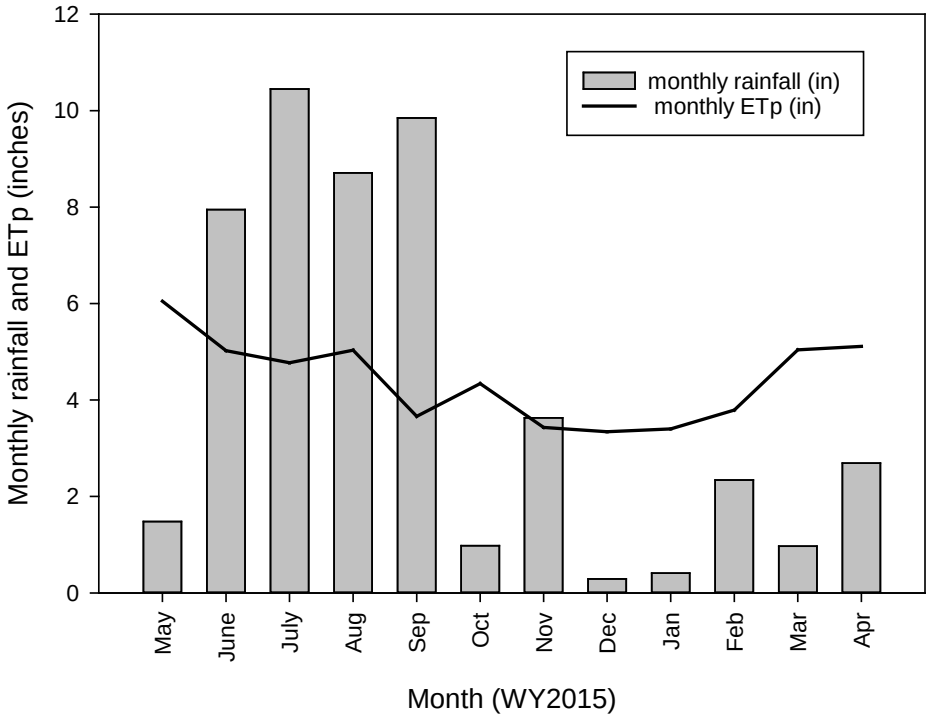

Figure 3. Monthly rainfall and wetland ETp at the Picayune Strand Restoration Project in WY2015.

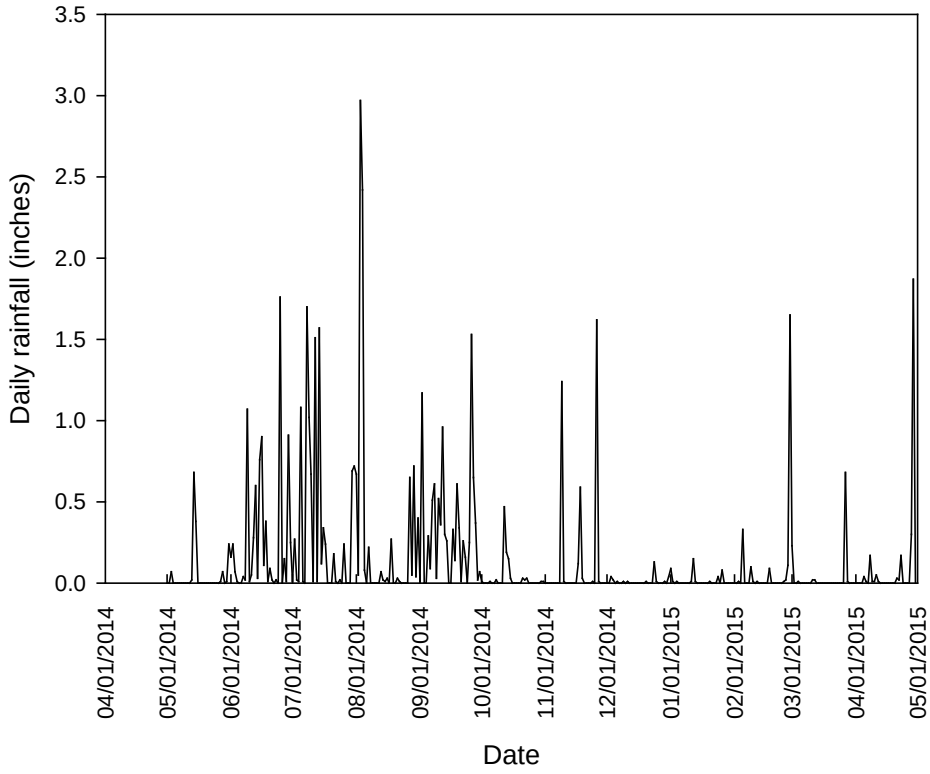

Figure 4. Daily rainfall at the Picayune Strand Restoration Project in WY2015.

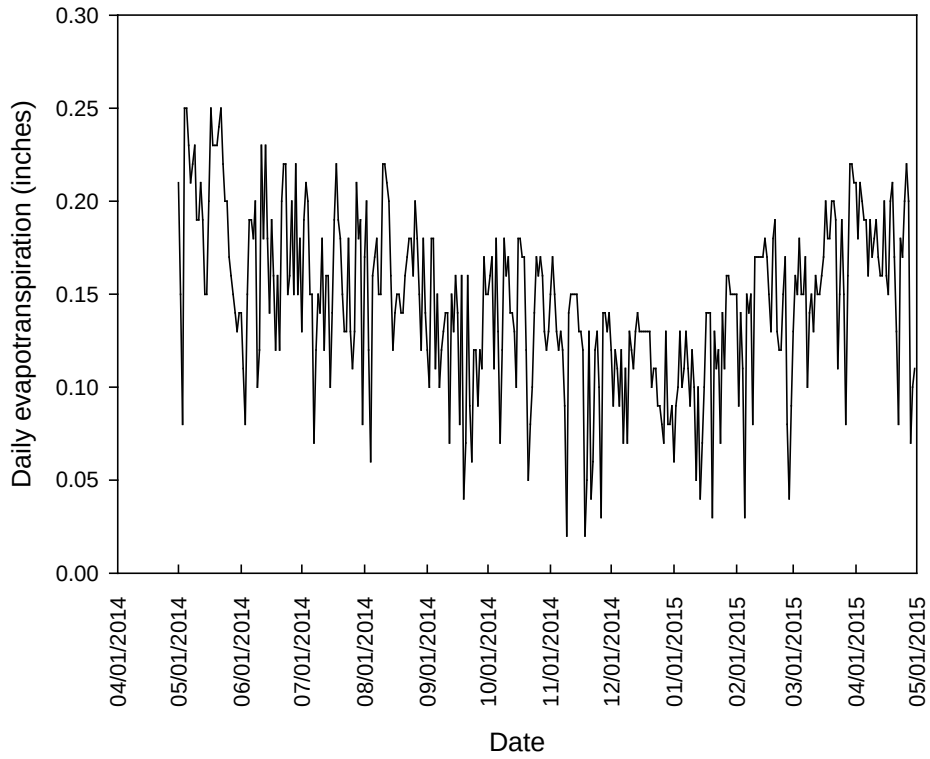

Figure 5. Daily wetland ETp at the Picayune Strand Restoration Project in WY2015.

FLOWS

Merritt Pump Station (S-488) construction is complete, and operation is expected to begin in June 2015. The purpose of the pump station is to provide water for Picayune Strand wetlands and estuaries for restoration purposes. The S-488 pump station has 3 pumps. Flows will be reported in this appendix in the *2017 South Florida Environmental Report – Volume III*.

GROUNDWATER LEVELS

Groundwater level is monitored at seven stations close to or to the east of Merritt Canal, which are shown in **Figure 6**. The stations sampled are SGT1W5, SGT2W5, SGT2W6, SGT3W5, SGT3W6, SGT3W7, and SGT4W6. Information about these sites is presented in **Table 5**. These stations have been renamed since the permit was issued, and the former names are also provided in the table. **Figures 7** through **13** depict WY2015 water levels and depths at each of the seven stations for the water year. Generally, water levels were below ground level or barely below, except at site SGT3W7. Water levels were lower than in WY2014, reflecting below average rainfall conditions in WY2015. Data used for these analyses are provided in Attachment B.

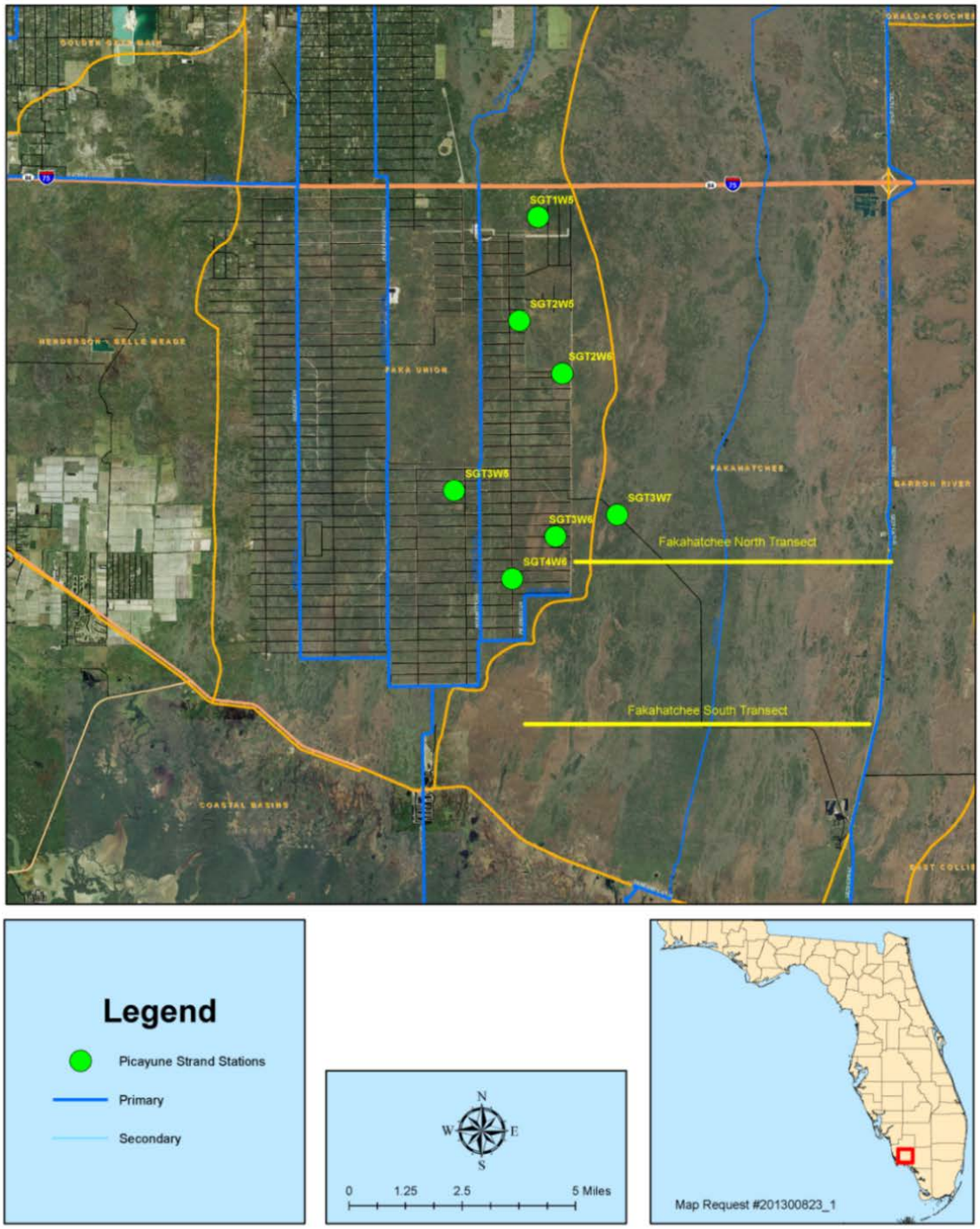

Figure 6. Picayune Strand Restoration Project groundwater level monitoring stations**.**

Table 5. Groundwater level monitoring stations and DBkeys.

DBHYDRO Station Name	Former Station Name	DBHYDRO DBKey	Status	Latitude	Longitude
SGT1W5	SGGE5SW	PT049	Existing	260835.680	812811.048
SGT2W5	SGGE10SW	PT059	Existing	260635.995	812834.490
SGT2W6	SGGE11SW	PT061	Existing	260535.218	812739.212
SGT3W5	SGGE16SW	PT069	Existing	260319.780	812956.813
SGT3W6	SGGE23SW	PT071	Existing	260227.500	812747.200
SGT3W7	SGGE17SW	PT073	Existing	260252.501	812628.314
SGT4W6	SGGE22SW	PT087	Existing	260138.427	812842.013

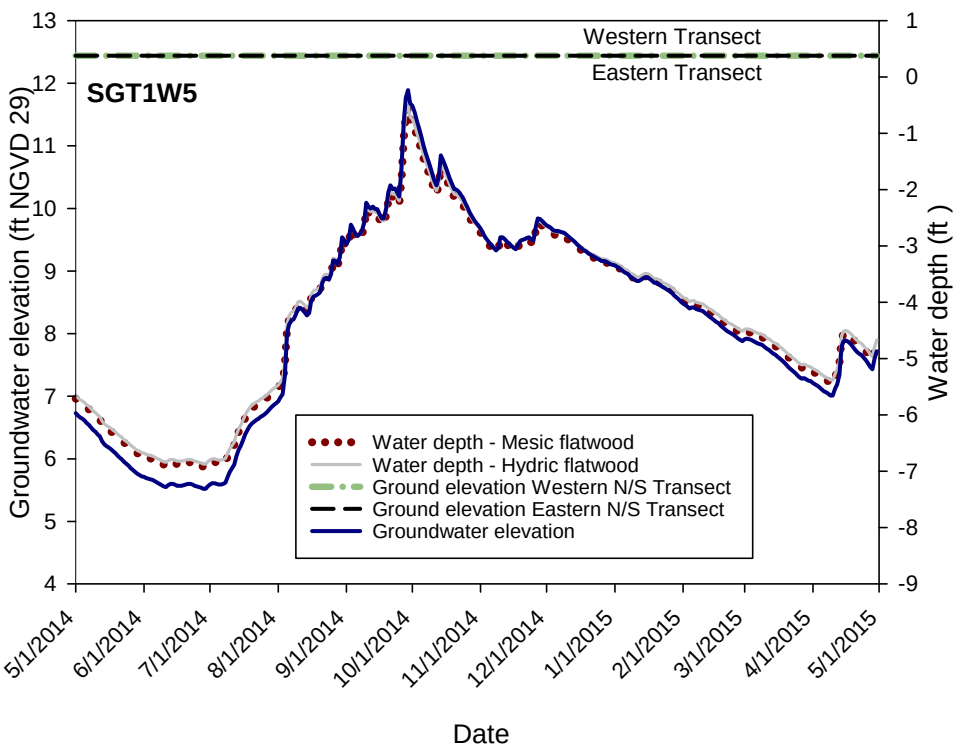

Figure 7. Ground elevation, groundwater elevation, and water depth for well SGT1W5.

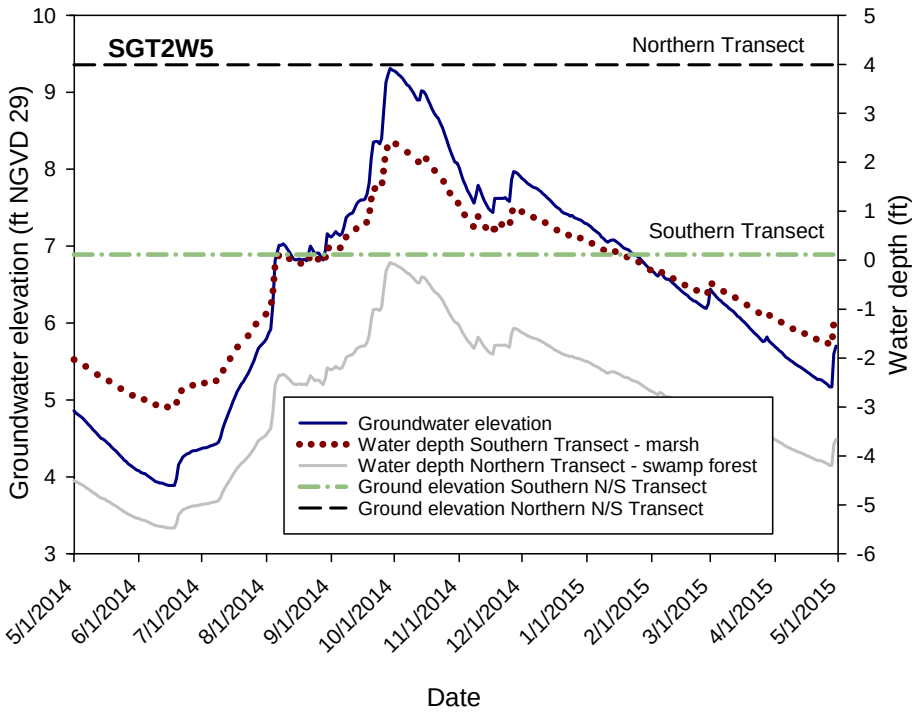

Figure 8. Ground elevation, groundwater elevation, and water depth for well SGT2W5.

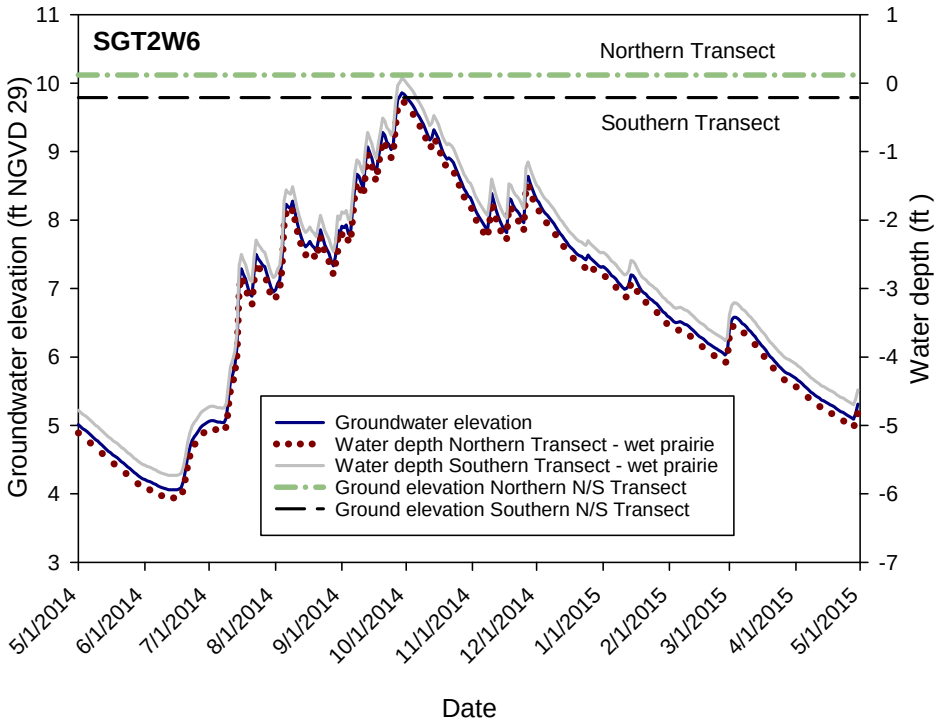

Figure 9. Ground elevation, groundwater elevation, and water depth for well SGT2W6.

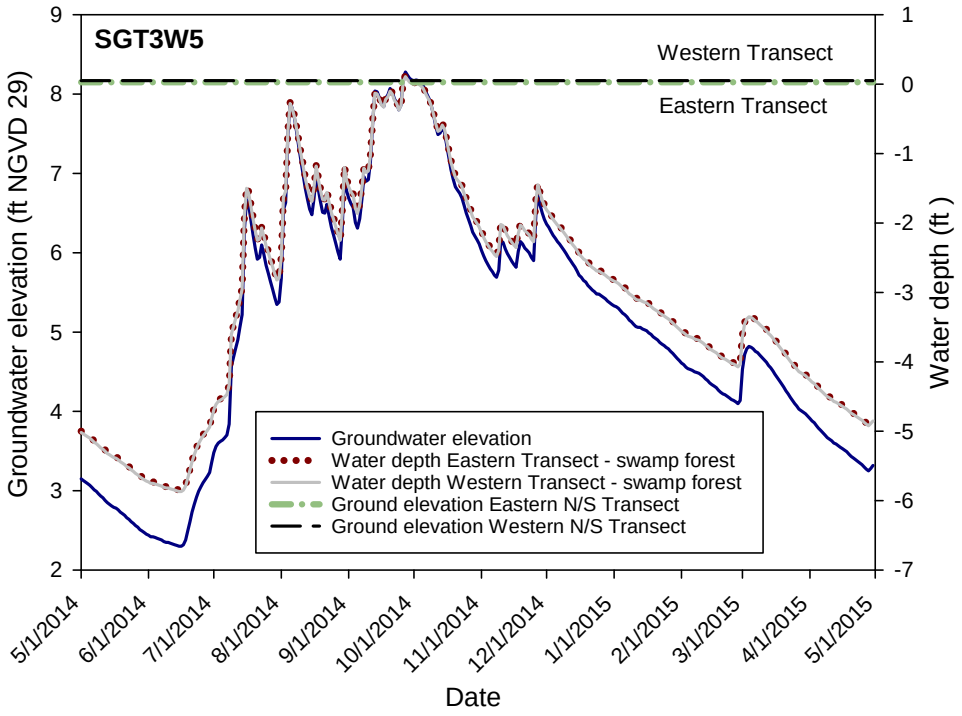

Figure 10. Ground elevation, groundwater elevation, and water depth for well SGT3W5.

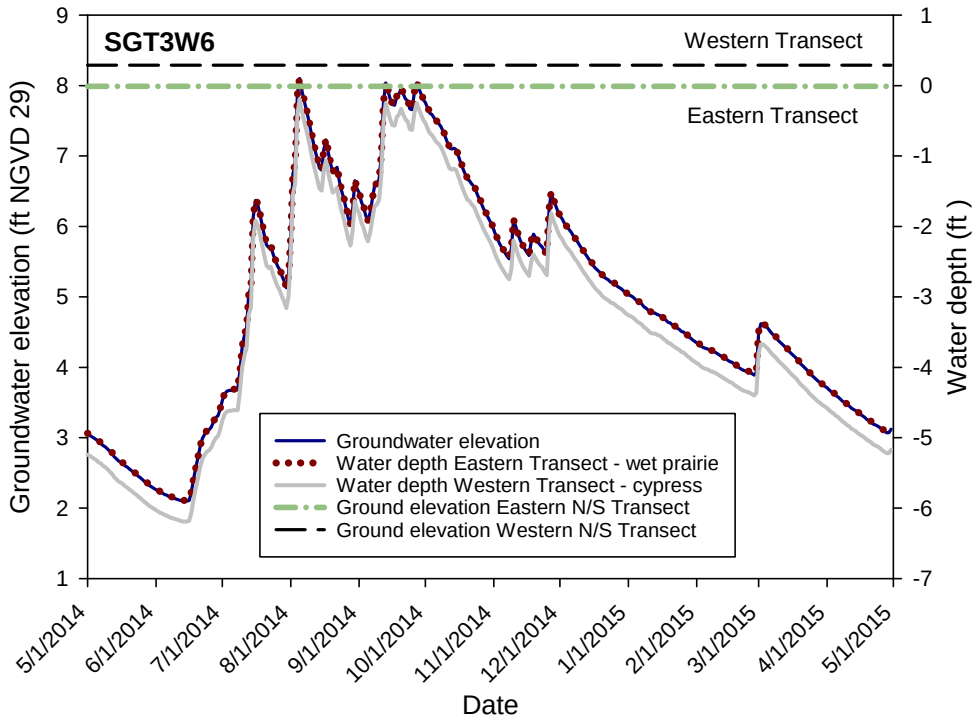

Figure 11. Ground elevation, groundwater elevation, and water depth for well SGT3W6.

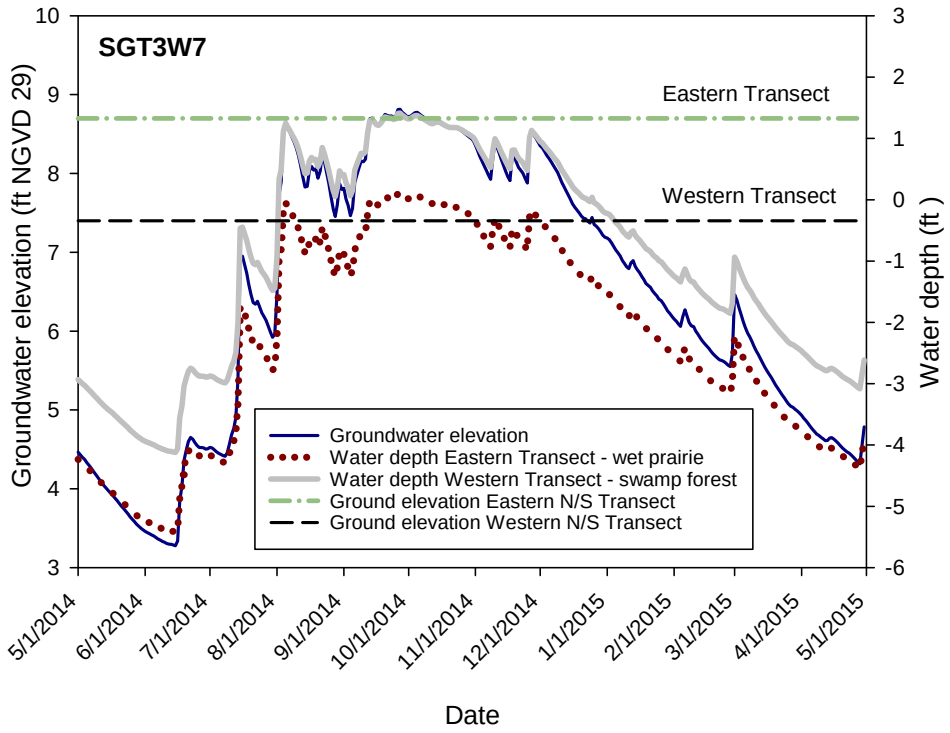

Figure 12. Ground elevation, groundwater elevation, and water depth for well SGT3W7.

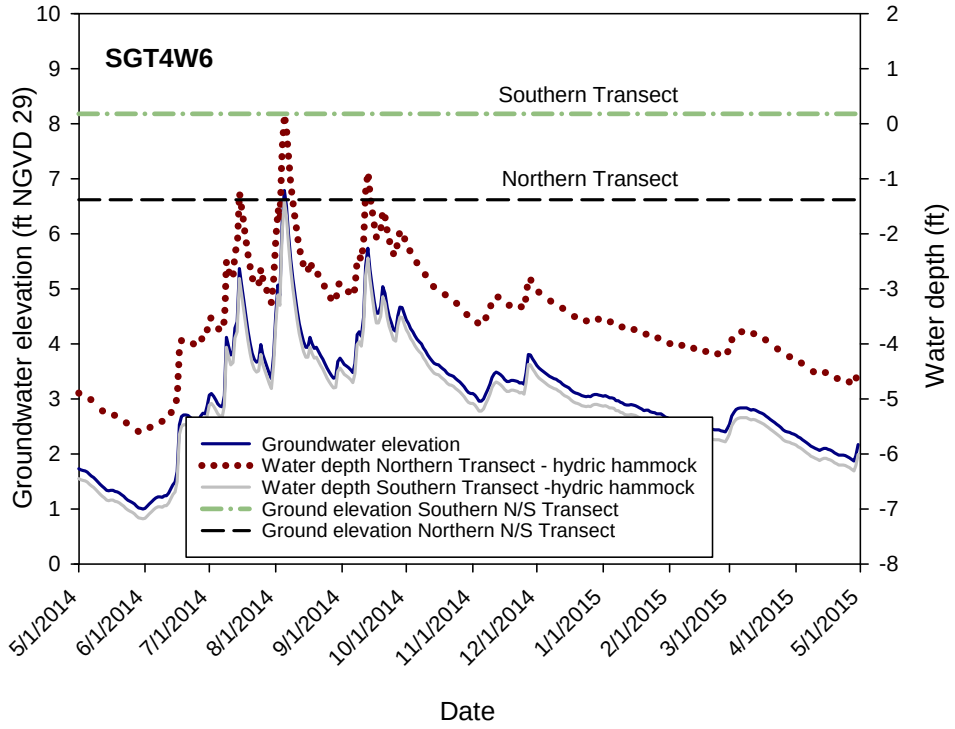

Figure 13. Ground elevation, groundwater elevation, and water depth for well SGT4W6.

EXOTICS MAPPING AND CONTROL

Mapping of exotic and nuisance vegetation continued in WY2015 within the footprint of the filled Prairie Canal, the cleared road and house demolition footprints east of Merritt Canal, and in the soil inversion sites off Miller Boulevard. Exotic control efforts were also conducted during the water year. Detailed information about these mapping and control efforts is provided in Attachment C.

VEGETATION TRANSECT MONITORING

Vegetation transect monitoring is no longer required for the permit. Because no detectable benefits are expected to be realized until after canal filling is completed and water levels have had a chance to assume a natural hydrologic cycle, vegetation monitoring for the Merritt Canal phase will begin in the first wet season following the first full year after the canal has been filled.

WILDLIFE MONITORING

Aquatic fauna monitoring for the Merritt Canal phase will begin in the first wet season following the first full year after the canal has been filled, because no detectable benefits are expected to be realized until after canal filling is completed and water levels have had a chance to assume a natural hydrologic cycle. Monitoring of the other wildlife and estuarine parameters will commence after all three pump stations are operational, the entire Picayune Strand Restoration Project is complete, and one full wet season has ended.

LITERATURE CITED

Abtew, W. and V. Ciuca. 2016. Chapter 2: South Florida Hydrology and Water Management. In: South Florida Water Management District, South Florida Environmental Report - Volume I, West Palm Beach, FL.

USACE and SFWMD. 2004. Comprehensive Everglades Restoration Plan Picayune Strand Restoration (Formerly Southern Golden Gate Estates Ecosystem Restoration) Final Integrated Project Implementation Report and Environmental Impact Statement. United States Army Corps of Engineers, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.

USACE and SFWMD. 2013. Draft Limited Reevaluation Report and Environmental Assessment, Picayune Strand Restoration Project. United States Army Corps of Engineers, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.

Attachment A: Specific Conditions and Cross-References

Table A-1. Specific conditions, actions taken, and cross-references presented in this report for the Picayune Strand Restoration Project (CERPRA permit 0221670).

Specific Condition	Description	Applicable Phase	Action Taken	Reported in 2016 SFER Vol. III, App. 2-1 in			
				Narrative (page #s)	Figure	Table	Attachment
9	Water Quality	Pre-construction and during construction until Prairie Canal is fully filled/plugged	Monitoring was not conducted, because Prairie Canal has been backfilled and water was not flowing at any of the water quality stations during WY2015.	5			
9	Weather: Rainfall and Evapotranspiration	Post-construction	Continuous automatic weather recordings were collected.	6 – 8	3 – 5	3 – 4	B
9	Water Levels at 7 Stations: SGT1W5 (formerly SGGE5SW) SGT2W5 (formerly SGGE10SW) SGT2W6 (formerly SGGE11SW) SGT3W5 (formerly SGGE16SW) SGT3W6 (formerly SGGE23SW) SGT3W7 (formerly SGGE17SW) SGT4W6 (formerly SGGE22SW)	Pre- and post-construction	Continuous water level recordings were collected.	8 – 13	6 - 13	5	B
9	Vegetation Transects	Pre- and post-construction	Vegetation monitoring will commence in WY2017 under a new permit.	14			
9	Wildlife Monitoring	Pre- and post-construction	Wildlife monitoring will commence in WY2017 under a new permit.	14			
9	Hydrologic Improvement	Pre- and post-construction	An assessment of hydrologic improvement was conducted.	2			B
9	Exotic Footprint Mapping and Control	Post-construction	Invasive native and exotic species were mapped and controlled along the construction footprints.	3, 14			C
17	Project Status	All	Project status is provided.	2			

Note: Conditions listed in this table correspond to permit 0221670-008-EM, which was in effect for almost the entire reporting period. Modification 0221670-010 was issued on April 29, 2015, one day before the reporting period ending, and its conditions will be listed in this table in the next annual report.

Attachment B: Hydrologic Data

This project information is required by Specific Condition 9 of the Picayune Strand Restoration Project permit (0221670), and is available upon request.

Attachment C: Picayune Strand Restoration Project – Annual Effectiveness Assessment Summary, November 30, 2014

This report, dated November 30, 2014, was provided to the South Florida Water Management District by The Institute for Regional Conservation under Purchase Order #4500080410. This report covers work completed by the contractor beginning at the end of September 2013 and through November 2014; therefore, it contains information for the previous water year (WY2014), in addition to the water year covered by this report (WY2015).

Picayune Strand Restoration Project – Annual Effectiveness Assessment Summary

Purchase Order # 4500080410

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November 30, 2014

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1.0 INTRODUCTION

The Institute for Regional Conservation (IRC) was contracted (purchase order 4500080410) by South Florida Water Management District (SFWMD) to map exotic and nuisance vegetation within the Picayune Strand Restoration Project (PSRP) and to coordinate exotic control efforts of contractors procured by SFWMD and Army Corps of Engineers (ACOE). For simplification, throughout this report, the term "exotics" refers to nuisance/invasive plants, whether exotic or native.

PSRP is divided into four phases, in order from east to west (and in order of oldest to most recent restoration): Prairie Canal Phase, Merritt Canal Phase, Faka Union Canal Phase, and Miller Canal Phase. The former development of Golden Gate Estates divided the region into blocks of roads with east-west roads labeled by number. Two areas deviate from this pattern, and both are problematic for exotics control: "Broken Wing Ranch" in the northeast corner of Prairie Canal Phase, and the "unblocked" area within northern Merritt Canal Phase. In 2014, exotics control and associated surveys were primarily focused on older restoration phases of Prairie Canal and Merritt Canal, although some treatments have begun in Faka Union Canal Phase, while Miller Canal Phase was included solely for treatments of melaleuca (*Melaleuca quinquinervia*).

This Annual Effectiveness Summary Report for FY 2014 documents the scope and effectiveness of exotic plant treatment efforts by the SFWMD and ACOE contractors. The first part of the results and discussion (section 3.1) documents the weather at the site through reporting period (FY 2014). Weather is an important aspect of exotic species eradication as it impacts the effectiveness of treatments and accessibility for crews. The second part of the results and discussion (section 3.2) explain our assessment of changes in coverage data for exotic and invasive plant species since the previous year's treatments. Each year the surveys are conducted prior to treatments to document cover changes since last treated. Therefore, changes in percent cover discussed in this report are based upon comparison of pre-treatment FY 2013 data vs. pre-treatment conditions documented in FY 2014. In section 3.3, we describe the treatments that were carried out in FY2014 in the different areas of Picayune. The effectiveness of these treatments will be assessed in the next financial year (FY2015).

IRC's contract was intended to run from December 2013 through September 30, 2014. However, due to fiscal issues within SFWMD, the contract start date was delayed to March 2014. During the contract-delay period of December 2013 to March 2014, IRC staff conducted minimum activities to manage exotic-control contractors. This primarily consisted of providing target maps and tracking weekly status by assessing contractors' GPS data and directing crews to target areas. During this period, very little survey of exotics cover was conducted, leading to a significant lag in GIS data collection and processing.

In addition, no ACOE contractor was available to treat the Merritt canal phase, until the rainy season was well underway. Therefore grass treatments of the entire footprint in the

Merritt phase were postponed until October 2014. Because of this schedule, IRC also postponed surveying the northern half of the Merritt phase footprints until September 2014 in order to estimate cover more accurately for herbicide crews.

2.0 METHODS

IRC surveyed and mapped exotics by vegetation type and provided the data directly to the exotic control contractors procured by SFWMD and ACOE. Providing data directly to the contractor represented the most cost-effective method for data transfer. IRC also conducted follow-up surveys to assess effectiveness of treatments. Two geodatabases were utilized: one to record field data and the other to delineate exotic infestations by vegetation type and track treatment.

2.1 FIELD DATA COLLECTION AND GEODATABASE

Annual field surveys were conducted to determine invasive species cover at full recovery post-treatment (i.e., just prior to the next treatment). These surveys enabled the direction of future control efforts and evaluated the success of prior treatments. There are six types of locations surveyed: a) "cleared footprints" including road removal or filled canal areas plus adjacent cleared re-graded areas, b) "tram footprints" including degraded logging trams that typically have piles of vegetative debris in center of footprint, c) former homesites, d) demolition sites, e) rehabilitation sites, and f) "outside footprint". In the Prairie Canal Phase, Brazilian pepper was treated and re-treated once 50' outside the footprint for all of the road and canal footprints, but not for the other phases (Barry 2008). Areas in treatment summaries below which are described as "new footprints" are associated with additional clearing conducted in the Prairie canal phase after initial efforts were completed.

Ground-truthing methodology consisted primarily of vehicle (or bicycle) surveys along road footprints (generally the center), with foot surveys conducted in homesites and in areas outside of the footprints. Tram footprint surveys in 2014 were done by foot, and due to dense shrubby vegetation, were frequently spot-sampled in lieu of surveying the entire length of the tram. Field ground-truthing focused heavily on known and suspected areas of exotic plant species infestations in priority areas set by SFWMD. Remote sensing was utilized to determine areas of suspected exotic plant species infestations, based on similar aerial photograph signatures. These efforts followed general construction schedules for PSRP, relating mostly to time-since-construction/land clearing activities. Therefore, surveys are essentially based on stratified random sampling, covering as many signatures as possible in the field while primarily utilizing the drivable centers of the cleared footprints as transects.

Field data were recorded in the IRC_Master_GDB.mdb geodatabase (ArcView 9.3 personal geodatabase), based on the FNAI Florida Invasive Plants Geodatabase project (http://fnai.org/invasivespecies.cfm), with modifications. Taxonomy for all plant species in the geodatabase follows Wunderlin and Hansen (2011). Percent cover was assessed

using the following cover classes: 1) <1%, 2) 1-5%, 3) 5-25%, 4) 25-50%, 5) 50-75%, 6) 75-95%, 7) >95%. All Florida Exotic Pest Plant Council (FLEPPC) Category I and II species were recorded in the field, as recorded in the FNAI methods (FLEPPC 2011) (http://www.fleppc.org/list/list.htm). Modifications included the expansion of the scope of species mapped, including native nuisance species and some non-FLEPPC-listed exotic species. Additional exotic species, not yet listed by FLEPPC, which have been noted to exhibit invasive behavior in Collier County, included missiongrass (*Pennisetum polystachion*) and signal grass (*Urochloa arrecta*). Additionally, species that may or may not exhibit invasive behavior, such as smutgrass (*Sporobolus indicus* var. *pyramidalis*) and shrubby false buttonweed (*Spermacoce verticillata*) were mapped. These species, along with several other less common species, covered nearly all roadsides prior to clearing in the Picayune Strand project area. These species are monitored to determine if they become established in the "undisturbed" adjacent areas in a manner that would be considered "invasive". Persistent landscape species at homesites were mapped, whether they were FLEPPC-listed or not, in the event these species become a problem in the future. Two native species, cattail (*Typha domingensis*) and common reed (*Phragmites australis*), that have the potential to become nuisance species were also mapped.

Another important departure from FNAI methodology was the incorporation of survey track logs (polyline feature class) with percent cover of dominant exotic species along the track route to strengthen the data set for production of polygon maps. Lastly, additional vegetation type data and additional point data were collected beyond the original FNAI geodatabase scope.

Hand-held Trimble Geo-Explorer and Thales Mobile Mapper GPS units were used in the field for data collection. Both units have ArcPad software and were utilized primarily with one polyline feature class (discussed above) with custom designed data fields with drop-down menus for vegetation type and exotic plant species density/cover codes exported from the geodatabase (IRC_Master_GDB.mdb). Five point feature classes were utilized to further document other exotic species, rare plants, rare or exotic animals, other points of interest, and fixed point photographs. Both GPS units allow for the use of digital aerial photography while in the field to help ensure location of signatures in question.

Polyline data were collected by streaming data by distance (5m). When more precision was needed (<5m) field data were added to the polylines manually while streaming. Each time a new vegetation type or distinctly different exotic species canopy coverage within the same vegetation type was noted, it was entered in the field as a new line segment. Streaming continued until either vegetation type or exotic species canopy coverage changed, at which time the segment was ended. The fields of the associated database were populated accordingly. When more precision was needed, such as narrow (<5m) but distinct vegetation types, manual points (using the 30 point-averaging feature) were taken to assist digitization. Besides vegetation type and canopy coverage of exotics, a comments field was utilized to describe co-dominants to assist in final habitat type determinations for the polygon map. These data were entered in the IRC_Master_GDB.mdb geodatabase in the "field_survey_tracklog" feature class.

While conducting initial surveys of road footprints within the Faka Union and Merritt Phases and logging trams in Prairie Canal Phase, a temporary feature class was created to add fields with drop-down menus to record data for exotics and vegetation types visible in areas immediately outside (adjacent) of the footprints. These data primarily consisted of vegetation type and Brazilian pepper (*Schinus terebinthifolius*) cover and depended on visibility from the trail in the center of the cleared road footprints. These data were processed and added to the 'field_survey_tracklog' feature class, with adjacent habitat data converted to text in the comment field.

Exotic species with less extensive coverage were recorded into a point feature class closely following the FNAI methodology. For example, common species such as Brazilian pepper generally were recorded using the polyline method. Uncommon exotic species, incidental occurrences, and those without distinct patches (i.e., not evenly distributed within a vegetation type), were primarily recorded as points. These species included, but were not limited to cogongrass (*Imperata cylindrica*) and old world climbing fern (*Lygodium microphyllum*). All species noted in the field were incorporated into the polygon map following fieldwork. Additionally, the data was augmented with data downloaded weekly from Garmin GPS units recorded by exotics-control contractors during treatments.

Observations of threatened or endangered plant species were recorded using GPS, as well as notes on abundance, phenology, and host plant (for epiphytes). State of Florida-listed orchids and bromeliads were the most commonly recorded species, none of which were Federally-listed species. These data were entered in the IRC_Master_GDB.mdb geodatabase in the "rare_plant_pts" feature class.

Occasionally, when near the center of a characteristic vegetation type, exotic plant species infestation, or other ecologically significant landscape feature, a fixed-point photograph location was established. These locations were not marked in the field; however, a GPS point was collected and stored in the "Photo_pts" feature class in the IRC_Master_GDB.mdb geodatabase.

Photographs were taken in cardinal directions starting with the north, and then shooting adjacent areas in a clock-wise pattern. Any interesting plants or features were also photographed with a zoom lens. Most photographs were taken in portrait orientation due to the thick vegetation, and additional photographs of the canopy were taken occasionally. Photographs from each fixed point were stored in a separate directory and provided in digital format to the SFWMD.

An additional point feature class was maintained for observations of any other interesting landscape features. This included plant species not previously known from PSRP (but not considered rare in South Florida), as well as other features, such as abandoned camps, junk piles, etc. Narrow vegetation type features requiring more precision than streaming with the polyline were recorded into this feature class. The referenced point feature class averaged 30 location coordinates, instead of simply taking the first location coordinates,

as in the polyline streaming method. This was often employed for small unique vegetation types in areas of poor GPS signal, such as dense canopy areas with high, multipath error. These data were recorded in the "Misc_pts" feature class in the IRC_Master_GDB.mdb geodatabase.

Finally, animal signs or direct observations of rare or exotic animals were occasionally recorded as point data. These generally included visual observations of individuals, burrows, nests, or signs of any significant finds within PSRP boundaries. These data were stored in the "rare_animal_pts" feature class in the IRC_Master_GDB.mdb geodatabase.

2.2 POLYGON GEODATABASE

A polygon geodatabase, PSRP_vegetation_GDB.mdb, was utilized to synthesize exotics survey data from the IRC_Master_GDB.mdb geodatabase in a final format. Annual updates of exotic species cover recorded in this geodatabase reflect full-recovery, post-treatment (i.e., immediately before next treatment) exotic species cover values. The polygon map was digitized manually, initially starting with existing data from Natural Resources Conservation Service (NRCS) vegetation map (Burch et al. 1997) and past maps done by Mike Barry, as a Division of Forestry employee in 2002-2004. These data were used as a base and were modified as ground-truthing progressed section by section. Existing and historical (1940) vegetation types were recorded along with exotics cover data, where possible.

The polygon geodatabase is an on-going work-in-progress, which can be updated and edited over time with the addition of new ground-truthing data. Ground-truthed areas can be viewed as "complete" data, while other areas remain in "draft" data format, until additional data are collected. "Draft" areas have been based on aerial photo-interpretation and extrapolation/interpolation of the closest ground-truthing data. For example, this fiscal year, data taken from road footprints was extrapolated to signatures between roads for the Merritt phase. A 'Yes/No' field was included for all polygons, indicating whether the polygon had been ground-truthed. However, it is important to note that only a portion of the larger polygons with 'Yes' values may have been actually ground-truthed. This is because the Yes/No field is populated after hand-digitizing polygons by selecting polygon records that intersect the field survey track log. If the track log enters a large area of similar signature, it was assumed to be the same, until shown differently with additional field data.

A variety of existing data resources went into the production of the polygon vegetation geodatabase. Aerial photography utilized for this project ranged from infrared to true color, from 1995 to 2012. Black and white photography from the 1940s was utilized for historical vegetation types. As mentioned above, actual GIS data from broader-scale mapping efforts done by NRCS (Burch et al. 1997) served as a base for the development of a more detailed, ground-truthed map. In addition, elevation data processed from 2007 LiDAR data were utilized to delineate polygons. These relatively recent elevation data

have greatly increased the accuracy of the polygons. Finally, aerial sketch mapping data received from SFWMD in 2011 also were utilized to populate exotic cover fields.

All data in the ground-truthing feature classes (points and polyline) were incorporated manually into the polygon geo-database. Large polygons generated from existing NRCS layers and Florida Forest Service (FFS) (formerly Florida Division of Forestry, FDOF) polygons formed the base layer. Subsequently, polygons in ground-truthed areas were further modified, following aerial photograph signatures identified by the field survey track log feature class. Multiple years of aerial photography were examined to assist with signature recognition. The 2007 LiDAR data also were utilized when digitizing polygons to discern differences where aerial signatures were ambiguous.

Fields in the attribute table of the polygon feature class were populated for vegetation types for (i) current conditions, (ii) 1940's or "pre-drainage" conditions, and (iii) percent cover of exotic species. Field notes from comment fields in the field geodatabase were entered into the polygon attribute table when applicable. All point feature classes were examined while digitizing to help identify and populate data fields.

Vegetation types followed the Comprehensive Everglades Restoration Plan (CERP) codes (Rutchey et al. 2006); see:
http://science.nature.nps.gov/im/units/sfcn/docs/Vegetation%20Classification%20-%20v6.15.09.xls.

Any vegetation types not found in the referenced report, but encountered in PSRP during field work, will be proposed for addition to the classification system. Other vegetation classification systems were secondarily designated using crosswalks for the purpose of automatically populating data fields from the CERP codes. FNAI natural communities were provided along with CERP habitat types for each habitat type polygon, following the FNAI natural communities' guidelines (see: http://www.fnai.org/NaturalCommGuide.cfm).

Florida Land Use Cover and Forms (FLUCFCS) were also used, based on FDOT definitions (FDOT 2009), but these general codes were not updated following recent evaluation of the system by Florida Fish and Wildlife Conservation Commission (Kawula 2009). NRCS (Burch et al. 1997) vegetation types were re-populated using the crosswalk originally to populate general (Level 2 or 3) CERP fields in the base layer of the polygon geodatabase. Recent mapping efforts are considering a much more detailed scale even without ground-truthing data.

Existing ground-truthing data were incorporated into the polygon map for a specific area by hand digitizing polygons around signatures, crossed and identified by polylines from the field survey track log feature class. Subsequent digitizing continued outward (extrapolation) from the ground-truthed areas. Therefore, the attribute table was populated with values based on aerial photograph signature interpretation and LiDAR data, according to similarity of the closest ground-truthed polygons. Exotic species

coverage data were entered into the attribute table, according to general similarity and proximity to ground-truthed signatures.

A Yes/No field in the geodatabase identifies which polygons intersect with ground-truthing point or polyline data. As noted earlier, not all areas of all polygons were ground-truthed. When interpreting areas actually ground-truthed, line data should be viewed overlaying the polygon map. Some signatures in areas not ground-truthed (i.e., extrapolated areas) also may have employed lower precision habitat type classifications of the South Florida vegetation classification system, if signatures were less than obvious. As a result, these areas should be identified as important for future ground-truthing efforts when resources are available. Finally, when digitizing and populating fields of the attribute table in areas not yet ground-truthed, areas with signatures that were difficult to discern, often included comments such as "Needs Ground-truthing" or may mention alternative classification system values that may be applicable.

2.3 COORDINATION OF EXOTIC CONTROL CONTRACTORS

IRC was available for onsite orientation of the exotic control contractor upon the initiation of each control effort. IRC was also available as needed for interpretation of maps, plant identification, discussion of priorities, or adjustment of control methodologies during treatments. Survey data in the form of maps and point data were loaded into the contractor's Garmin GPS units to ensure the treatment of all known locations of invasive exotics.

Contractor's progress was tracked by collecting GPS units gathered by the contractor. Any new locations of invasive exotics found by the contractors were also added to the geodatabases. Using the crew's weekly GPS track logs also allowed IRC to go directly to known infestations that lacked track data to determine if the locations had been overlooked, the location simply lacked satellite signal, or if crew members without GPS units had performed the treatment. Spot assessments were conducted in the field randomly throughout the year to ensure ongoing treatments did not miss areas, while treatment crews were mobilized. Emphasis was placed on identifying areas missed by the contractor to allow additional treatment before they demobilized from the area.

2.4 ASSESMENT OF EFFECTIVENESS OF TREATMENTS

Bimonthly Status Reports, including status maps, noting exotic and nuisance vegetation treatment areas have been submitted to the SFWMD. Problems encountered during treatments were discussed, as well as justifications for priorities or actions taken in the field. Lists of exotic and nuisance, vascular, plant species observed within the footprints were prepared using taxonomy following Wunderlin & Hansen (2011). At the end of the fiscal year, final reports have been prepared to summarize treatments and to assess effectiveness of the previous year's treatments.

Annual field surveys were conducted of the contract area to determine invasive species cover at full recovery post-treatment (i.e., just prior to the next treatment) to direct new

control efforts and evaluate success of previous treatments. As much as possible, the field teams re-visited the areas treated in the previous fiscal year. Typically, surveys are accomplished between February and July. However, due to preference for sites to be surveyed shortly before treatment, the seasonality of surveys varies with availability of funding and exotics-control contractors. Therefore, time between "annual" surveys does not precisely correlate to 12 months, and some species may be more or less apparent during various times of the growing season. For this report, timing of 2013/2014 surveys were as follows: Prairie Canal Phase (January 2013 and May 2014); Merritt Canal Phase southern half (April 2013 and June 2014); Merritt Canal Phase northern portion (April 2013 and September 2014); Faka Union Canal Phase (February 2013 initial incomplete). Initial surveys are more time consuming than annual re-visits.

New data were "cleaned-up" in the geodatabase (IRC_Master_GDB.mdb) and then utilized to update the polygon geodatabase (PSRP_vegetation_GDB.mdb, see section 2.2). Exotics cover values for each year have been maintained in the referenced geodatabase. As treatments have continued over multiple years, values have varied less, as target species typically remain at the same low cover values (i.e., maintenance levels). However, lower priority species, which have not been targeted, often require more adjustments.

For the purpose of analyzing data, each exotics cover classes is represented by its median range (i.e. <1% = 0.5, 1-5% = 3, 5-25% = 15, etc.). Comparisons were made and maps produced showing cover by groups of species targeted by control efforts. Combined exotic species cover estimates were made by summing median values of cover classes for each polygon by the designated group in the PSRP_Vegetation_GDB file geodatabase. This gives an overview of where the majority of herbicide and labor was allocated geographically. As discussed in past reports, this method of summing median values can result in overestimates of cover, especially if several exotic species cover <1% and multiple species treated are overlapping (ERM 2013).

To develop a summary for individual exotic species within the study area, cover class median values (i.e., <1% = 0.5, 1-5% = 3, etc.) are multiplied by acreages and tallied by the groupings for subsequent analysis. It should be noted that these coverage estimates are based on many independent locations, or records in the geodatabase. The final sums for acreage by cover class have been compared to previous years. If target species values increased, an effort was made to understand why, and recommendations were made to correct the problem. In some cases, this lead to management decisions to discontinue treatment of specific targets, as current methods were not working, or no alternative methods were possible, given budgetary or other factors.

3.0 RESULTS AND RECOMENDATIONS

This report summarizes work completed by IRC (purchase order #4500074695) and Applied Aquatic Management, Inc. (exotic control contractor to SFWMD) since the end of September, 2013 through November 30, 2014. Trends in percent cover by invasive exotic and nuisance species are presented below (section 3.2) based on areas re-surveyed

this fiscal year by IRC. This section documents the change in exotic plant species cover since last treated in (FY 2013). Foliar treatments focused on exotic grasses especially cogongrass and torpedograss in the Prairie Canal Phase cleared footprints. Brazilian pepper treatments began in the logging tram footprints of the Prairie Canal Phase using ACOE funds, but continued with SFWMD to re-treat the footprints and demolition sites and buffers of the Prairie canal phase and Merritt canal demolition sites. Foliar treatments were not conducted in the Merritt phase footprints this fiscal year. Also presented in this report is work that was briefly initiated in August 2013 at the northern end of the Faka Union Canal Phase and resumed in this fiscal year.

3.1 WEATHER AND WATER LEVELS

Temperatures were generally above average for the year, especially during the winter months and near average during summer months (www.gohydrology.org). Low temperatures did not influence herbicide treatments this year, with the exception of a few patchy mild frost events which prevented treatment of top-killed Burma reed (*Neyraudia reynaudiana*) at road-ends in Faka Union Phase. Due to delays in funding and contractor availability, the bulk of treatments were conducted during summer. Heat indices were regularly over 100 and sometimes over 110. On these afternoons, crews needed extra breaks and progress was very slow. In fact, during late summer when heat and humidity were most extreme, crew members often opted to return home early before reaching their 40 hours for the week, which rarely has happened in the past.

Rainfall data for the PSRP is recorded near Miller and 52nd Ave SE. However, this year rainfall was extremely patchy (personal observation). Instead rainfall totals were estimated from the National Weather Service, Advanced Hydrologic Prediction Service (http://water.weather.gov/precip/). Rainfall for January through November 18th of 2014 is presented over a map of Picayune in Figure 1. Although heavy rains fell over the western half of Picayune, rains largely missed the northeast portion of Picayune, including the Broken Wing Ranch. Furthermore, areas in the Florida Panther National Wildlife Refuge (FPNWR) in the upper portions of the Fakahatchee Strand also experienced substantially below average rainfall.

Water levels in three of the SFWMD monitoring wells in the Prairie Canal Phase (where at least 1 canal has been filled) are presented in Figures 2-4. As would be expected with lower rainfall in the adjacent Fakahatchee strand and FPNWR to the north, all three wells show lower annual water levels in 2014. In fact, only the marsh habitat in Figure 2 showed a period of inundation. Merritt and Faka Union Phases in their current status (prior to backfilling) generally do not flood, even with above average rainfall

Water levels remained low in treatment areas and did not ultimately limit herbicide treatments this summer. However, foliar treatments were postponed because of the potential for afternoon thunderstorms, and crews focused on basal bark treatments of Brazilian pepper and lantana (*Lantana camara*). Water levels remained low in Broken Wing Ranch until mid-September, and never rose out of cypress strands (personal observation).

3.2 OVERALL EXOTIC AND NUISANCE SPECIES COVER

This fiscal year a total of 323 km of polyline data with habitat type and invasive exotic cover were collected and loaded into the field_survey_tracklog feature class of the IRC_Master_GDB.mdb (see Section 2.1). This is slightly more than last year (301 km) (IRC 2013).

To assess effectiveness of exotics treatments, changes in percent cover of exotic species were tracked and compared to pre-treatment cover from 2013. Survey data has the dual purpose of informing the exotics-control contractor of targets or focus areas as well as revealing information about locations that may have been missed or may not have been effectively treated the year before.

Data include re-assessment of a majority of previously treated cleared footprints, recently cleared logging tram footprints, and sampling of demolition sites in the Prairie Canal and Merritt Canal Phases. In the Faka Union Canal Phase, contractors were delayed by weather and unable to treat footprints until late 2013/early 2014, which was several months after surveys. As a result, just before treatment, spot checks of percent cover were made to adjust cover values. Additionally, new GPS data and notes from exotics-control contractors were utilized to augment the data. Surveys of footprints of the Faka Union Phase are planned for fall 2014 in preparation for treatments soon after. Currently, treatments in this phase are 1-2 years behind schedule, depending on the completion time of the actual footprints.

A total of 61 invasive exotic species and two native nuisance species were mapped using points, polylines, and polygons in areas treated as a part of PSRP (mostly in Prairie Canal and Merritt phases). Over 100 species have been recorded thus far and incorporated into the geodatabase for the entire Picayune Strand State Forest. One additional invasive species, centipedegrass (*Eremochloa ophiuroides*) was added to the geodatabase for Picayune Strand State Forest from the work completed to date in FY 2014. This previously undetected species was found on some footprints in the northern Merritt Phase and nearby abandoned home sites where it probably existed in the past but was un-noticed due to cover by other larger exotic species, now much reduced. Several other exotic species, which are not currently listed as invasive species, were documented at the demolition sites, which continue to be the most diverse sources of invasive exotics in PSRP. In FY 2014, many additional locations of invasive exotic species were recorded, totaling 212 new points from IRC survey data, out of the existing Picayune Strand State Forest total of 8,853 points.

Summary data for 2014 is presented as overall cover by species in each area in an effort to focus on overall trends of each species (i.e. increase or decrease) with fewer geographic details. When the overall trend of a species is in fact a gross over-simplification (i.e. when some locations increased substantially and others decreased, but overall cover unchanged) this will be discussed in the text. Presentations of infested acreage by cover class for each area by species and groups of species, as was provided in

previous years (ERM 2013, IRC 2013) will be restricted to treatment summaries and grouped according to target species of the treatment effort (section 3.3).

These data illustrate that we have kept in check high-priority aggressive, fast growing, invasive exotic grass species such as cogongrass and torpedograss, while low-priority species such as those not listed by FLEPPC, continue to spread. Woody species like Brazilian pepper have been increasing steadily between scheduled re-treatments, again illustrating the need for maintenance over the long term. These same conclusions were discussed in previous reports (ERM 2013, IRC 2013).

Of the non-targeted species which have significantly increased over the past years, smutgrass, shrubby false buttonweed, and tanglehead (*Heteropogon contortus*) have increased the most. All of these species are upland species. It is hoped that hydrological restoration will assist in controlling these species in lower, longer hydroperiod areas, however additional work in upland footprint areas may be required for long-term ecosystem health that promotes native species (ERM 2013).

Although widespread increases in coverage of these species is problematic for restoration success, they remain "low-priority" species due to budget constraints. Attempts were made early on to control smutgrass and shrubby false buttonweed, which detracted resources from high-priority cogongrass and torpedograss. In 2010 smutgrass cover began to decrease in wetter areas (Barry 2009, Barry 2010), but rebounded during the following two dry years and increased coverage, even in seemingly manageable isolated treatment areas in the southern Prairie Canal Phase (ERM 2011). Shrubby false buttonweed treatments were discontinued for similar reasons, after experimental treatments on the upper two miles of the Prairie Canal Phase. Tanglehead treatments were also discontinued early on due to identification problems, since this grass species closely resembles the native, desirable native crimson bluestem (*Schizachyrium sanguineum*) when not in bloom (Barry 2008). In summary, considering long term restoration goals, priority has been placed on species most likely to impact undisturbed areas, while accepting that the disturbed footprints may not ultimately be vegetated by appropriate native species, particularly in drier areas, unless budgets and treatment efforts are substantially increased.

3.2.1 PRAIRIE CANAL CLEARED FOOTPRINTS

Data assessment of invasive species within the Prairie Canal Phase footprints is now analyzed in three geographical areas. Two of these areas have achieved "maintenance level" criteria (identified in last year's report) and have thus had maintenance responsibility turned over to Florida Forest Service (FFS). The current proposed plan defines "maintenance level" coverage as having no nuisance native or exotic species that exceed a pre-determined species-specific maintenance level percent cover value for three consecutive years (Appendix I). All species of concern must be below their maximum percent cover values within a block before turning maintenance responsibility over to FFS. Aggressive species maintenance levels are <1% cover, while less aggressive species are <5% cover.

The first proposed geographic area is the upper two miles of the Prairie Canal Phase footprint, totaling 46 acres. This was the first area cleared in 2004, followed by exotic control treatments since 2007, and tracked by IRC since 2008. Much of the area flooded in 2008 which likely helped shape the dominant plant community and limiting Burma reed which formerly dominated the berms in that area (Barry 2009). Currently, a problem area remains along the western edge of the footprint south of 66th Avenue SE which is adjacent to many homesites and has recent disturbed soil associated with fire management by FFS.

The second proposed geographic area is a block that includes east-west roads from 104th through 116th, between Prairie Canal and Patterson Blvd, totaling 210 acres. This area is predominantly marl soils which have far less exotics cover in general. Additionally, the adjacent area has been maintained by a fairly regular prescribed burning schedule since the late 1990's thus keeping Brazilian pepper cover lower. Neither of these two geographic areas had exotics treatments by FFS this fiscal year and no directives from upper level management were given to maintain them (Dexter Sowell, personal communication). It appears no official action to give responsibility for maintenance of these areas to FFS has occurred.

Very little noticeable changes were observed in "maintenance level" geographic areas (Figures 6 and 7, Tables 2 and 3). All high priority species remained below 1% cover. In fact nearly all showed slight reductions; the only exception was natalgrass *(Melinis repens*), which increased slightly in the upper two miles of the Prairie Canal footprint (Table 2).

Outside of the two "maintenance level" geographic areas, higher priority species largely remained below 1% cover in the Prairie Canal footprint with a few notable exceptions (Figure 5, Table 1). Both Brazilian pepper and lantana increased in total cover since last year. These two woody species have not been re-treated since 2009. The increase primarily occurs in persistent problem areas, especially well-drained footprints near Merritt Canal (west of Patterson Blvd), where the effects of hydrological restoration are yet to be realized. Natalgrass now FLEPPC I, also increased above 1%. This species is notoriously difficult to control without multiple treatments per year. Fortunately, it has not aggressively impacted areas adjacent to the cleared footprints. On the other hand, natalgrass proliferates quite well in remnant log piles within tram footprints, which provides a perpetual seed source for adjacent lands.

Both high-priority species cogongrass and torpedograss remained well below 1% overall, with a slight reduction in cover (Table 1). Despite a relatively wet rainy season in 2013 (which favors torpedograss growth), the localized increases in torpedograss coverage were only observed in a few of the perpetual problem areas, such as more recently disturbed areas along Stewart Blvd and just south of Stewart Blvd along Prairie Canal footprint. Most areas remained below previous cover values, and the overall decrease likely reflects both the careful treatments by Earth Balance, Inc. the previous year and the lack of additional ground disturbance activities such as 'touch up' grading and footprint

expansion activities. Caesarweed (*Urena lobata*) showed a substantial drop in cover as measured this fiscal year (Figure 5), likely a reflection of longer hydroperiods observed during 2013 wet season. Many of these areas were in the southern 2/3 of the Prairie Canal Phase.

Several significant exotic species continue to increase and have yet to be targeted in control efforts. Most notably, smutgrass, shrubby false buttonweed and tanglehead are well above 1% overall. Smutgrass, despite the relatively wet year in 2013, actually increased in cover. Other species such as tanglehead , pitted bluestem (*Bothriochloa pertusa*), and a handful of other species have remained largely unchanged or slightly increased. All of these species were prevalent in the roads prior to clearing. The observed decrease in tanglehead this year (Table 1) may reflect a combination of a wet year in 2013, plus 2014 having a potential under-representation due to surveys being done when tanglehead is non-reproductive, rendering the species difficult to identify.

Several lower-priority invasive grass species that thrive in wet, disturbed soils are perpetual problems and will remain so after re-hydration of PSRP. Bermudagrass (*Cynodon dactylon*) was not treated in 2012, thereafter showing a noticeable increase (ERM 2013), then treated in 2013 by Earth Balance, Inc. (EB) who had prior experience with this species, and 2014 surveys show a noticeable decrease in Bermudagrass (Figure 5, Table 1). Thalia lovegrass (*Eragrostis atrovirens*) has increased in distribution, and persists particularly in wet areas of the Prairie Canal footprint. Workers with EB had experience controlling this species and were able to target this species for treatment last year, contributing to a percent coverage decrease when re-surveyed this year. Vaseygrass (*Paspalum urvillei*) was targeted for treatments in previous years and did show a decrease this year when re-surveyed (Table 1). Common reed, a non FLEPPC listed nuisance native species that has been aggressively targeted in past year's foliar treatments, also showed a slight decrease this year.

The upper two miles of the Prairie canal consists of higher ground with less marl substrate, Non-targeted species such as smutgrass and shrubby false buttonweed changed little this year (Table 2, Figure 6). Bermudagrass and thalia lovegrass cover were not reduced as elsewhere (discussed above), however that is because the footprint recently disturbed by FFS had not yet re-vegetated with exotics when EB did treatments.

3.2.2 PRAIRIE CANAL DEMOLITION SITES AND THEIR BUFFERS

Nearly all invasive exotic species remained below 1% (Figure 8, Table 4) when examining overall cover for the combined demolition sites (where actual clearing took place) and their buffers (ranging from heavy past disturbance more than 10 years ago to relatively undisturbed habitat). The most notable exception is Brazilian pepper, which has steadily increased over the past couple of years. At the time of the 2014 survey, it exceeded 5% overall. This year Brazilian pepper was placed as a high priority to survey in the demolition site buffers. The increase in coverage is expected, since the last treatments were 4 to 5 years prior. However it is encouraging that levels are still well below cover when initial treatments were conducted (Figure 8). Brazilian pepper

increased more so in two areas: around abandoned homesites just south of 66th Avenue SE near Prairie Canal, and all areas close to I-75.

Cogongrass cover changed very little overall (Table 4) although cover trends varied geographically. We found no cogongrass in several former intense treatment areas, for example the open field just north of the end of 55th Avenue SE (now the tie-back levee). Very little cogongrass was found in previous problem areas south of 66th Avenue SE. Unfortunately, there was a substantial increase in areas scattered in the woods north of the tie-back levee. Based on these observations, using hand crews to re-treat the Broken Wing Ranch area will be elevated in priority next fiscal year, at least for the northern half.

Some high and moderately high priority grasses increased (Figure 8, Table 4). Natalgrass nearly doubled. Most of this increase occurred in areas were natalgrass recolonized areas intensely treated for other invasive grasses, such as the end of 55th Avenue SE and the end of 62nd (formerly dominated by elephantgrass (*Pennisetum purpureum*)). Natalgrass is showing up at additional homesites. It has not increased in the less disturbed buffers (Mike Barry, personal observation). Burmareed, elephantgrass, and missiongrass all showed a slight increase in seemingly random locations.

Other species such as Guineagrass (*Panicum maximum*) and Caesarweed increased slightly. Guineagrass, restricted to a couple homesites, has been successfully treated according to post-treatment surveys, thus indicating its persistence is likely due to a substantial seed bank (Mike Barry, personal observation). The increased coverage by Caesarweed was primarily in areas that burned last year. However, the increase was not nearly as dramatic as observed after wildfire in 2011 (ERM 2011). Perhaps the wetter conditions in 2013 prevented a large increase.

The non FLEPPC-listed species smutgrass and shrubby false buttonweed both increased since last year's survey, as they generally have since 2008 (Table 4). Smutgrass quite substantially increased, primarily in disturbed locations. Most homesites are on higher ground and thus will not have the benefit of upland exotics being controlled by hydrological restoration. It is becoming clear that without treatments, smutgrass may persist over the long term at disturbed sites on higher ground. That is of particular concern for cleared road footprints north of the tie-back levees and on higher ground.

3.2.3 MERRITT CANAL CLEARED FOOTPRINTS

The footprints of the Merritt Canal Phase were surveyed this year at two distinct time periods. Footprints south of the un-blocked area were surveyed in the spring of 2014, as they had in the past. Due to scheduling delays of the exotics-control treatment, northern footprints were surveyed in September 2014, which means the data reflect two rainy seasons since prior survey in April 2013. Both survey events were lumped together to simplify analysis. The northern areas have always had more coverage by exotic species.

From lessons learned during Prairie Canal Phase, the first treatments of the Merritt Canal Phase targeted high priority grass species of cogongrass and torpedograss within the cleared footprints as well as adjacent patches of cogongrass. Thus far we have been successful in keeping total cover well below 1% and levels have been fairly stable for the last two years despite many areas having two growing seasons between treatments (Figure 9, Table 5). Torpedograss, which thus far has been fairly isolated, has also been maintained at lower values through diligent survey and treatments.

There has been no treatment of woody species. Brazilian pepper cover has increased steadily since the first survey in 2012 and now at 4.3% (Figure 9, Table 5) is, well above the target cover of <1% (Appendix I). Lantana follows a similar trend, now at 3.4%. Leadtree (*Leucaena leucocephala*), although well below 1%, had increased substantially adjacent to demolition sites where it formerly dominated. The densest Brazilian pepper occurs east of DeSoto Blvd. and north of 122nd Avenue SE, mostly in areas where Brazilian pepper covers greater than 75% of the sections between the cleared footprints. Serious consideration should be made for budgeting basal-bark treatment of invasive woody species in cleared footprints. Heavy concentrations of Brazilian pepper in areas north of the tie-back levee are of particular concern since, especially near I-75, and these areas are very important to the Florida panther (*Felis concolor coryi*) and the Florida Panther National Wildlife Refuge has expressed concern for management in these locations (Ben Nottingham, personal communication).

Natalgrass has continued to increase, despite sporadic treatments, and now approaches 2% overall (Figure 9, Table 5). The heaviest infestations are north of the unblocked area mostly north of the tie-back levee, however some areas just below the un-blocked area west of DeSoto also occur. Because this is a FLEPPC category I species that continues to increase, it is being targeted as high priority in foliar treatments recently initiated within the Merritt Phase (not summarized in this report).

Guineagrass and missiongrass both have increased considerably, mostly north of the un-blocked areas. Both of these species occurred pre-construction in heavy concentrations near what is now the Faka Union pump station. Clearing and re-grading in this area was recently completed, and is now being heavily colonized by these two species. These species will likely remain a challenge on higher ground and above the tie-back levee and may require multiple treatments per year.

Several treated grass species have been held at bay. Bermudagrass remained well below 1% and did not show an increase since 2013, despite the fact that seed was included in the planting mix for stabilization the tie-back levee. Vaseygrass, still below 1%, is slowly trending upwards, much like it did in the Prairie Canal Phase, as it continues to pop up in almost every footprint. Common reed has remained well below 1% and holding steady. Burmareed, also below 1%, has continued to trend downward indicating success of treatments.

Caesarweed has not been systematically treated. Despite the lack of treatments, cover has been trending downward, now at 3.4% (Figure 9, Table 5). A considerable seed

source persists in these areas and infestations are expected to flare following any future fire or disturbance. Prolonged flooding can assist in controlling this species, thus the Merritt Canal backfill should be helpful.

Cover by non-listed species such as smutgrass, shrubby false buttonweed and tanglehead continues to be a serious concern for much of the Merritt Phase footprints, especially north of the unblocked area and more so north of the tie-back levee where no increase of hydroperiods is expected. No treatments have been conducted on these species within the Merritt Phase footprints. Tanglehead (7% cover) and shrubby false buttonweed (4% cover) both showed a decrease since 2013 (Figure 9, Table 5). Tanglehead is the dominant vegetation in some footprints north of the tie-back levee. Smutgrass now exceeds 10% cover, doubling since 2012. The dominance of many footprints north of the unblocked areas is a culmination of several factors that resulted in smutgrass being abundant pre-construction: a) roads, b) homesites with extensive disturbance surrounding them, and c) cattle ranching (grazers dislike smutgrass, thus increasing its presence). Unless conditions drastically change, or treatment budgets are more than doubled, these species, especially smutgrass, will likely remain as the dominant cover in the footprints north of the unblocked area indefinitely.

3.2.4 MERRITT DEMOLITION SITES AND THEIR BUFFERS

As was learned from the Prairie Canal Phase, it is imperative to treat areas surrounding demolition sites, as well as former homesites or camps. Nowhere is that line between 'intact' woods and disturbed homesites more vague than in the unblocked areas of the Merritt Phase. Multiple factors make the unblocked area difficult to restore: a) drainage effects have been severe near the Faka Union canal, b) human disturbance was severe near the former rock quarry (now the Faka Union pump station), c) there remains a multitude of abandoned trails, fire breaks, large and small borrow pits, camps, trash piles, corrals, and disturbed areas connecting the former homesites, and d) cattle leasing (which results in increased smutgrass coverage) continued after FFS took over management of the region.

As a result, the 5,260 acres of the unblocked area in the Merritt Phase are a serious obstacle to restoration success and needs to be treated. The worst areas are in the northern portions, and in 2010 treatments began, covering 441 acres. In 2012 and 2013 more initial treatments, as well as re-treatments were conducted. In 2013 we reported data for the entire unblocked area. Subsequent budgets were insufficient to expand initial treatment areas, or re-treat. It is well known that for most exotic plant species, persistent follow-up treatments is essential for success, thus the insufficient funding for retreatment appears as an erroneous oversight on minimizing costs and meeting our long term goals.

For this report, we analyzed the 1,225 acres that had at least one treatment between 2010 and 2014. Only 441 acres were treated and mapped in 2010, and mapping for the rest of the 1,225 acres was not completed until 2012. Due to the significant difference in mapped acres for 2010, our data focus on changes for 2012, 2013, and 2014, particularly for trends in invasive exotic cover.

Considering 2010-11 data are excluded from the analyses (Figure 10, Table 6), the 2012 cover levels may be misleading for some species diminished during 2010 treatments of the 441 acres. This is particularly true for leadtree, which is unevenly distributed, and one of the largest patches was included in 2010 treatment. Low coverage in 2012 reflects effective prior treatment, while gradual increases to levels recorded in September 2014 levels reflect the lack of follow-up treatment.

Brazilian pepper cover was 4.4% in 2012, followed by additional initial treatments (and few retreatments) that resulted in 2.5% cover in 2013, and followed by a year with little or no retreatments that resulted in 3.0% cover in 2014. Again, if all Brazilian pepper had been mapped in 2010, it would have had been the highest cover level yet. It is clear that the significant threshold of 5% will be reached in the next year or two without retreatments, keeping in mind the goal is <1% cover for Brazilian pepper within footprints (Appendix I).

Cogongrass has been aggressively treated, first at several large patches at homesites within the first 441 acres treated in 2010, then throughout the rest of the total 1,225 acres, including several enormous patches, along with many acres of lighter infestation. The trend since 2012 has been fairly stable (Figure 10 and Table 6). With constant vigilance, many of the patches in the first 441 acres treated were completely gone when surveyed in 2014, however, the rest of the areas actually increased, albeit not back to pre-treatment levels.

Natalgrass, Guineagrass, and missiongrass all showed reductions following initial treatments, but have since increased (Figure 10 and Table 6). Natalgrass has basically been increasing at most of the homesites as Brazilian pepper, leadtree, and cogongrass treatments have left voids to fill (Mike Barry, personal observation). Guineagrass and missiongrass seed banks persist, particularly near former homesites. If new soil disturbance occurs in these areas, such as the 2013/14 construction activity for the Faka Union pump station and tie-back levee, these species show explosive recolonization. Aggressive treatment schedules, perhaps two or more treatments per year, will likely be necessary to control all three of these species. Burmareed has also increased in a similar manner, as well as, popping up in demolition site buffer areas.

Smutgrass, shrubby false buttonweed and tanglehead have remained fairly stable, with a slight increase in cover by smutgrass (Figure 10 and Table 6). Cover has been approximately 10% for smutgrass, which includes dense coverage at homesites, and areas of lower cover likely due to the combination of drainage, trails/firebreaks, and cattle grazing. No treatments have been conducted on these species. Without treatments these species are expected to increase in higher-elevation areas and areas north of the tie-back levee.

3.2.5 LOGGING TRAM FOOTPRINTS

Exotic species cover in the logging trams of the Prairie and Merritt Canal Phases is primarily Brazilian pepper, other woody species and Caesarweed. These areas do not have as much exotic grasses as the other areas likely due to their location in mostly forested ecosystems and the relatively narrow footprint (~20m). Most of these trams were completely choked with woody vegetation, often Brazilian pepper and dense canopy cover from cypress (*Taxodium ascendens*) and laurel oak (*Quercus laurifolia*) making it inhospitable for most sun-loving exotic grasses. Another significant feature of cleared logging trams is the remaining log piles and vegetative debris in the center of each tram.

Data from logging trams in the Faka Union Phase are not presented in this report as surveys are incomplete. Initial impressions are that Faka Union trams differ from Merritt and Prairie Canal trams. Due to more severe drainage and catastrophic fires, the Faka Union trams had pre-restoration conditions that were more open, with large cogongrass patches established in and around them.

Trams in the Merritt and Prairie Canal phases have been surveyed 3 times starting in 2012. Because of the woody vegetation, some of these areas were quite difficult to access. It should be noted that this year IRC often sampled only portions of the trams where Caesarweed was dominant because of the potential for seed dispersal. In these cases data was collected from either side of the thickets and extrapolated through the centers in the polygon maps.

Caesarweed accounts for the greatest cover percents of exotics in the logging trams of the Prairie and Merritt Canal Phases (Figures 11 and 12, Tables 7 and 8). Thus far crews have not targeted this species systematically. Considerable acreage with concentrations in the 75-95% range were documented in initial surveys, particularly in the higher-elevation areas. Unfortunately, the first couple of years following clearing were exceptionally dry summers, so flooding did not control seedling establishment (ERM 2012). Overall cover in 2012 and 2013 was in the 20-30% range (though on the ground it is very patchy). This year trams in both phases trended downward to below 20%, despite the lack of herbicide treatments. This may be a result of the wetter summer in 2013 or simply a gradual reduction associated with time since disturbance (the clearing) and gradual shading out by other species. Regardless, a large seed bank is expected to persist and to re-emerge when conditions improve, such as after a fire.

Brazilian pepper and lantana were the next most significant exotic species in the trams (Figures 11 and 12, Tables 7 and 8). Unlike Caesarweed, they have trended upwards, as is typical for woody species starting essentially at zero. Brazilian pepper cover in trams has exceeded the <1% threshold (Appendix I) from the beginning, differing from road footprints. This is likely because these narrow footprints are flanked by dense Brazilian pepper, and this species readily gets established on the residual log piles, and some Brazilian pepper rootstock survived the clearing process and have since re-sprouted (Mike Barry, personal observation). Both lantana and Brazilian pepper cover increased substantially in 2014, and in the Prairie Canal Phase overall cover has exceeded the 5%

threshold for Brazilian pepper, although several locations in both phases exhibit coverage that exceeds 50%. Brazilian pepper and lantana were in fact treated following these surveys in the Prairie Canal Phase this year (section 3.3.2 below) and will need to be done soon in the Merritt Phase as well.

Other exotic grasses found in the trams include cogongrass, Burmareed, Guineagrass, vaseygrass, missiongrass, tanglehead, and natalgrass, all less than 1% (Figures 11 and 12, Tables 7 and 8). Cogonrass was limited to isolated patches in the Merritt phase and has trended downwards due to aggressive treatments. Very little cogongrass was found in trams of the Prairie Canal Phase, and all were very small infestations which have been treated and re-treated. Vaseygrass is more evenly distributed, and overall cover still remains low. Natalgrass thrives on the residual log piles and is likely to increase coverage over time. Smutgrass cover approaches 1% in the Prairie Canal Phase trams and exceeds it in the Merritt Canal Phase trams (where it is higher and drier).

3.3 EXOTIC CONTROL TREATMENTS WITHIN PSRP SINCE NOVEMBER 2013

This report summarizes work completed by Applied Aquatic Management, Inc. (AAM), exotic control contractor to SFWMD and ACOE during this time period, since the end of November, 2013 through October 30, 2014. Additional foliar treatment of high priority grasses was initiated in October 2014 by EB in northern Merritt Canal Phase footprints, but is not summarized in this report because it is ongoing. No re-treatment of soil rehabilitation sites were conducted this fiscal year.

In last year's report (IRC 2013) we had recommended foliar re-treatment of select species for all cleared road and canal footprints as highest priority. Foliar treatments of the cleared road footprints were partially completed for Faka Union and Prairie Canal Phases, and not initiated in the Merritt Canal Phase. Because AAM had a sizable hand crew available during the summer (and water levels remained low), efforts were diverted towards basal-bark treatments of Brazilian pepper and lantana. AAM's efforts are summarized below.

Over $600,000 is estimated to have been spent on nearly 6,000 acres of coverage by treatments (Table 9). It was difficult to separate costs by task this year because of crews multi-tasking as described below in detail. As a result some task costs are not available in Table 9.

3.3.1 FOLIAR TREATMENTS WITHIN FAKA UNION CANAL PHASE

Work funded by ACOE was initiated in footprints at the northern end of the Faka Union Canal Phase footprints last fiscal year the week of 8/5/2013 to 8/11/2013 but was cut short due to regular afternoon thunderstorms. Treatments were reinitiated 11/4/2013 (week ending 11/7/2013) and continued to 12/13/2013, but were not summarized in last year's report (IRC 2013). Work was still incomplete but AAM did not have crews available at that time. Next, work began again on 2/17/2014 (week ending 2/20/2014)

from where they had left off in December and continued to 3/13/2014, wrapping it up for the fiscal year 2014.

AAM crew conducted foliar treatments using glyphosate with imazapyr in the road footprints off Everglades Blvd., starting at the north end by I-75 and moving southward. Treatments focused on exotic grasses especially cogongrass and Burmareed, but also missiongrass and vaseygrass were targeted. Jaraguá (*Hyparrhenia rufa*) was targeted from August to December down to 68th Avenue SE.

A total of 867 acres were treated between I-75 and 80th Avenue SE on both sides of Everglades Blvd (Table 10, Figure 13). The footprints treated in this period were some of the most heavily infested with invasive exotic grasses in PSRP. Specifically, the east ends of the roads from 68th Avenue SE to 74th Avenue SE were nearly 100% by high priority grasses such as Burmareed and missiongrass. Cogongrass also dominated areas of the footprints, especially where large solid patches existed adjacent to the roads. Of the 867 acres treated, roughly 37 acres consisted of percent cover of combined targets >50% (Table 9).

Weather influenced this effort only a little. First, due to a patchy frost, crews were unable to treat all dense Burmareed at the ends of 70th Avenue SE and 72nd Avenue SE because some were brown and top-killed, mostly at the end of 72nd Avenue SE. Also, to keep the AAM crew working towards the end of the treatment period when fairly windy conditions occurred in the open east-west road footprints, crews instead treated the narrow, more protected logging trams and in some cases began treating the large cogongrass patches in the woods adjacent to the road footprints.

Furthermore, several roads were still in the process of being graded and thus not treated. This includes 58th Avenue SE through 66 Avenue SE where only a narrow swath was covered by AAM. Additional grading work was ongoing, especially for the tie-back levee at 66th Avenue SE and to roads south of Stewart Blvd. A great deal of work remains in the cleared footprints of the Faka Union Canal Phase, with a sizeable backlog of work.

3.3.2 BASAL-BARK TREATMENTS WITHIN LOGGING TRAM FOOTPRINTS OF THE PRAIRIE CANAL PHASE

During the period of February 3, 2014 to March 18, 2014, AAM conducted basal bark treatments of Brazilian pepper and lantana using Garlon 4 in the logging tram footprints of the Prairie Canal Phase. Work began south of Stewart Blvd and continued northward until funds were exhausted at 84th Avenue SE and Patterson Blvd (Figure 14). Patchy frost occurred during this time period, but had minimal influence on treatments.

Additionally, treatments were conducted in higher-elevation areas (identified using LiDAR) adjacent to trams. These areas were treated for several reasons. First, dense Brazilian pepper occurred adjacent to these trams. Second these areas included tropical hardwood hammocks with several less common and desirable tree species including

plants such as chiggory grapes (*Tournefortia hirsutissima*), (State Endangered), and satinleaf (*Chrysophyllum oliviforme*), (State Threatened). Third, these high spots will not likely see reduction in Brazilian pepper after hydrological restoration.

A total of 401 acres were treated (Table 11). This includes 133 acres of logging tram footprints, 32 acres of 50' buffer of road footprints (re-treatment), and 236 acres adjacent to trams, or in some cases a continuation of trams where the tram remains uncleared due to archeological sites. In the logging trams most of the acreage consisted of 5.2 acres of <1% cover, 52 acres of 1-5% cover, and 66 acres of 5-25%, and 7.3 acres of 25-50% combined Brazilian pepper and lantana (Table 11). Outside the tram footprints consisted of areas with higher percent cover including 74 acres of 5-25% cover, 38 acres 25-50%, 29 acres at 50-75%, and 24 acres of 75-95% cover.

3.3.3 MELALEUCA TREATMENTS WITHIN PSRP

From March 19, 2014 to June 11, 2014 AAM crews worked to treat Melaleuca primarily in the long blocks between 68th and 64th west of Miller Blvd but also in a couple of locations to the south off Miller Blvd and into the edge of the Belle Meade tract (Figures 16 and 17). Funding for this effort was originally from FWC IPMS but administered through SFWMD.

A total of 515 acres were treated (Table 12). The majority of the time (through early June) was spent hand-treating dense patches of multiple stemmed resprouts from trees previously treated (Figure 16). This effort totaled 158 acres, with roughly 38 acres of short multiple stemmed individuals covering greater than 50% (Table 12). These patches were burnt over, frozen back, damaged by insects, but still covered much of the ground. A sparse coverage of native groundcover persists. Considering the wet 2013 summer which may have contributed to the rapid re-growth of Melaleuca observed in one year, it raises questions about the capacity of bio-control agents to control Melaleuca after hydrologic restoration is attained.

Similar areas were treated by hand in previous years, but at a smaller scale and as a method test. On re-inspection areas had responded very well to this type of treatment and a high diversity of appropriate native species had re-colonized the area (Mike Barry, personal observation). This was a stark comparison to areas treated ten years ago using aerial application of velpar where only weedy natives or in some cases cogongrass had colonized. These results justified the high labor cost of hand chopping the multiple stemmed Melaleuca thickets.

When these patches were completed, the AAM crew was re-located to the Belle Meade adjacent to PSRP (Figure 17) in areas where red-cockaded woodpeckers (*Picoides borealis*) were known to occur. A total of 357 acres were treated, beginning with dense multiple stemmed patches, and the crew was successful at significantly improving the habitat for these Federally Threatened woodpeckers. The majority of the acreage covered consisted of less than 5% cover by Melaleuca with 63 acres at 5-25%, 4 acres at 25-50%,

2 acres each for 50-75% and 75-95% cover (Table 12). Treating this area is important to reduce seed source for the adjacent PSRP.

3.3.4 FOLIAR TREATMENTS WITHIN PRAIRIE CANAL PHASE

Foliar treatments in the Prairie Canal Phase started May 13, 2014, using SFWMD funds, covering known previously-treated areas of torpedograss in the general vicinity of Stewart Blvd intersection with Prairie Canal and near Patterson Blvd, as well as the canal footprint south of Stewart Blvd. Some crew members were simultaneously sweeping the areas for hardwoods such as Brazilian pepper (section 3.3.5 below).

Approximately 1,379 acres were swept for exotic grasses in the Prairie Canal phase from May 13, 2014 to June 4, 2014 (Figures 18 and 19, Table 13). About 9.4 acres were treated outside the footprint targeting adjacent cogongrass patches south of Stewart Blvd. This includes just under 2 acres with >50% cover primarily of cogongrass and were targeted to remove the few isolated patches in this general area. This included some work in the areas considered to be at "maintenance level" along the east-west roads 104th through 116th and E of Patterson Blvd (Section 3.2.1) because FFS had no plans in the near future to treat the area (Dexter Sowell, personal communication).

Approximately 1,247 acres, or the majority of the footprint areas covered by the AAM crew, were less than 5% cover of combined primary targets (Bermudagrass, cogongrass, Burmareed, torpedograss, guineagrass, common reed, and vaseygrass). In the moderate cover range there were 3 acres of 25-50% cover and 17 acres of 5-25% cover inside the footprint. Most of this moderately-high cover acreage was found around Stewart Blvd and along Patterson Blvd from Stewart Blvd northwards to 90th Avenue SE and consisted primarily of Bermudagrass and torpedograss. The crew continued northward to 66th Avenue SE, then shifted to only treating Brazilian pepper and lantana because afternoon thunderstorms were becoming more frequent in early June.

3.3.5 BASAL-BARK TREATMENTS WITHIN ROAD AND CANAL FOOTPRINTS OF THE PRAIRIE CANAL PHASE

During the period of May 13, 2014 to August 7, 2014, AAM conducted basal bark treatments of Brazilian pepper and lantana in the road, canal and logging tram (those not completed with ACOE funding) footprints of the Prairie Canal Phase using SFWMD funds. (Figures 20 and 21). This treatment was elevated as a priority due to AAM hand crew availability and weather. Some crew members were simultaneously sweeping the areas for high priority exotic grasses such as cogongrass and torpedograss (section 3.3.4 above).

Approximately 1,618 acres were treated (Table 13). Of this total acreage, only 39 acres included retreatments in the 50' buffer outside the footprint. Because of limited budget the crew generally stayed within the cleared footprints. Most of the acreage treated in the footprint was low cover, with 757 acres of zero and <1% cover by Brazilian pepper and lantana. About 210 treated acres of 5-25% cover, 37 treated acres of 25-50% cover, and

<1 treated acre of 50-75% cover. The areas with greater than 5% cover included very few areas south of Stewart Blvd such as 114th Avenue SE west of Patterson Blvd (Figure 20). The bulk of the more heavily infested footprints were north of Stewart Blvd including 88th, 80th, and 79th Avenues SE east of Patterson Blvd, and 76th through 70th Avenue SE west of Patterson Blvd, and both sides of Patterson Blvd from 68th Avenue SE northward (Figure 21). Higher percent cover was found on some of the new footprints cleared along existing woods heavily infested with Brazilian pepper, and these were treated.

Additionally, to be efficient with crew staging and management, about 50 acres of logging trams north of 80th Avenue SE were treated. This allows tram and road footprints re-treatments to be scheduled together in the future. Approximately 10 acres of logging tram were recorded as 5-25%, just over 2 acres of 25-50% cover, and about an acre of 50-75% cover were treated (Table 14). No work was conducted in adjacent areas outside the footprints, but in order to keep these relatively narrow tram footprints free of Brazilian pepper, it will be necessary to treat the surrounding woods in the future.

3.3.6 BASAL-BARK TREATMENTS WITHIN DEMOLITION SITES AND THEIR BUFFERS OF THE PRAIRIE CANAL PHASE

Brazilian pepper and lantana were treated from July 8th, 2014 to September 25, 2014 at the Broken Wing Ranch in Prairie Canal Phase (Figure 22). Work began near 79th Avenue SE and Prairie Canal in order to complete the lowest lying areas first, as the rainy season had already begun. Because of the frequent afternoon downpours, and other logistical issues, AAM has only conducted basal bark treatments and not conducted any priority grass treatments in the Broken Wing Ranch area at this time.

Despite the onset of the rainy season, water levels remained low through September, allowing treatments with Garlon 4 to be conducted throughout all summer months. Patchy afternoon thunderstorms continually missed the Broken Wing Ranch area. In fact, 90 day precipitation analysis (departure from average) from National Weather Service (http://water.weather.gov/precip) taken in July showed that The Broken Wing ranch area and adjacent areas on Florida Panther National Wildlife Refuge and Fakahatchee Strand Reserve State Park has received much less rainfall than surrounding areas, mostly in the 4-8 inch deficit range relative to average (Figure 1). In contrast, just to the west and northwest, areas were over 12 inches above average and only less than 5 miles away. In addition, the water control structures in the nearby Merritt Canal had been kept open to facilitate work on that canal (Ron Turchin, personal communication).

A total of 1,740 acres were re-treated using basal-bark and cut-stump (smaller individuals) application of Garlon 4 targeting Brazilian pepper and lantana (Table 14). In addition, a few widely scattered leadtree and woman's tongue (*Albizzia lebbeck*) were also treated at some of the demolition sites using a higher concentration of Garlon 4. Most of the acreage was light densities with 1,304 acres having combined cover of Brazilian pepper and Lantana at less than 5% cover. However, significant acreage of higher cover Brazilian pepper was found in some areas, especially closer to I-75 and also

near Prairie Canal just south of 66th Avenue SE (Figure 22). Approximately 436 acres were greater than 5% cover, and 3 acres were greater than 50% cover (Table 15). This is encouraging as cover was much higher during initial treatments 4-5 years ago as indicated above in section 3.2.2 and shown in Figure 8.

3.3.7 BASAL-BARK TREATMENTS WITHIN DEMOLITION SITES AND THEIR BUFFERS OF THE MERRITT CANAL PHASE

Brazilian pepper and Lantana were treated from 9/29/2014 to 10/9/2014 in previously treated areas at Merritt Phase demolition sites, starting at the former Vietnamese camps in the northern portions of the unblocked sections which had a large infestation of leadtree when initial treatments were conducted in 2010 (Figure 23). A total of 142 acres were treated, with emphasis placed on visiting all known infestations of leadtree (which requires high 30% concentration of Garlon 4 in basal-bark treatments).

Combined cover of Brazilian pepper, Lantana, leadtree, and air-potato (*Dioscorea bulbifera*) in the treated area is presented in Table 16. The majority of the acreage consisted of combined cover in the 1-5% and 5-25% categories, with nearly 5 acres of 25-50%, which unfortunately included the leadtree regrowth. Brazilian pepper was present in nearly all of the treated acreage. Some miscellaneous ornamental or food plants were also treated which had sporadically survived previous treatments. Several air-potato patches were also treated, however most had already set bulbils for the season prior to treatment.

Much work remains with roughly 1,000 more acres of retreatment, and large areas are still in need of initial treatments, totaling over 5,000 acres.

3.3.8 FOLIAR TREATMENTS WITHIN DEMOLITION SITES AND THEIR BUFFERS OF THE MERRITT CANAL PHASE

Select species of exotic grasses were treated from10/20/2014 to 10/30/2014 in a portion of the Demolition Sites of the Merritt Phase using SFWMD funds, finishing up the remaining budget for fiscal year 2014. Work was carried out using a swamp buggy and 2 AAM workers, thus was limited to vehicle accessible areas. Some of the worst exotic grass locations were homesites with abandoned roads and trails. Insufficient budget remained to sweep adjacent areas with hand crews, which is necessary to effectively control cogongrass.

Work focused on some of the same homesites as the basal-bark treatments (above) in the northern portions of the un-blocked areas (Figure 24). A primary target was jaraguá, which is easily recognizable in autumn when it flowers. Other primary targets at the homesites included cogongrass, missiongrass, Guineagrass, and Burmareed. Remaining bamboo (*Bambusa vulgaris*) was also treated, as were stray vaseygrass individuals. Natalgrass, which dominated some of the sites, was not treated. Smutgrass, which covers nearly all of the areas treated, was also not sprayed.

A total of 203 acres were treated, consisting primarily of low cover by combined targeted species (Table 16). More than half of the area lacked coverage by targeted species, and 34 acres with cover by targets less than 1%, as the targets were quite patchy. A total of 17 acres of 1-5% cover, 12 acres of 5-25% cover, <1 acre of 25-50%, and 3 acres of 50-75% cover by combined targets were treated.

The 3 acres of highest cover category is one cogongrass patch located even with 74th Avenue SE in the un-blocked areas (Figure 24). This was a re-treatment of a large cogongrass patch which was so thick in earlier treatments the massive amounts of dead thatch underneath prevented chemical from making it to the ground. Now much of that thatch was gone and more effective treatment is expected. However, this was less than half of this 7+ acre patch (not shown in Figure 24 as only treated areas are shown). The rest of this large patch will require hand crews (not swamp buggy accessible) and as of yet initial treatments have not been conducted.

This re-treated patch marks where initial treatments will start if budgets are sufficient to continue. It illustrates the need for more funding quite clearly, and what is common knowledge to all who work with exotic species control it is a losing battle to treat half of a dense patch of cogongrass. This same logic applies for the rest of the exotic control efforts in PSRP where much of the forest is still packed full of Brazilian pepper and cogongrass. As long as that is the case, we will be unable to achieve success, but will continue to work with what we have to best minimize damage by invasive exotics.

3.4 RECCOMENDATIONS

Unlike last fiscal year, SFWMD budgets have again increased while ACOE budgets have been reduced. In fiscal year 2015 it appears very little funding will be available, but this may change. As a result, priorities will be placed on re-treatment and continuing initial treatments of the Faka Union phase footprints may have to wait another year, potentially putting us a couple years behind schedule on this phase.

Melaleuca treatments are again not put into the priorities listed below because it is a priority for the entire PSRP area, not just the footprints and demolition sites discussed below, and because the funding source is different. IRC anticipates assisting with the allocation of funds from FWC to treat *Melaleuca* along the western edge of the project area along the portion of the Belle Meade tract which is home to the majority of the remaining red-cockaded woodpeckers (*Picoides borealis*) in Picayune Strand State Forest.

The below treatments are prioritized in the order that we believe would accomplish the most this fiscal year, given current budget projections. But creativity and flexibility are key when dealing with changing weather, crew availability, and budgets.

1. Conduct foliar re-treatment using swamp buggy of the Merritt Phase footprints (ACOE). This treatment was scheduled in fiscal year 2014 thus is a high priority. (*Actually at the time of the final edits of this report this task has just been completed.*)

2. Complete re-treatments this fall (*just completed*) of jaraguá in cleared footprints of Prairie and Merritt Canal phases (ACOE).

3. Re-treat (foliar) at least high priority species (torpedograss) using a swamp buggy (or similar vehicle) the Soil remediation sites and associated demolition sites in the Miller phase (SFWMD). IRC recommends waiting to re-treat lower priority grasses such as lovegrass (Eragrostis bahiensis) until budgets for both agencies stabilize, because after missing two years of re-treatment in these areas cover by lovegrass is almost equivalent to initial treatment levels. Furthermore it is clear that frequent re-treatments, perhaps multiple treatments per year, will be required to control this species.

4. Conduct thorough foliar re-treatment of all Prairie canal phase cleared footprints using swamp buggy or similar vehicle (SFWMD). These treatments can be conducted any time this fiscal year, except if a freeze or fire occurs, prior to rainy season. However, the sooner the better, because the foliar treatments conducted in these areas last fiscal year (see section 3.3.4) were incomplete and lower quality than typical re-treatment efforts. They were done with labor crews using backpack sprayers but with crew members who were less experienced with plant ID and were done simultaneously with Brazilian pepper.

5. Foliar treatment of Prairie Canal logging trams (ACOE). These were incomplete last fiscal year but levels of infestation were low. IRC recommends that SFWMD funds be re-directed to this task given ACOE budget shortfalls. This task can be completed relatively inexpensively while completing task 4 (above).

6. Conduct foliar re-treatments using swamp buggy of the Faka Union canal phase cleared footprints which were treated last fiscal year (described in section 3.3.1), targeting only higher priority species such as cogongrass, Burma reed, and missiongrass as during initial treatments (ACOE). Due to the expected budget shorfalls this fiscal year IRC recommends crews do not conduct additional initial treatments within this phase as additional budget may be necessary to treat heavily infested areas in the Merritt phase (see below).

7. Foliar Re-treatment of Prairie and Merritt Canal phase demolition sites and their buffers (SFWMD). The best option is to utilize backpack sprayers and conduct a thorough re-treatment to keep cogongrass under control. This task will be a costly but important task.

8. Re-treat Brazilian pepper, lantana and miscellaneous hardwoods using Garlon IV within Prairie and Merritt canal phase demolition sites and their buffers where re-

treatments left off this past fiscal year (SFWMD). These treatments are discussed in section 3.3.7 above. Re-treatment this fiscal year would continue southward in the unblocked areas which had been treated in the past but were not completed this fiscal year.

9. Foliar treatment of L-6 footprint (ACOE). This recently cleared footprint for a new levee to be constructed in the Belle Meade tract should be treated, at a minimum, once, for high priority grasses such as torpedograss and cogongrass. This is elevated in priority because no work had been done since initial clearing. It may be difficult to conduct these treatments without also treating Brazilian pepper, so changes in priority may occur depending on IRC survey results.

10. Re-treat areas of Brazilian pepper in Prairie Canal phase logging trams (ACOE) treated this past fiscal year (see section 3.3.2). Re-treatment should be considered for next fiscal year if unable to complete this task this year, as the first re-treatment following initial treatments of Brazilian pepper is the most important re-treatment to achieve long term success.

11. Conduct initial treatment of Brazilian pepper in Merritt Canal phase logging trams (ACOE). IRC believes given budget limitations, treatment of Brazilian pepper in the Merritt canal phase road removal footprints could wait another year, however, many of the trams are getting more heavily infested, in part because they were cleared earlier than many of the roads, and because they are surrounded by heavy infestations of Brazilian pepper.

12. Conduct initial foliar treatments using swamp buggy of the Faka Union canal phase cleared footprints starting where crews left off last fiscal year (described in section 3.3.1), targeting only higher priority species such as cogongrass, Burma reed, and missiongrass as during initial treatments further north (ACOE).

13. Continue initial foliar treatments at demolition sites and their buffers in the Merritt Phase. This could include the use of a swamp buggy for larger (1-5 acre) patches of cogongrass but will require backpack crews for most of the roughly 4,000 acres remaining. Budgets are unlikely to be sufficient to treat the whole area this fiscal year, and areas have already been prioritized within the unblocked areas of the Merritt phase for immediate treatments.

14. Following foliar treatments at demolition sites and their buffers in the Merritt Phase, Brazilian pepper and hardwoods will require treatment. Again this includes roughly 4,000 acres of hand treatments and would be prioritized according to completed foliar treatments. This should not be done prior to foliar treatments because the increased light may promote expansion of exotic grasses if left untreated.

4.0 ACKNOWLEDGEMENTS

IRC wishes to thank all who were involved in survey and control of invasive exotic and nuisance species in PSRP this fiscal year. Especially to Alan Buckhalt who continues to perform steady quality work on this project. We thank him for his sweat, knowledge, and his sense of pride as his history on site motivates him to do a good job and to always creatively seek out ways to improve our overall success. We also wish to thank John Kovolovsky for his motivation to learn new grass species and hard work in dense melaleuca areas. Thanks to Lorenzo Jr. for sticking with Alan, and for all the crew members who worked through the worst of the summer months.

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Figures

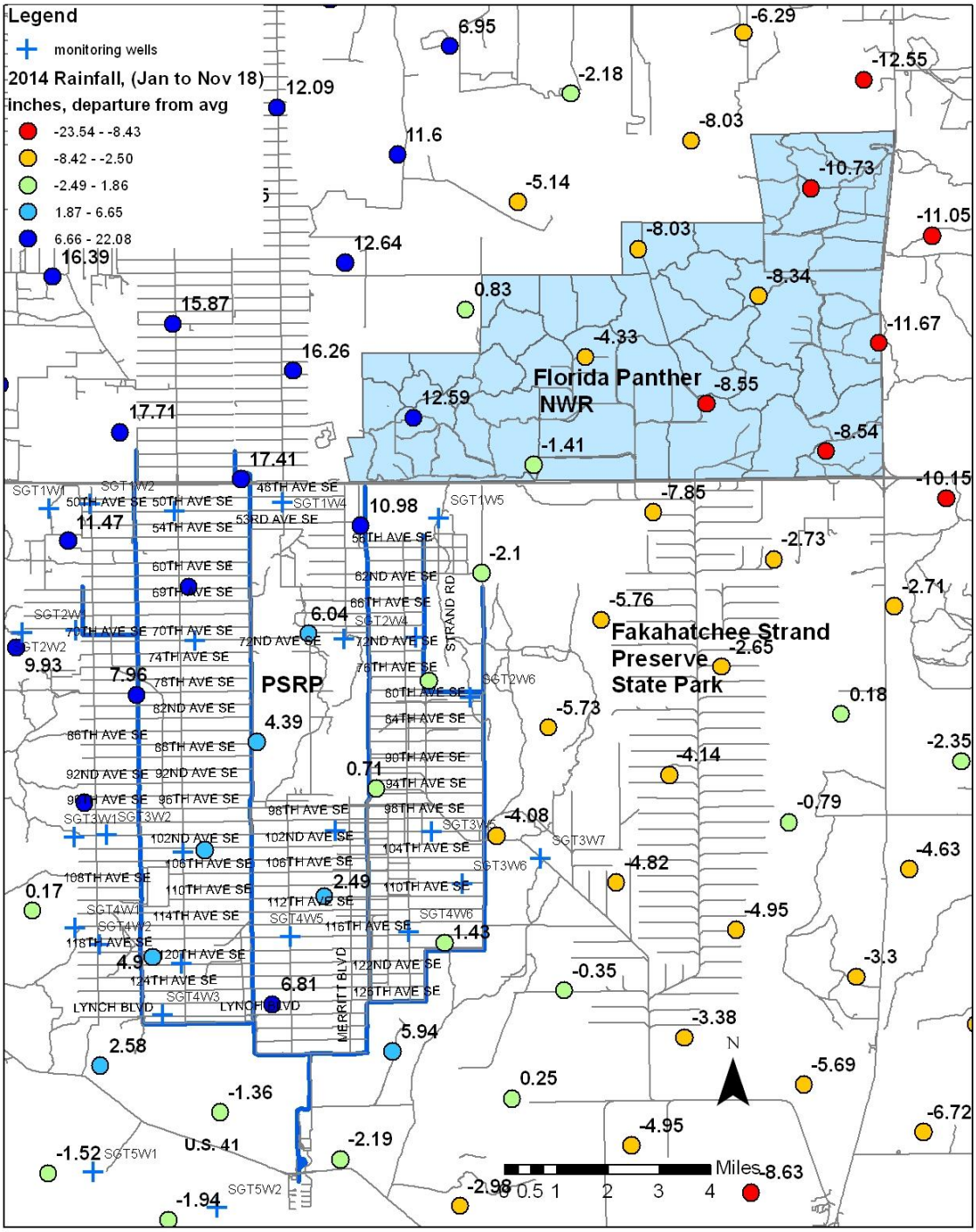

Figure 1: Picayune Rainfall Summary, Doppler Radar Estimates, Departure from Average (http://water.weather.gov/precip/
Advanced Hydrologic Prediction Service)

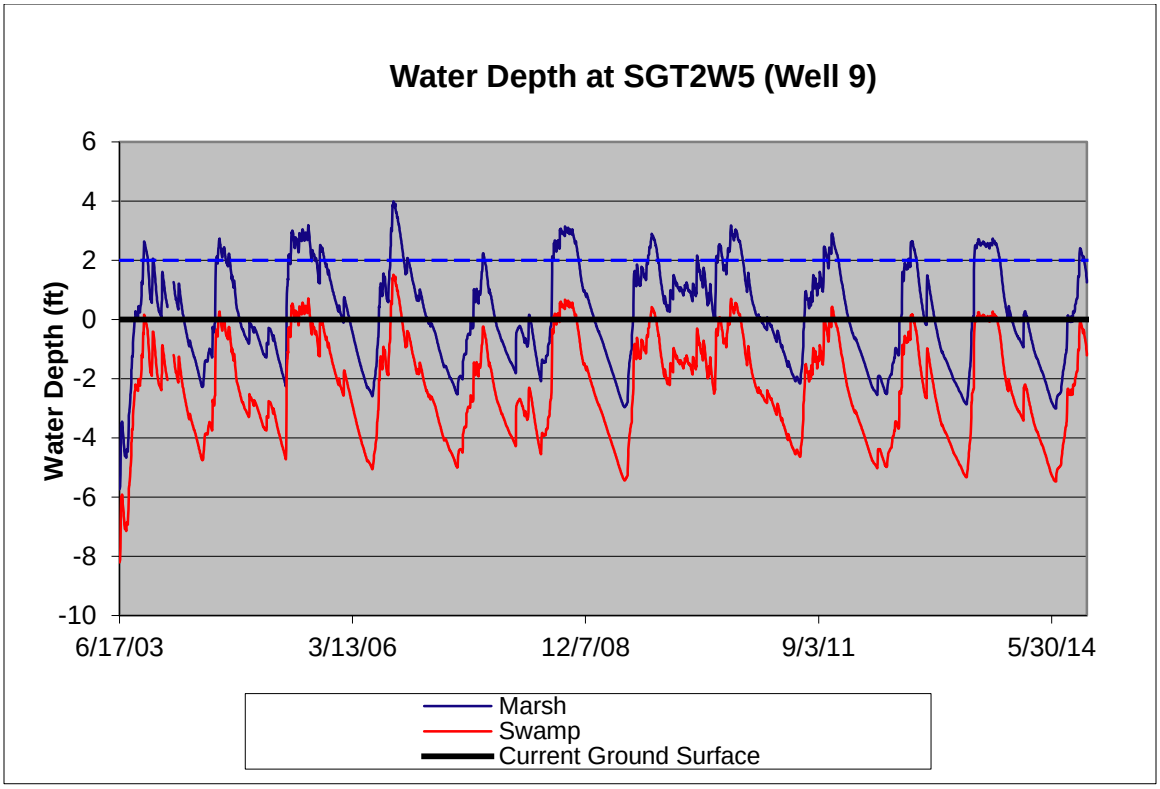

Figure 2: Water Depth at SGT2W5 (Well 9)

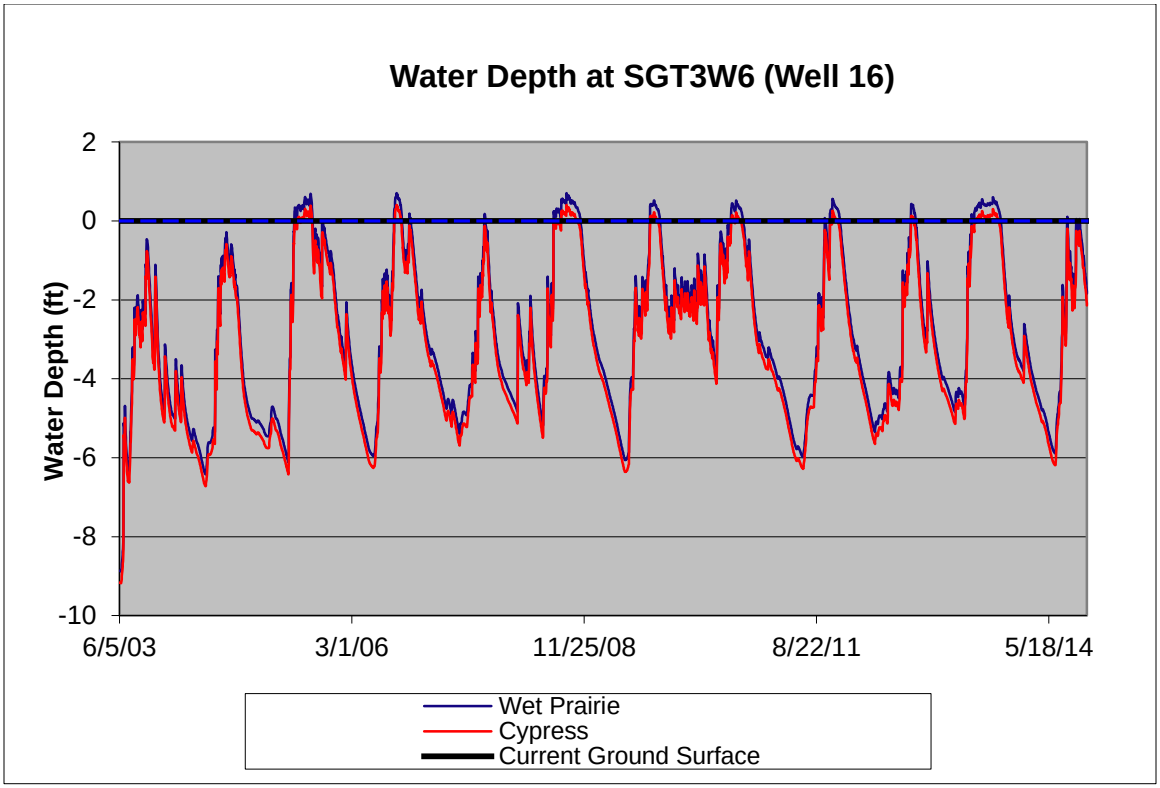

Figure 3: Water Depth at SGT3W6 (Well 16)

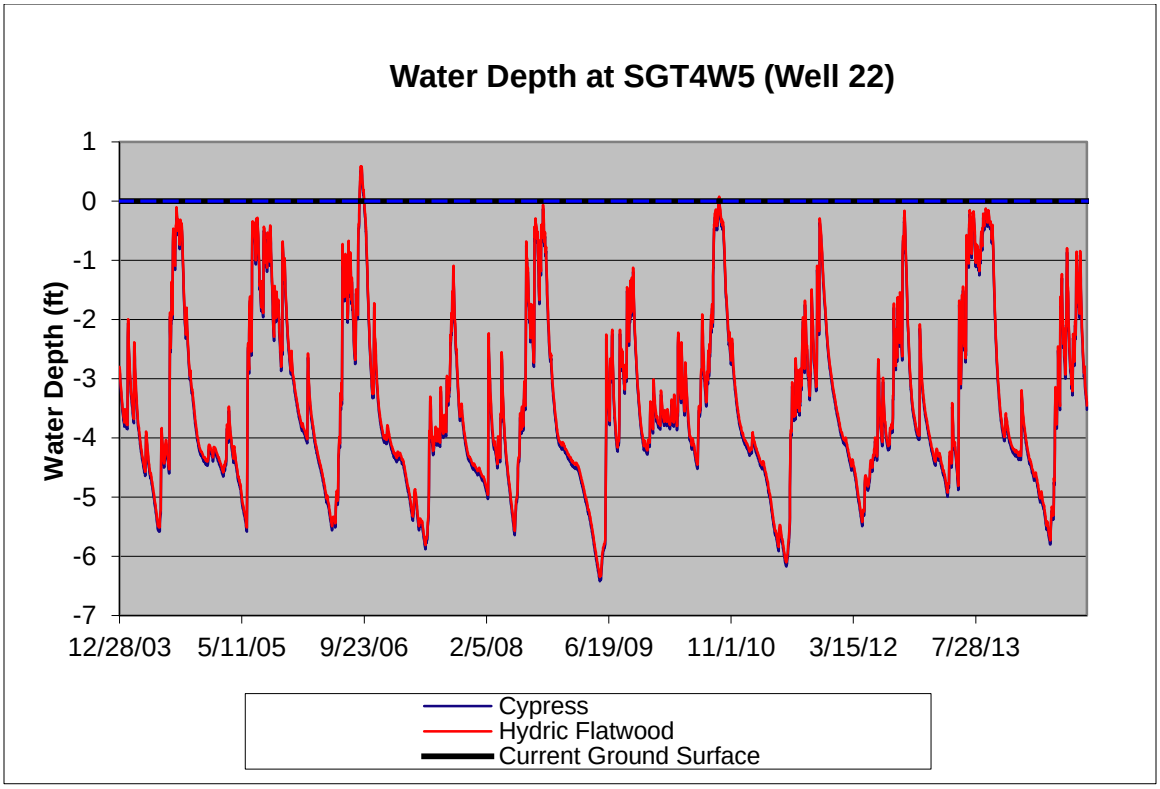

Figure 4: Water Depth at SGT4W5 (Well 22)

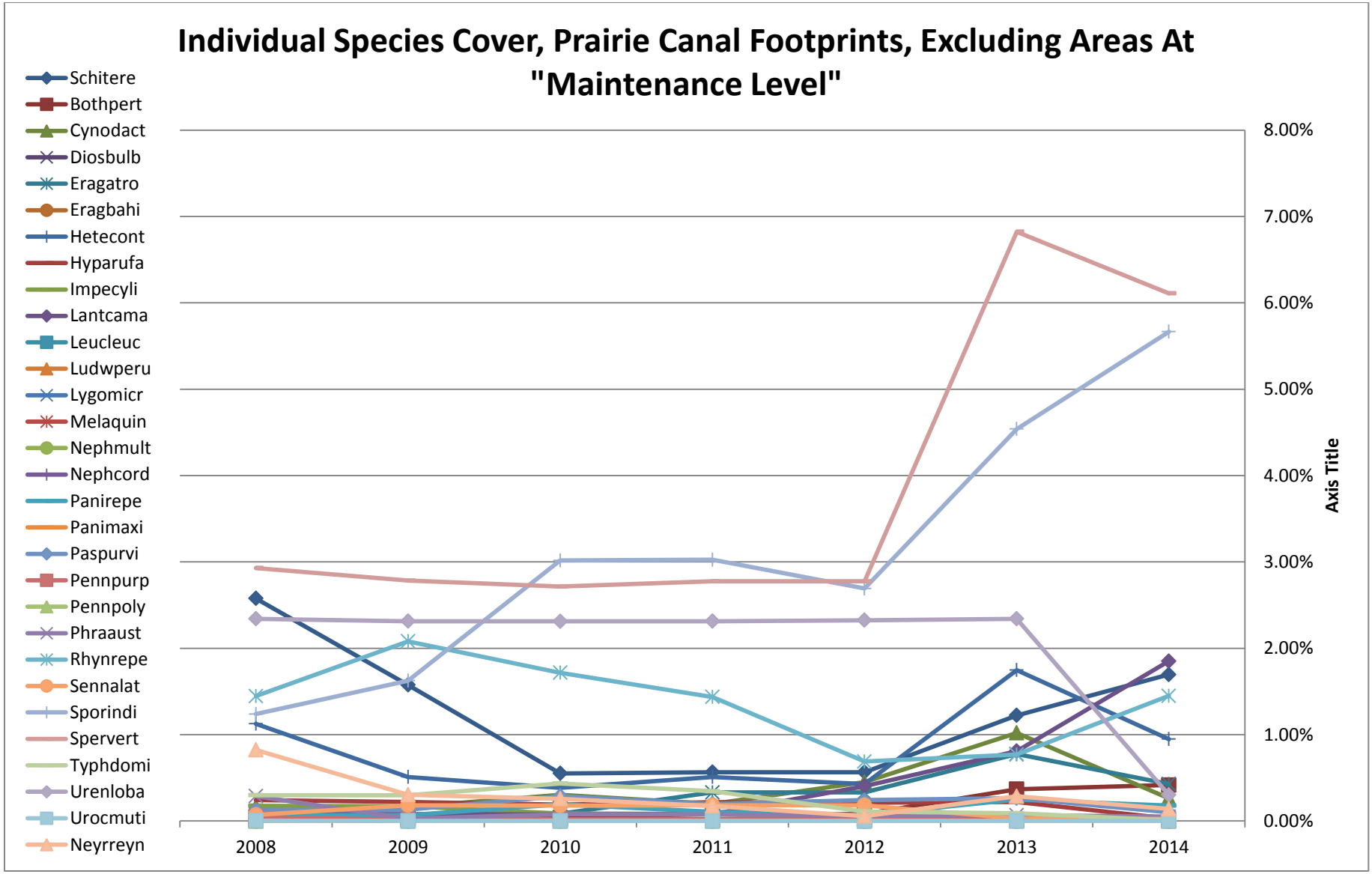

Figure 5: Individual Species Cover, Prairie Canal Footprints, Excluding Areas at "Maintenance Level"

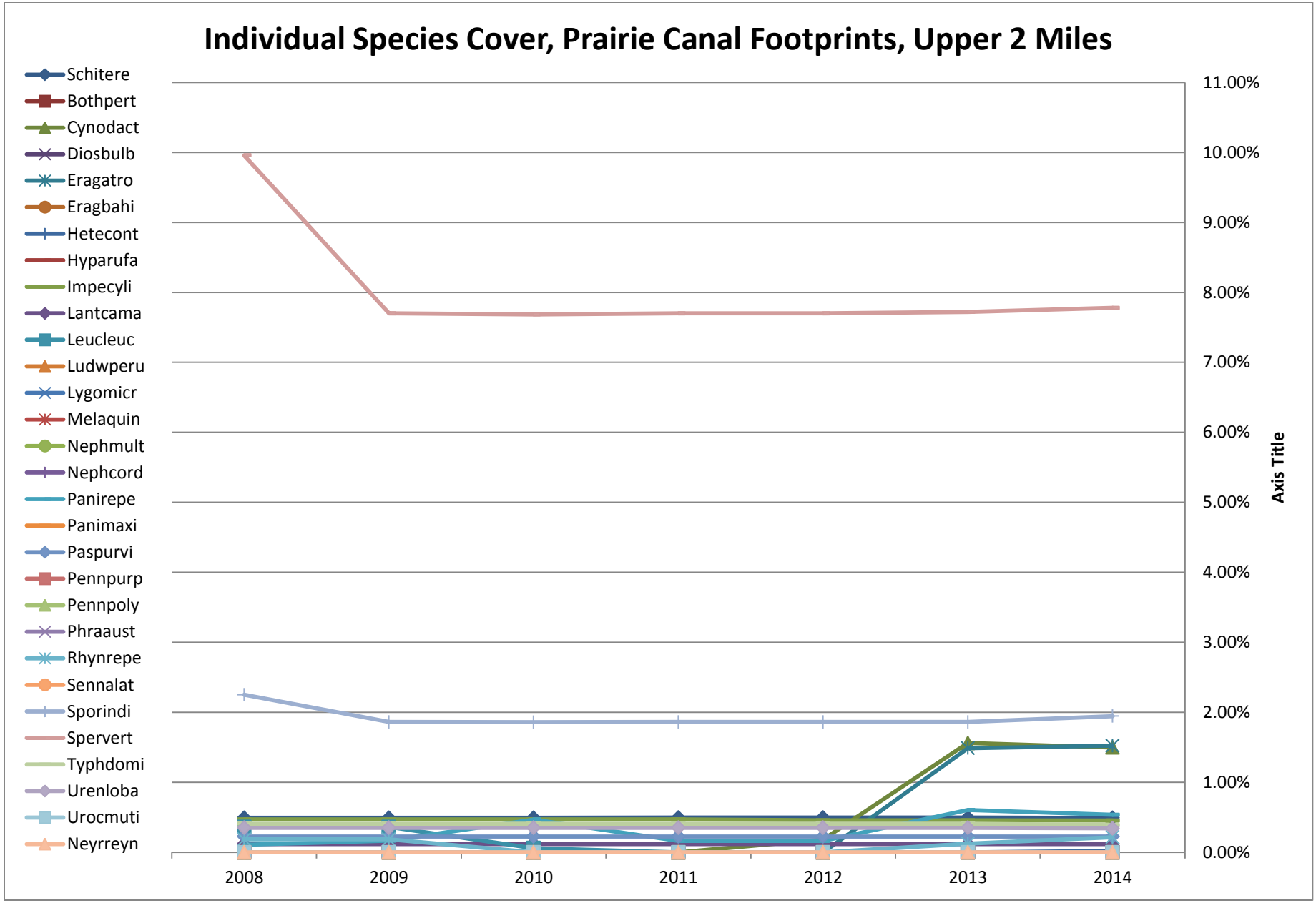

Figure 6: Individual Species Cover, Prairie Canal Phase Cleared Footprints (Upper 2 Miles of Prairie Canal)

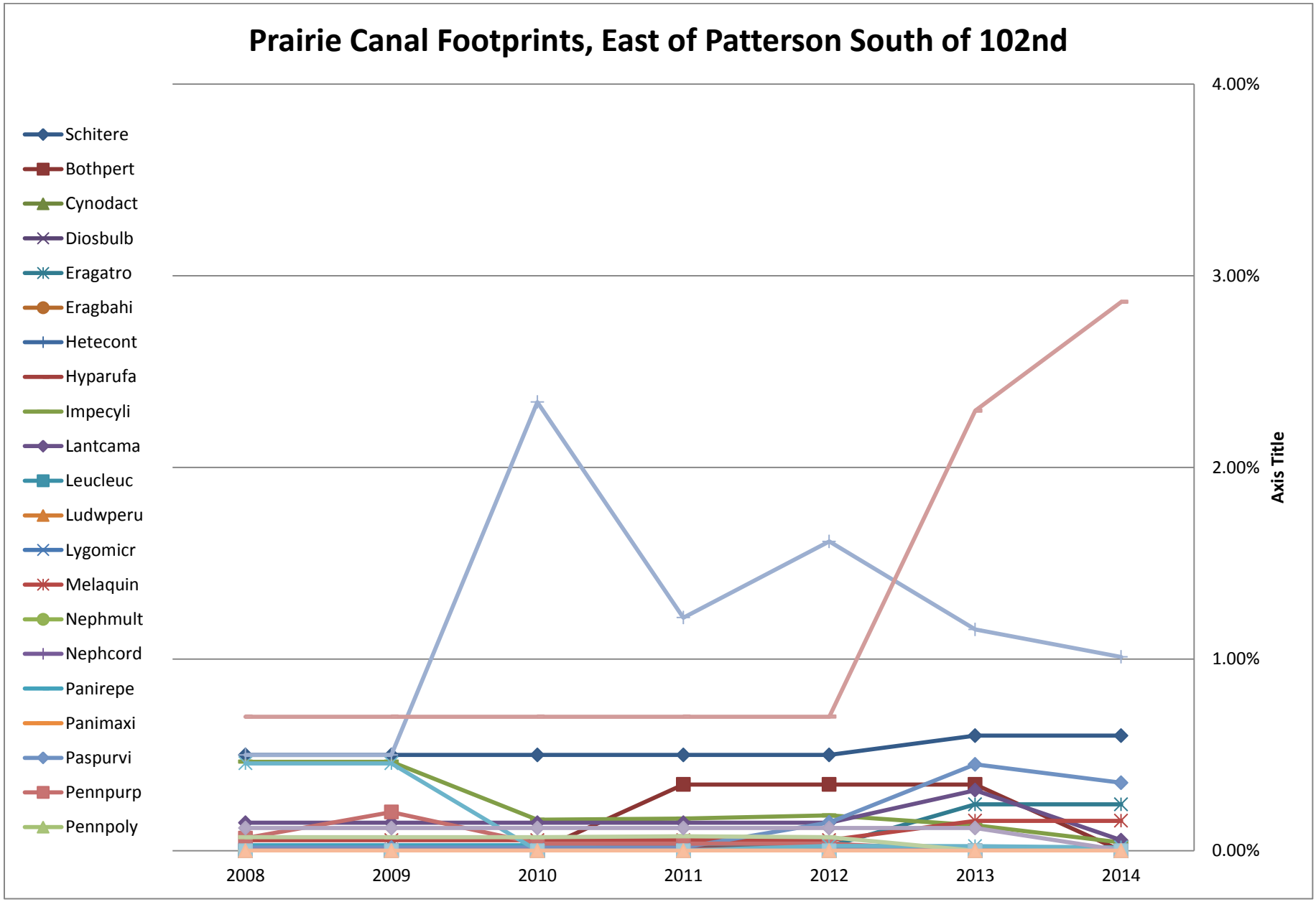

Figure 7: Individual Species Cover, Prairie Canal Phase Cleared Footprints (E-W roads from 104th through 116th and E of Patterson)

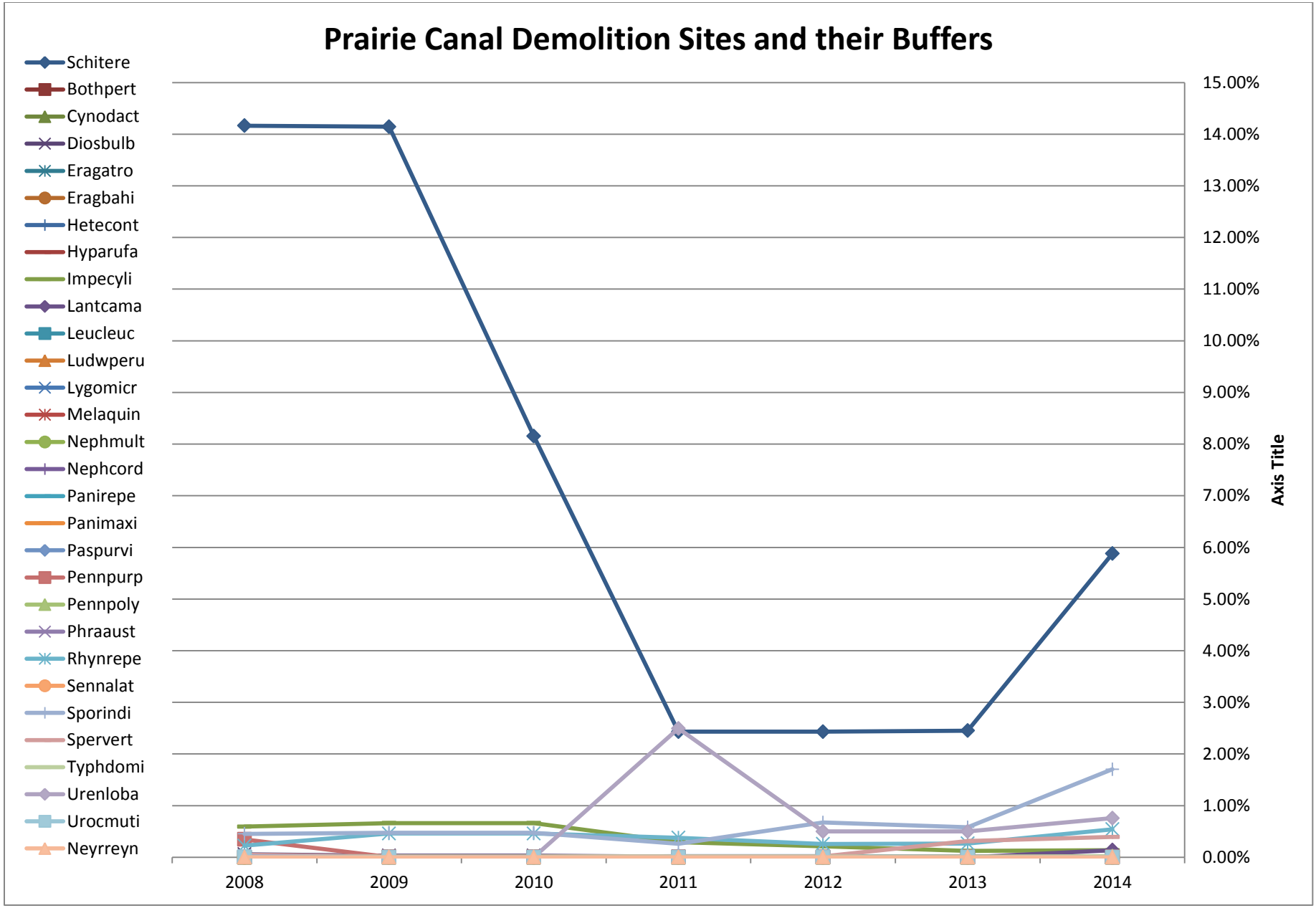

Figure 8: Individual Species Cover, Prairie Canal Phase Demolition Sites and their Buffers

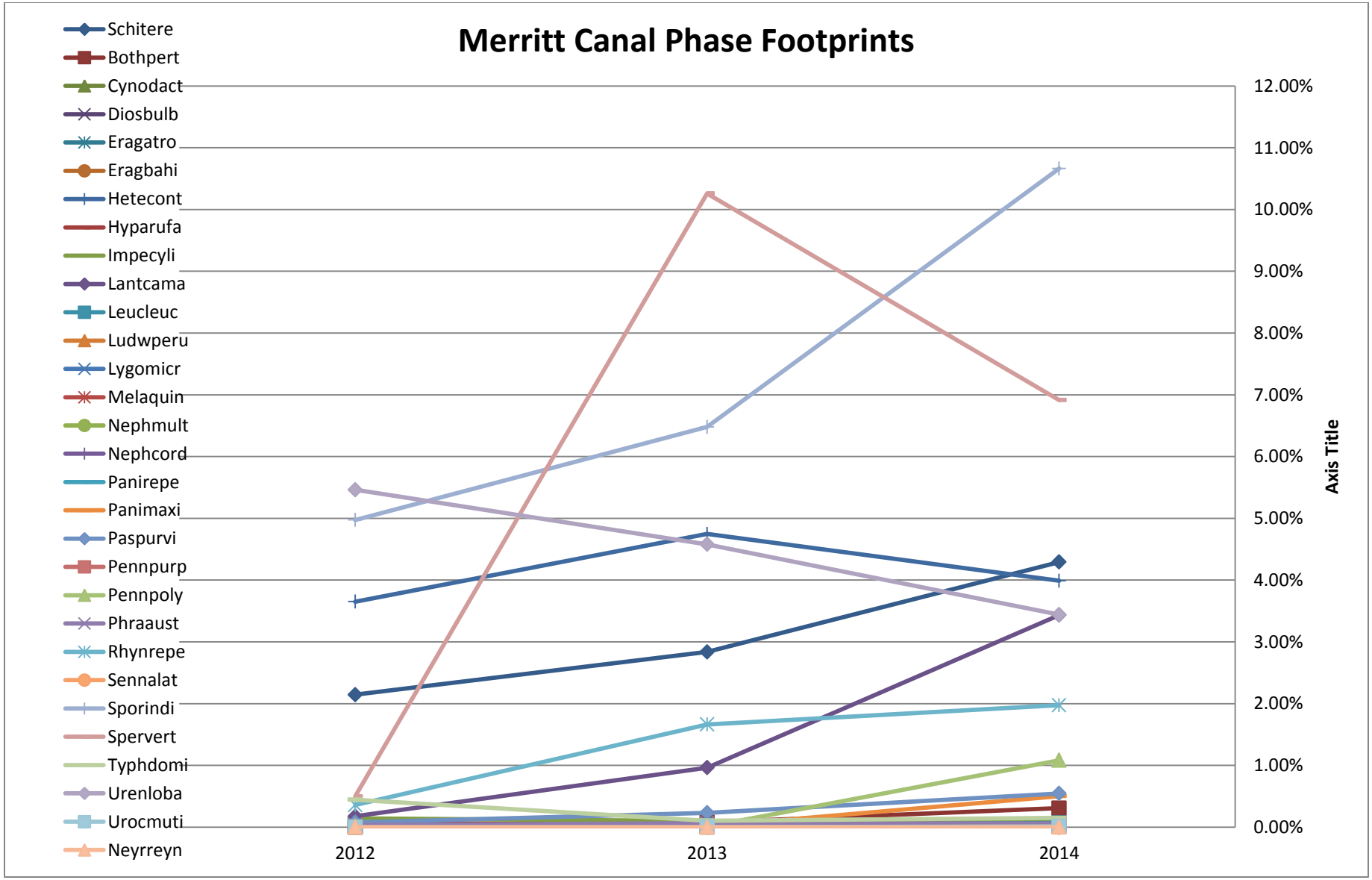

Figure 9: Individual Species Cover, Merritt Canal PhaseFootprints

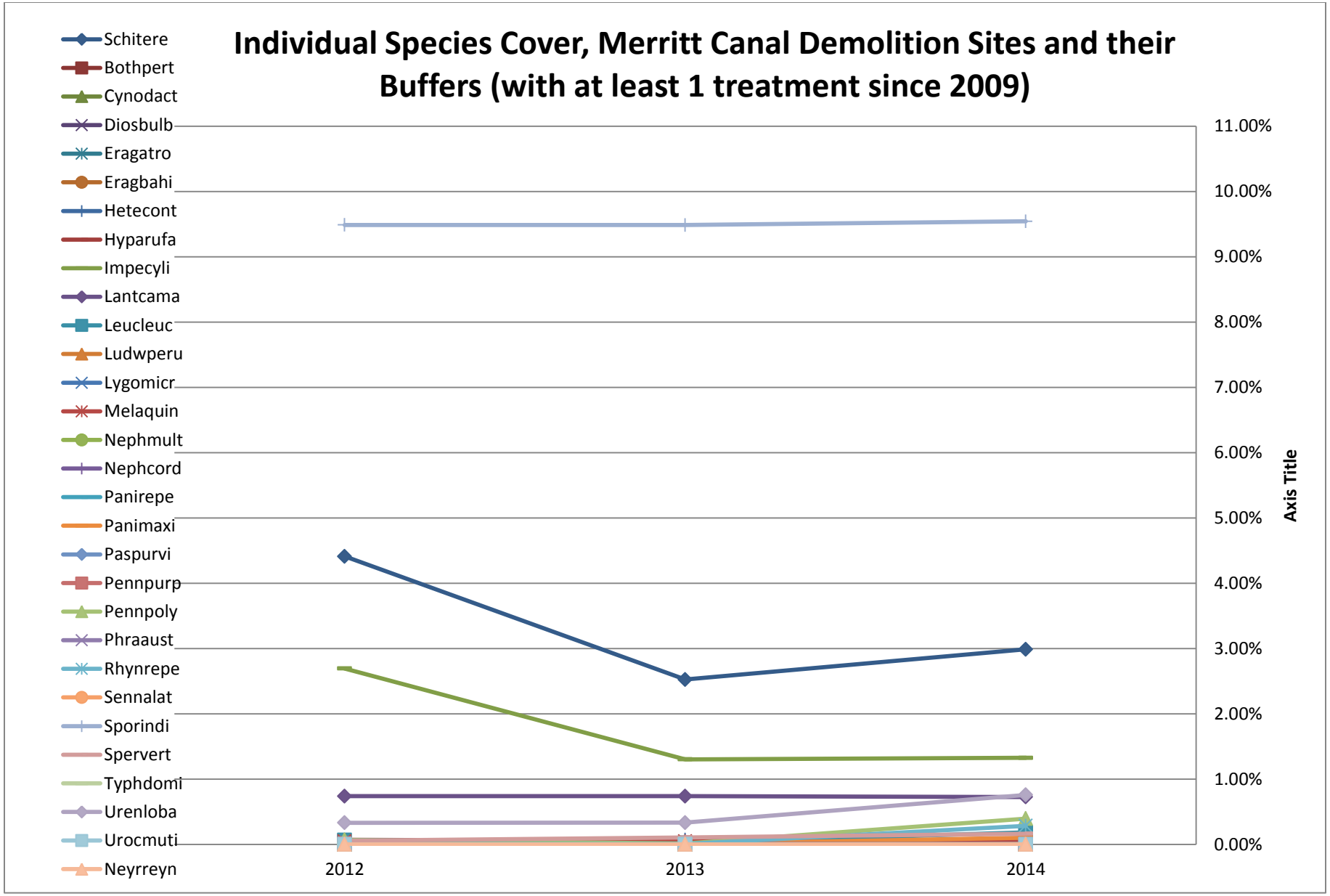

Figure 10: Individual Species Cover, Merritt Canal Phase Demolition Sites
(*mapping still incomplete, but very little complete prior to 2011, thus the low values, except for leucleuc at the first home sites treated in Merritt Canal Phase, 2010*)

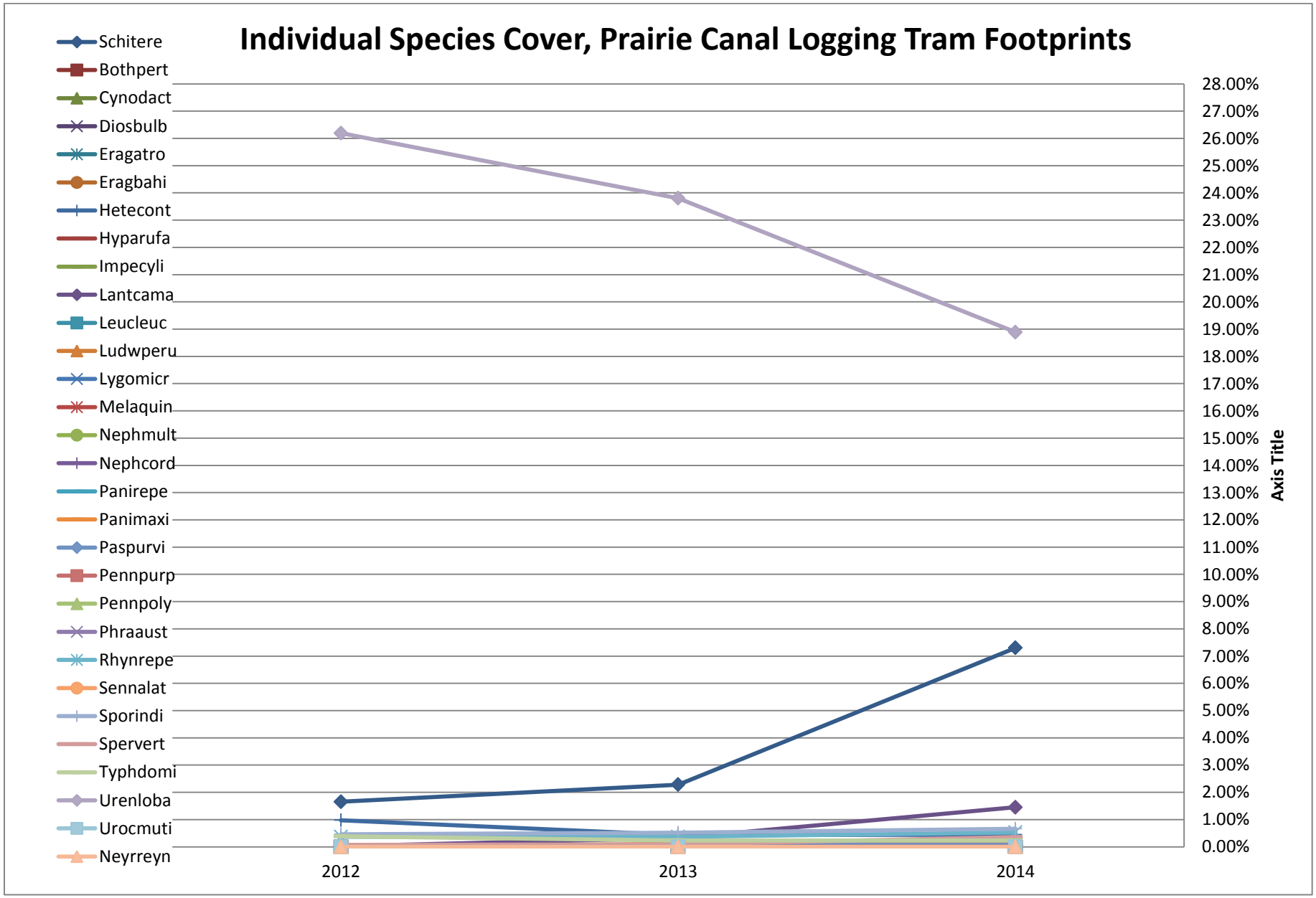

Figure 11: Individual Species Cover, Prairie Canal Phase Logging Tram Footprints

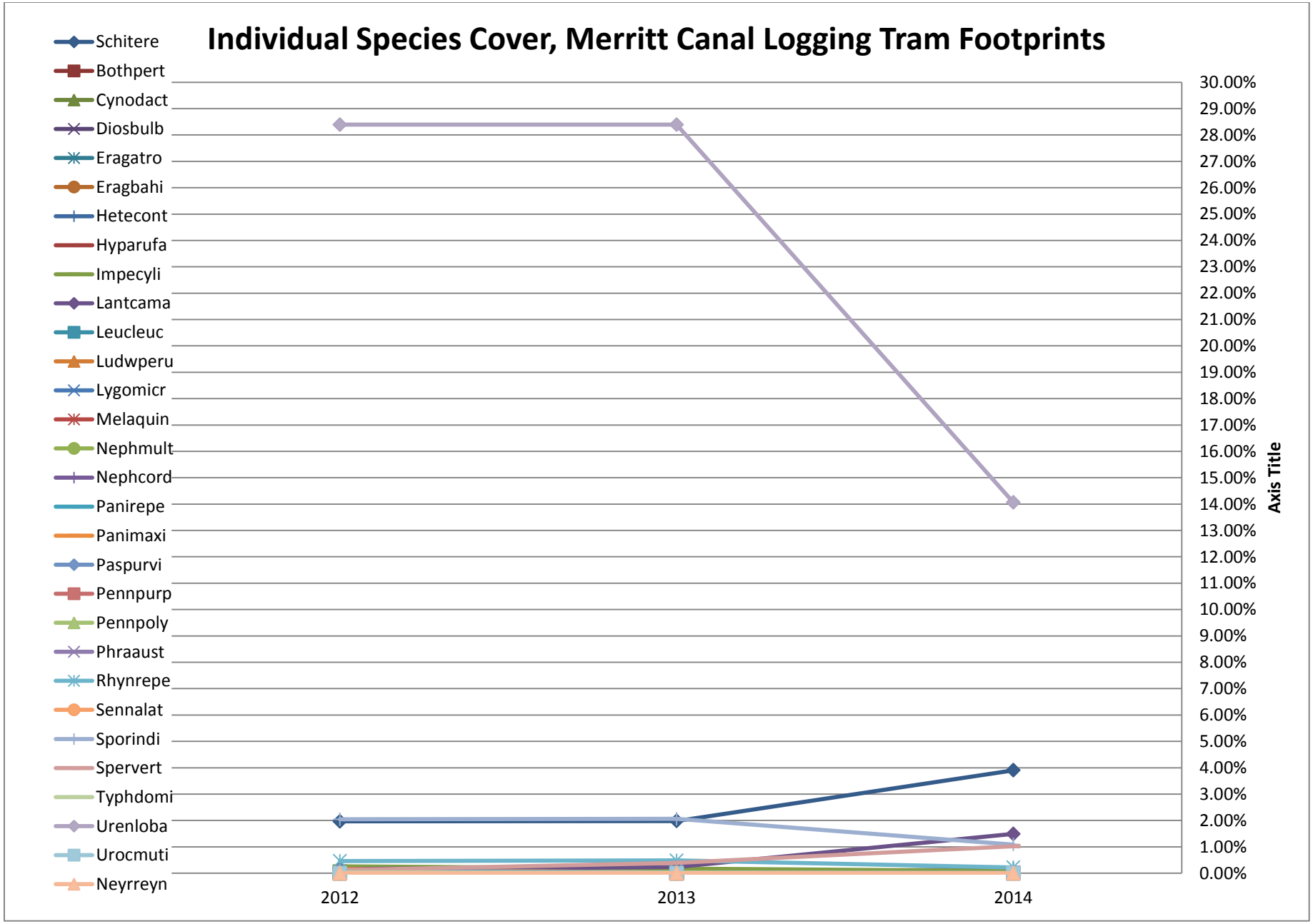

Figure 12: Individual Species Cover, Merritt Canal Phase Logging Tram Footprints

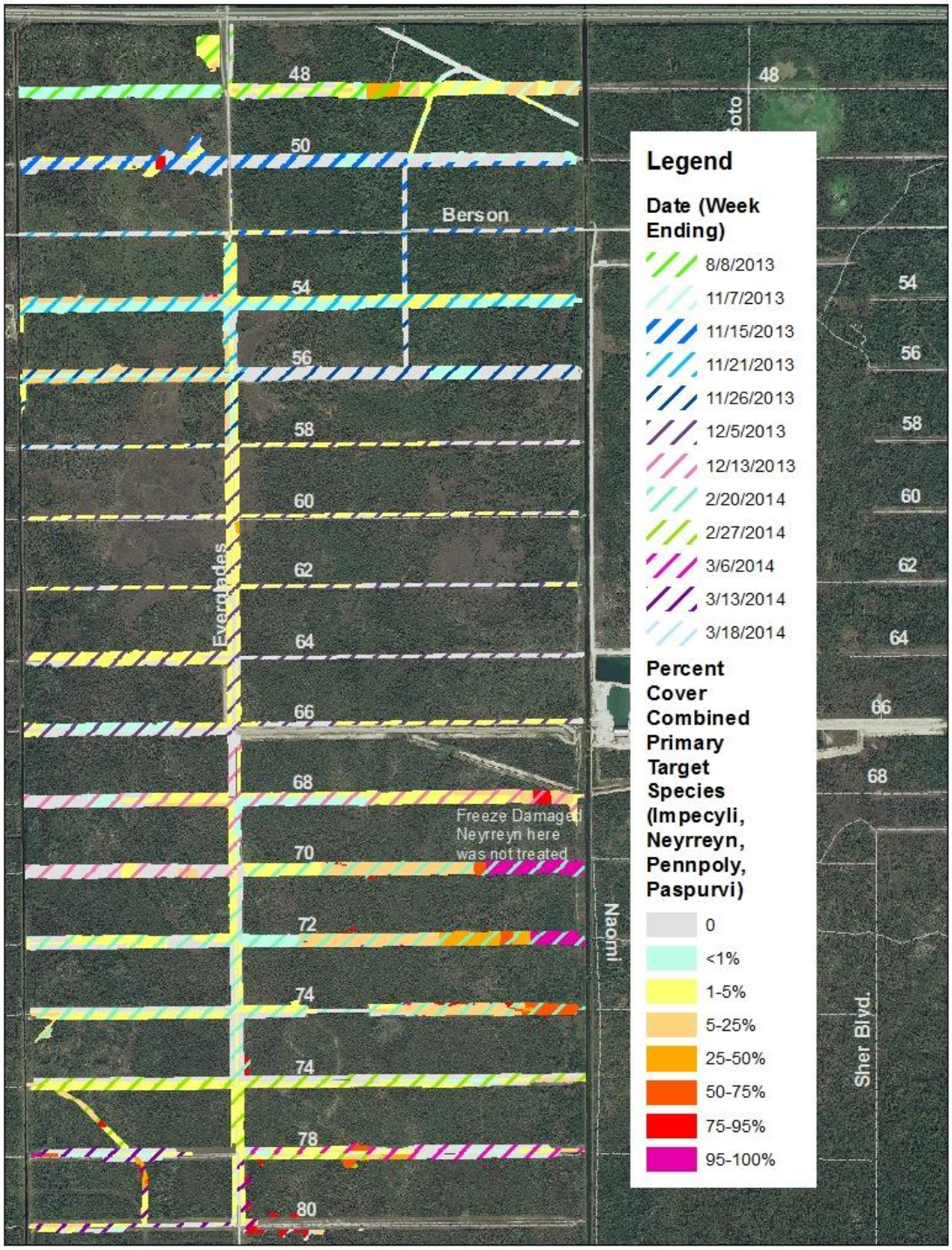

Figure 13: Area Covered by Initial Foliar Treatment (ACOE) of Priority Species in Faka Union Canal Phase at PSRP, FY 2014

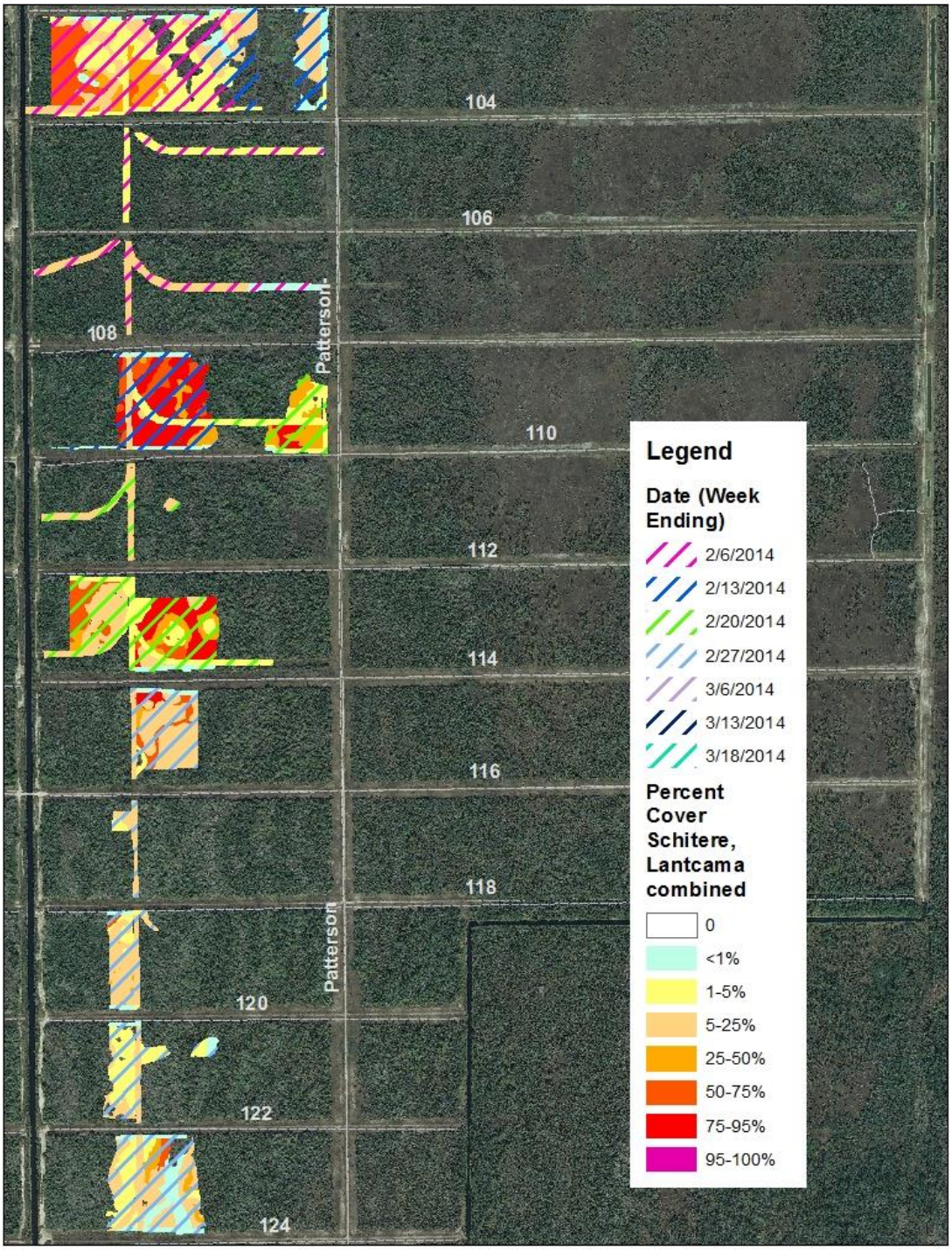

Figure 14: Area Covered by Initial Basal-Bark Treatment (ACOE) of Logging Trams in Prairie Canal Phase at PSRP, FY 2014 (Southern Half)

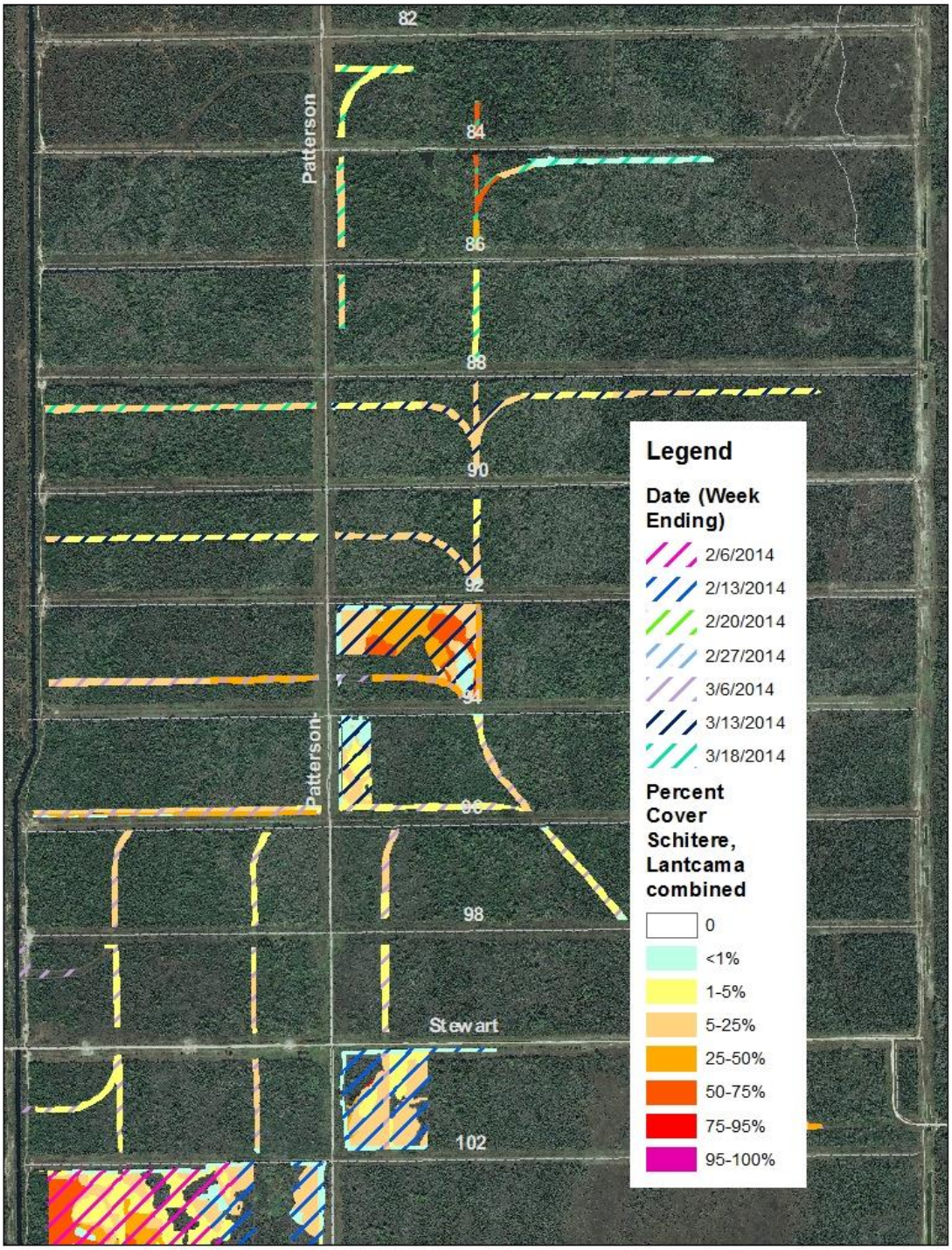

Figure 15: Area Covered by Initial Basal-Bark Treatment (ACOE) of Logging Trams in Prairie Canal Phase at PSRP, FY 2014 (Northern Half)

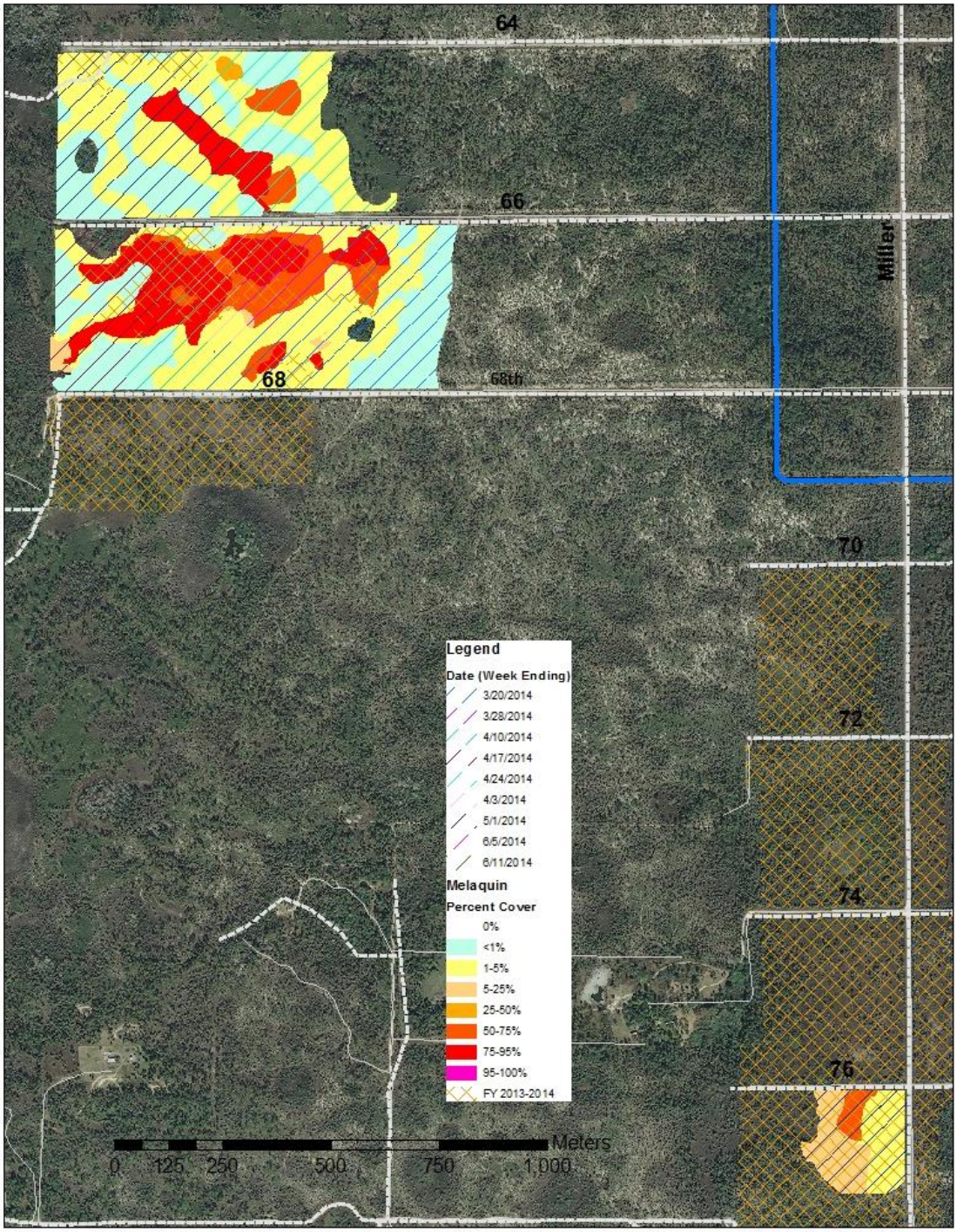

Figure 16: Area Covered by Cut-Stump Treatments (IPMS/SFWMD) of Melaleuca at PSRP, FY 2014

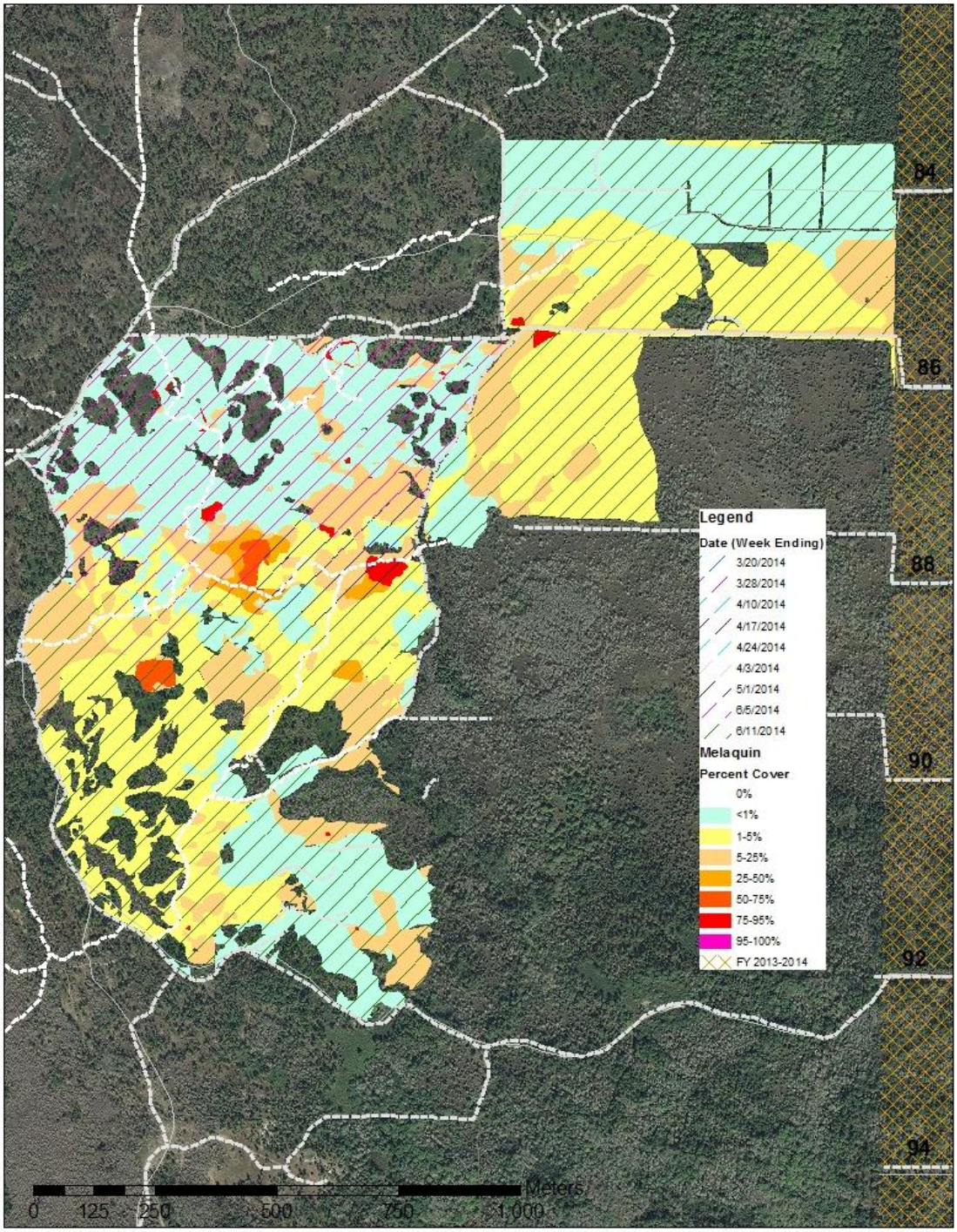

Figure 17: Area Covered by Cut-Stump Treatments (IPMS/SFWMD) of Melaleuca in Belle Meade, adjacent to PSRP, FY 2014

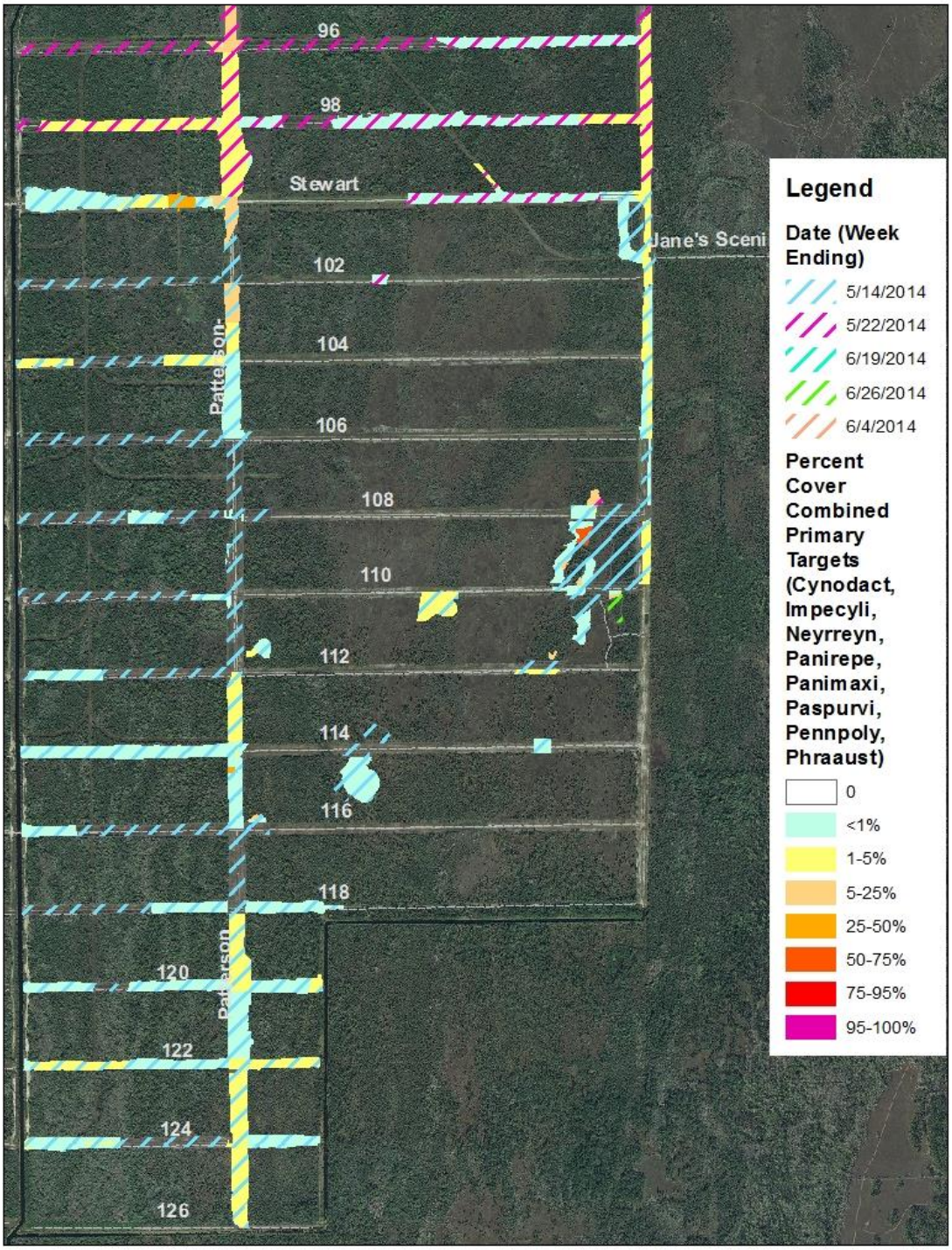

Figure 18: Area Covered by Foliar Re-Treatments (SFWMD) of footprints in Prairie Canal Phase at PSRP, FY 2014 (Southern Half)

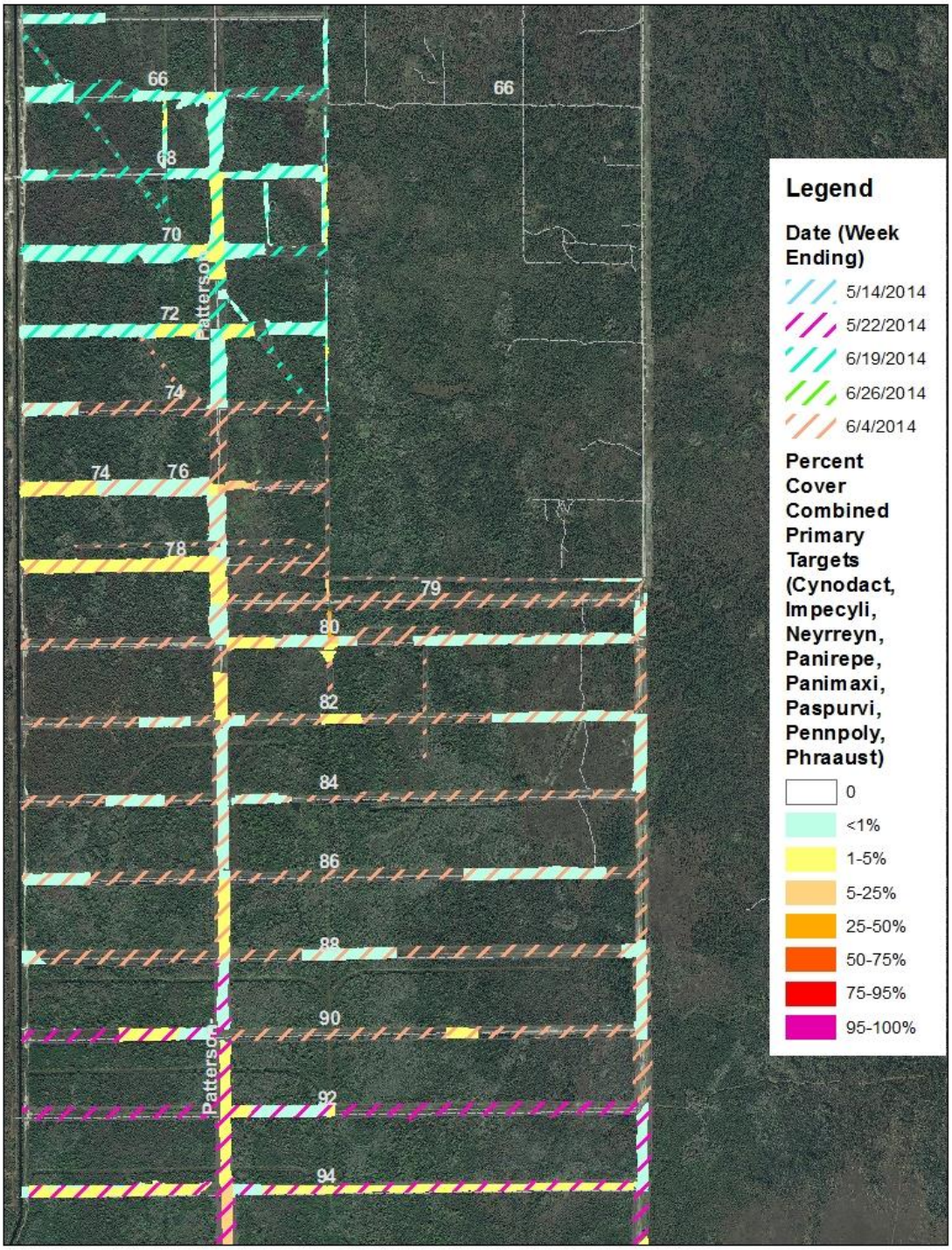

Figure 19: Area Covered by Foliar Re-Treatments (SFWMD) of footprints in Prairie Canal Phase at PSRP, FY 2014 (Northern Half)

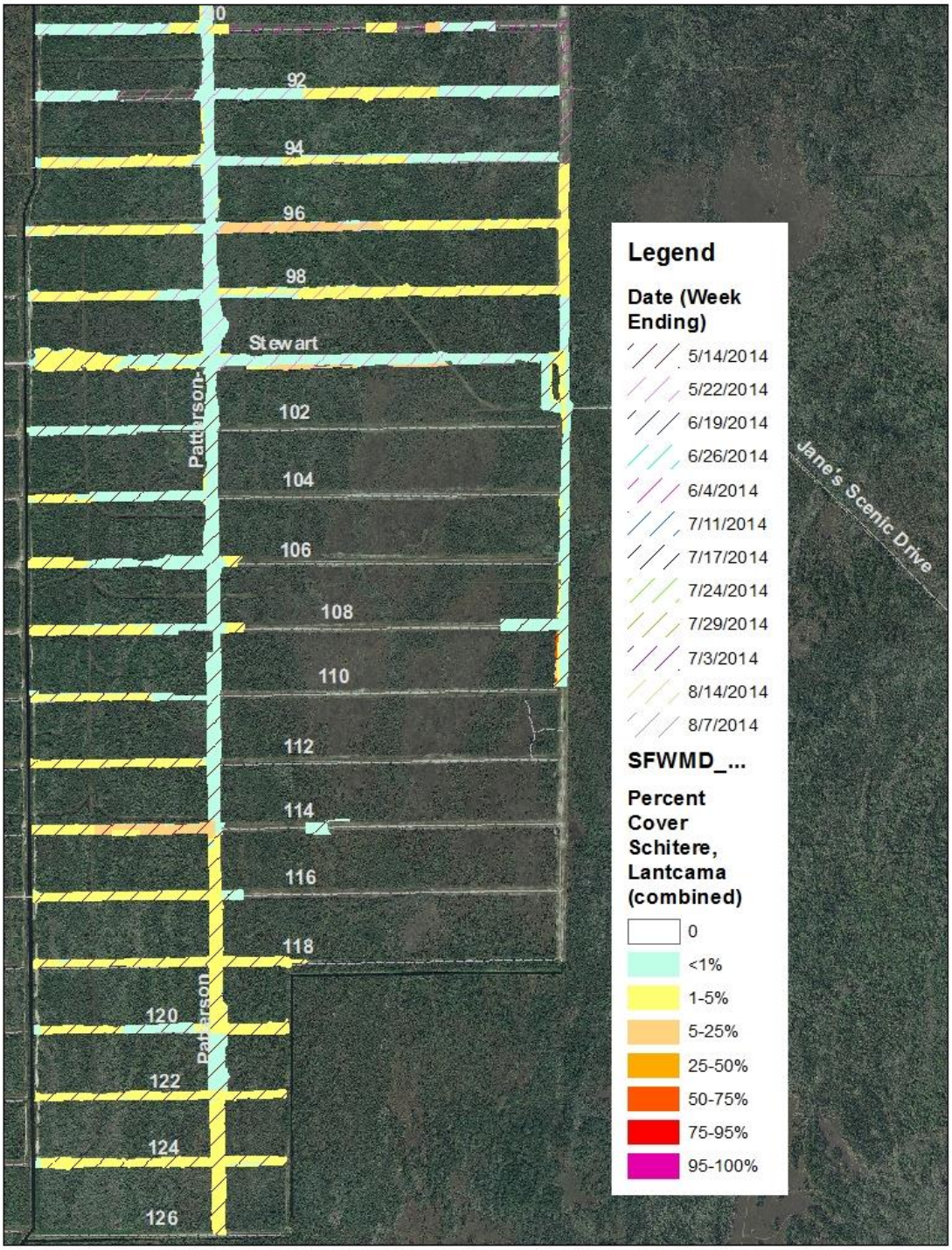

Figure 20: Area Covered by Basal-Bark Re-Treatments (SFWMD) of footprints in Prairie Canal Phase at PSRP, FY 2014 (Southern Half)

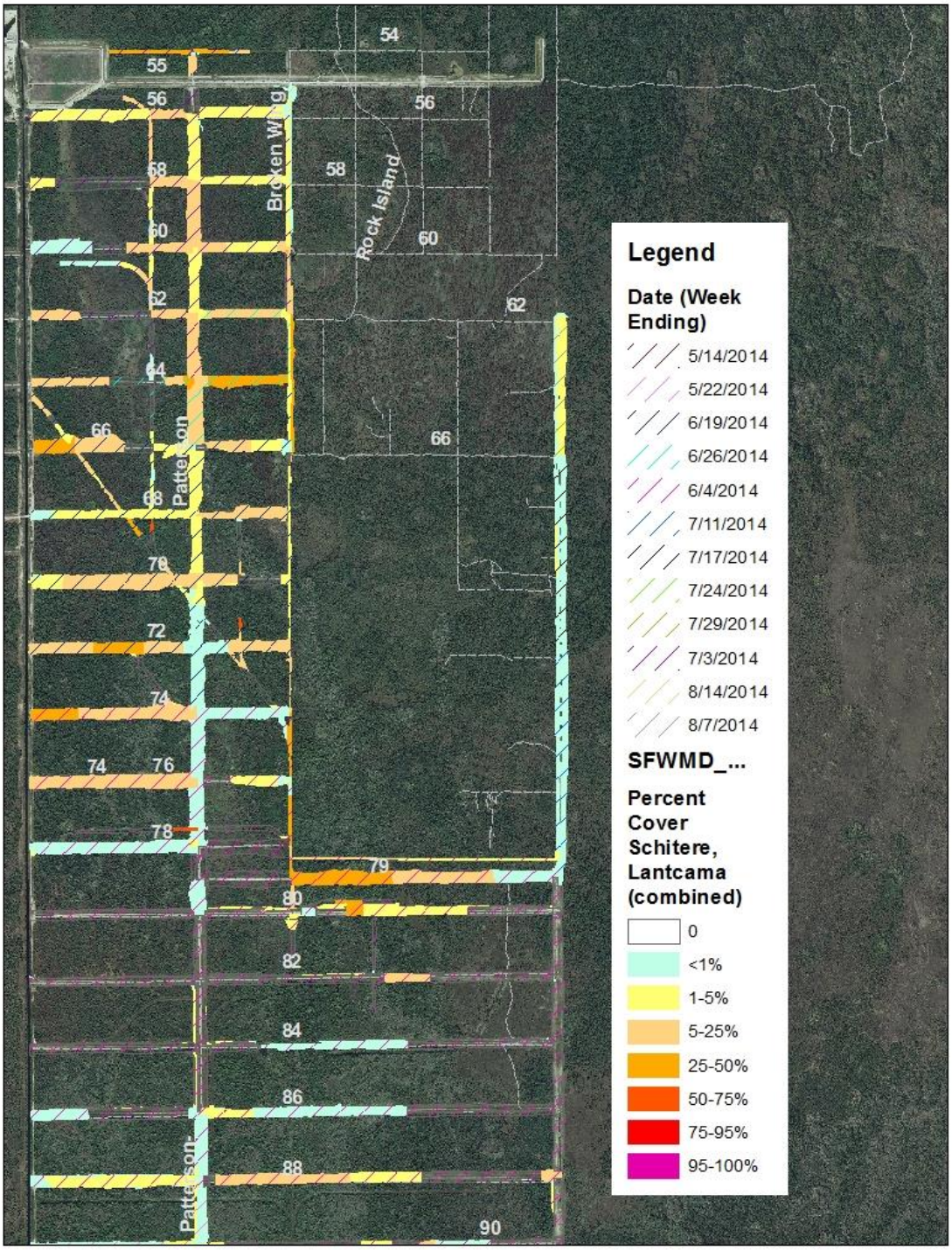

Figure 21: Area Covered by Basal-Bark Re-Treatments (SFWMD) of footprints in Prairie Canal Phase at PSRP, FY 2014 (Northern Half)

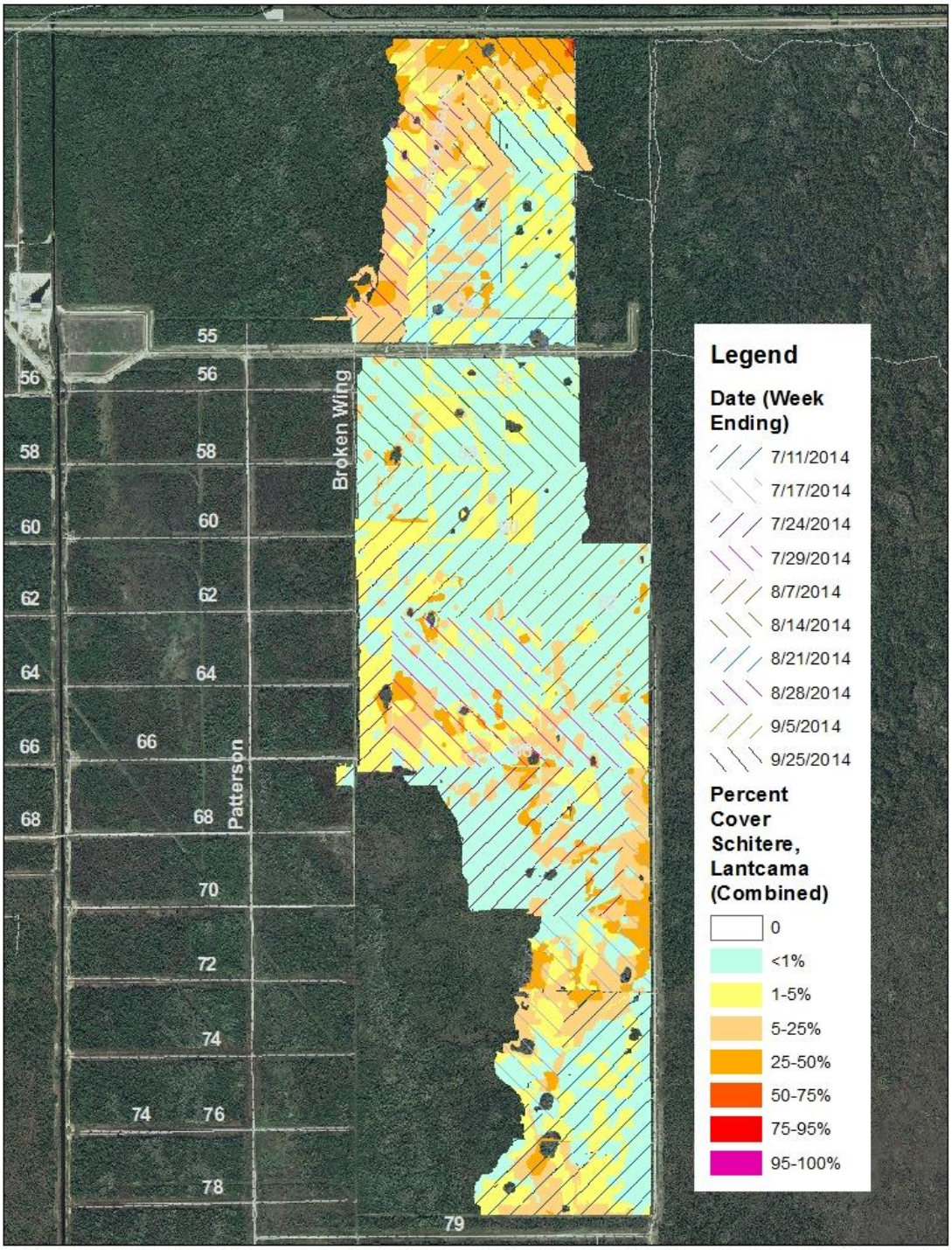

Figure 22: Area Covered by Basal-Bark Re-Treatments (SFWMD) of Demolition Sites and their Buffers in Prairie Canal Phase at PSRP, FY 2014

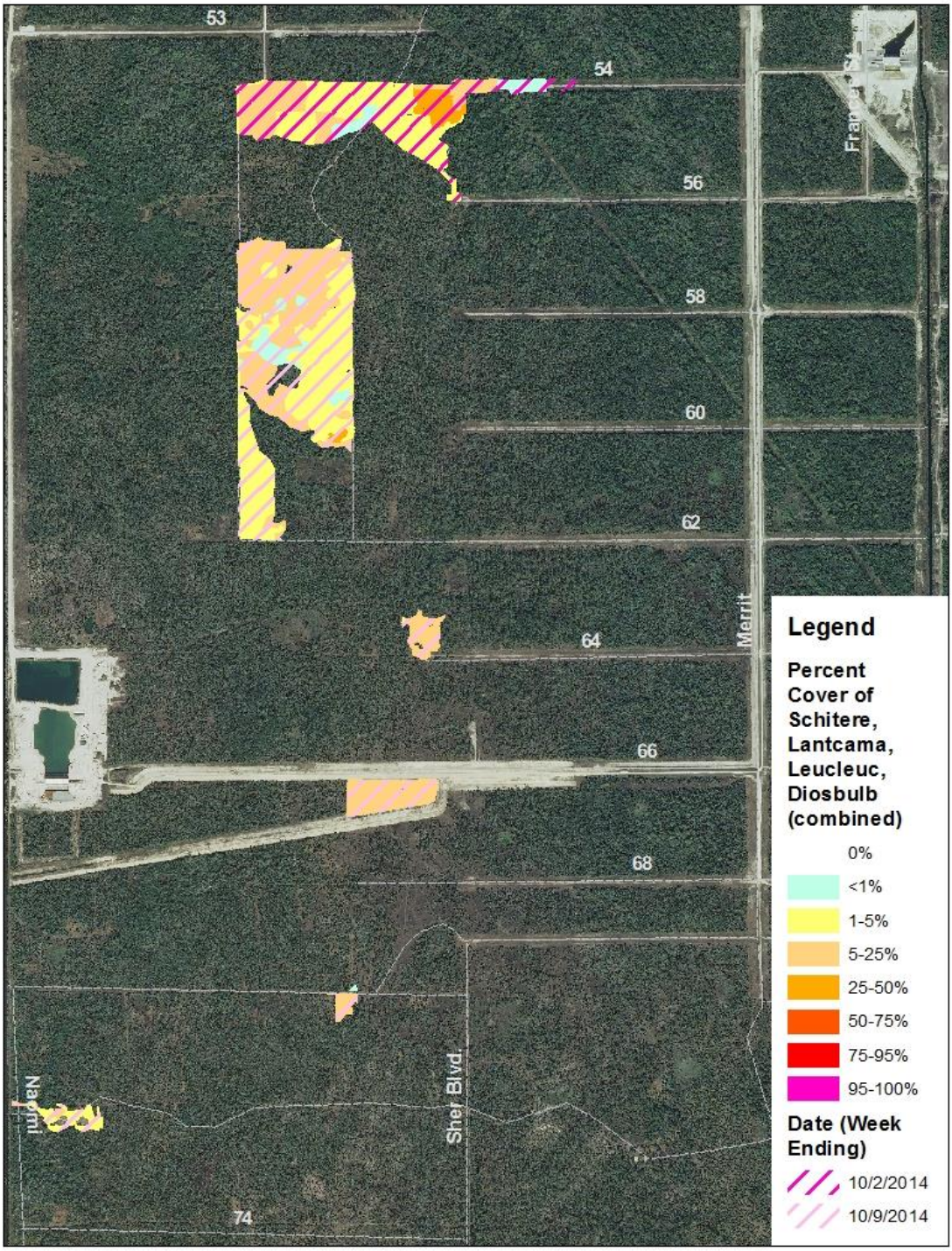

Figure 23: Area Covered by Basal-bark Re-Treatments (SFWMD) of Demolition Sites in Merritt Canal Phase at PSRP, FY 2014

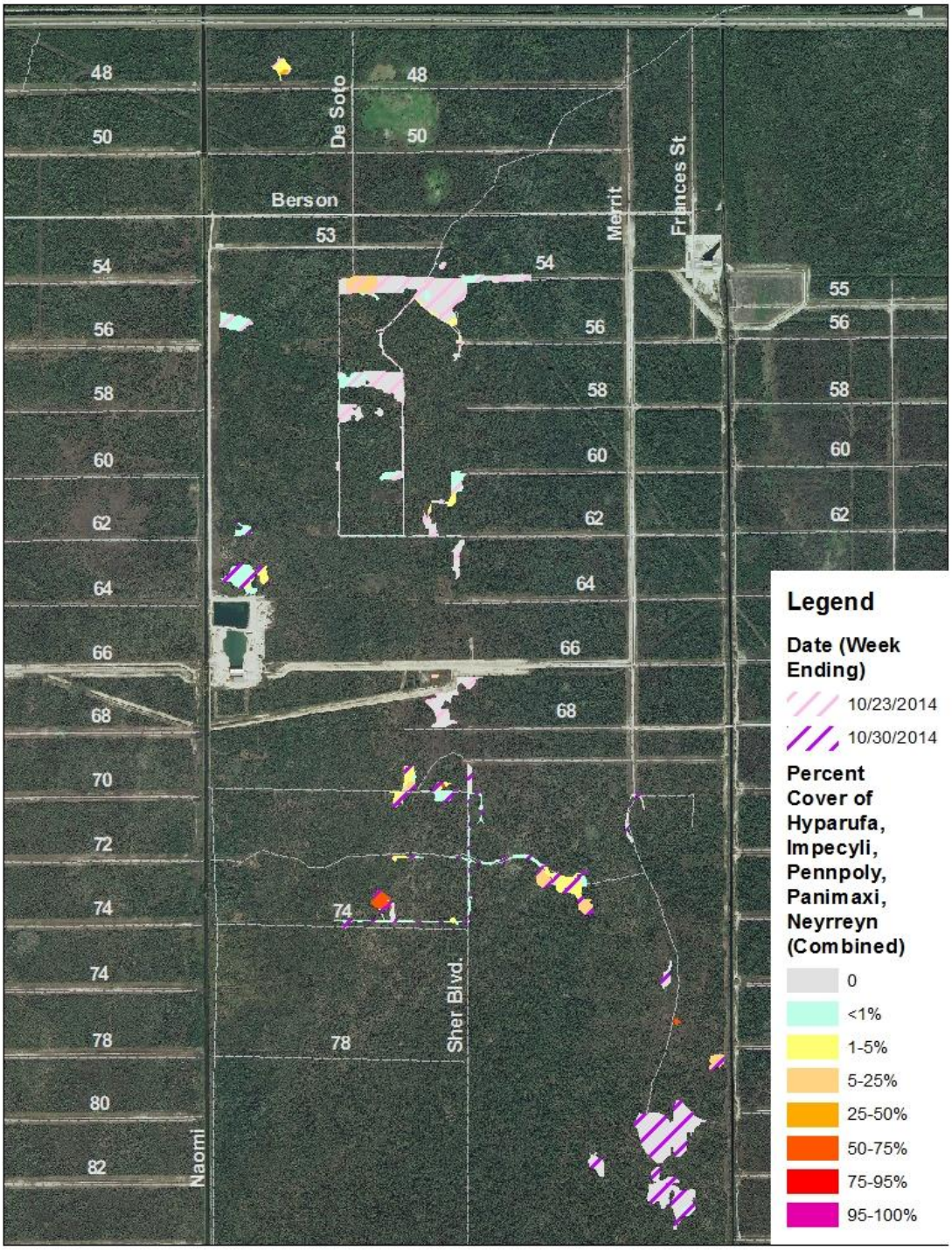

Figure 24: Area Covered by Foliar Re-Treatments (SFWMD) of Demolition Sites in Merritt Canal Phase at PSRP, FY 2014

Tables

Table 1: Individual Species Cover, Prairie Canal Footprints, Excluding Areas at "Maintenance Level".

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	1.70%	0.42%	0.26%	0.00%	0.43%	0.00%	0.95%	0.03%	0.03%	1.85%	0.00%
2013	1.22%	0.37%	1.02%	0.00%	0.77%	0.00%	1.75%	0.22%	0.07%	0.81%	0.00%
2012	0.56%	0.08%	0.45%	0.00%	0.33%	0.00%	0.43%	0.21%	0.03%	0.40%	0.00%
2011	0.56%	0.08%	0.20%	0.00%	0.33%	0.00%	0.51%	0.22%	0.08%	0.08%	0.00%
2010	0.55%	0.04%	0.30%	0.00%	0.08%	0.00%	0.38%	0.19%	0.09%	0.08%	0.00%
2009	1.58%	0.04%	0.16%	0.00%	0.08%	0.00%	0.51%	0.22%	0.17%	0.08%	0.00%
2008	2.58%	0.01%	0.16%	0.01%	0.08%	0.00%	1.13%	0.24%	0.18%	0.08%	0.00%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.02%	0.00%	0.01%	0.00%	0.02%	0.14%	0.18%	0.05%	0.10%	0.00%	0.00%
2013	0.02%	0.00%	0.02%	0.00%	0.02%	0.29%	0.25%	0.00%	0.26%	0.01%	0.00%
2012	0.02%	0.00%	0.00%	0.00%	0.02%	0.06%	0.07%	0.00%	0.24%	0.02%	0.00%
2011	0.02%	0.00%	0.00%	0.00%	0.02%	0.17%	0.11%	0.00%	0.20%	0.02%	0.00%
2010	0.02%	0.00%	0.00%	0.00%	0.02%	0.26%	0.19%	0.00%	0.29%	0.02%	0.00%
2009	0.02%	0.00%	0.00%	0.00%	0.02%	0.30%	0.07%	0.00%	0.13%	0.02%	0.00%
2008	0.02%	0.00%	0.00%	0.00%	0.02%	0.82%	0.07%	0.00%	0.13%	0.04%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.05%	1.45%	0.02%	5.67%	6.11%	0.01%	0.30%	0.00%
2013	0.07%	0.77%	0.03%	4.54%	6.82%	0.09%	2.34%	0.00%
2012	0.07%	0.69%	0.18%	2.69%	2.78%	0.11%	2.32%	0.00%
2011	0.08%	1.44%	0.18%	3.02%	2.78%	0.34%	2.31%	0.00%
2010	0.08%	1.72%	0.18%	3.02%	2.72%	0.43%	2.31%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2009	0.03%	2.08%	0.18%	1.62%	2.78%	0.30%	2.31%	0.00%
2008	0.29%	1.45%	0.07%	1.24%	2.93%	0.30%	2.34%	0.00%

*Prairie Canal Phase footprints, except Upper Two Miles of Canal and east to west roads south of 102nd and east of Patterson Blvd.

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 2: Individual Species Cover, Prairie Canal Phase footprints, Upper Two Miles of Canal.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	0.49%	0.00%	1.50%	0.00%	1.52%	0.00%	0.02%	0.00%	0.45%	0.12%	0.00%
2013	0.50%	0.00%	1.56%	0.00%	1.49%	0.00%	0.00%	0.00%	0.46%	0.12%	0.00%
2012	0.50%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.12%	0.00%
2011	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.12%	0.00%
2010	0.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.12%	0.06%
2009	0.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.12%	0.36%
2008	0.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.12%	0.36%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.45%	0.54%	0.00%	0.23%	0.00%	0.00%
2013	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.61%	0.00%	0.23%	0.00%	0.00%
2012	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.16%	0.00%	0.23%	0.00%	0.00%
2011	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.16%	0.00%	0.23%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.47%	0.00%	0.23%	0.00%	0.00%
2009	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.17%	0.00%	0.23%	0.00%	0.00%
2008	0.00%	0.00%	0.00%	0.00%	0.00%	3.03%	0.11%	0.00%	0.23%	0.00%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.00%	0.22%	0.00%	1.95%	7.78%	0.39%	0.34%	0.00%
2013	0.00%	0.13%	0.00%	1.86%	7.72%	0.41%	0.35%	0.00%
2012	0.00%	0.00%	0.00%	1.86%	7.70%	0.41%	0.35%	0.00%
2011	0.00%	0.00%	0.00%	1.86%	7.70%	0.41%	0.35%	0.00%
2010	0.00%	0.00%	0.00%	1.86%	7.69%	0.41%	0.35%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2009	0.00%	0.19%	0.00%	1.86%	7.70%	0.41%	0.35%	0.00%
2008	0.00%	0.19%	0.00%	2.25%	9.96%	0.41%	0.35%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 3: Individual Species Cover, Prairie Canal Phase footprints, East of Patterson South of 102nd.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	0.60%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.01%	0.04%	0.05%	0.00%
2013	0.60%	0.35%	0.00%	0.00%	0.24%	0.00%	0.00%	0.01%	0.13%	0.32%	0.00%
2012	0.50%	0.35%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.18%	0.15%	0.00%
2011	0.50%	0.35%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.17%	0.15%	0.00%
2010	0.50%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.16%	0.15%	0.00%
2009	0.50%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.46%	0.15%	0.00%
2008	0.50%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.46%	0.15%	0.00%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.00%	0.00%	0.16%	0.00%	0.00%	0.01%	0.00%	0.00%	0.35%	0.00%	0.00%
2013	0.00%	0.00%	0.16%	0.00%	0.00%	0.04%	0.00%	0.00%	0.45%	0.00%	0.00%
2012	0.00%	0.00%	0.05%	0.00%	0.00%	0.05%	0.00%	0.00%	0.15%	0.04%	0.00%
2011	0.00%	0.00%	0.05%	0.00%	0.00%	0.08%	0.00%	0.00%	0.02%	0.04%	0.00%
2010	0.00%	0.00%	0.05%	0.00%	0.00%	0.22%	0.03%	0.00%	0.02%	0.04%	0.00%
2009	0.00%	0.00%	0.05%	0.00%	0.00%	0.22%	0.03%	0.00%	0.02%	0.20%	0.00%
2008	0.00%	0.00%	0.05%	0.00%	0.00%	0.22%	0.03%	0.00%	0.02%	0.07%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2013	0.00%	0.02%	0.00%	1.01%	2.86%	0.00%	0.00%	0.00%
2013	0.00%	0.02%	0.00%	1.15%	2.30%	0.00%	0.12%	0.00%
2012	0.00%	0.03%	0.00%	1.61%	0.70%	0.07%	0.12%	0.00%
2011	0.00%	0.00%	0.00%	1.22%	0.70%	0.08%	0.12%	0.00%
2010	0.00%	0.00%	0.00%	2.34%	0.70%	0.07%	0.12%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2009	0.00%	0.46%	0.00%	0.50%	0.70%	0.07%	0.12%	0.00%
2008	0.00%	0.46%	0.00%	0.50%	0.70%	0.07%	0.12%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 4: Individual Species Cover, Prairie Canal Phase Demolition Sites and their Buffers.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	5.88%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.13%	0.14%	0.00%
2013	2.45%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%	0.00%
2012	2.43%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%
2011	2.43%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.29%	0.00%	0.00%
2010	8.15%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%
2009	14.14%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%
2008	14.16%	0.00%	0.00%	0.06%	0.02%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.00%	0.00%	0.01%	0.00%	0.00%	0.03%	0.00%	0.01%	0.01%	0.01%	0.02%
2013	0.00%	0.00%	0.01%	0.00%	0.00%	0.02%	0.00%	0.00%	0.01%	0.00%	0.00%
2012	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.01%	0.02%	0.00%	0.00%
2011	0.00%	0.00%	0.01%	0.00%	0.00%	0.02%	0.00%	0.00%	0.02%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%
2009	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%
2008	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.35%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.00%	0.54%	0.00%	1.70%	0.39%	0.02%	0.76%	0.00%
2013	0.00%	0.27%	0.00%	0.58%	0.31%	0.01%	0.50%	0.00%
2012	0.00%	0.26%	0.00%	0.67%	0.02%	0.01%	0.50%	0.00%
2011	0.00%	0.38%	0.00%	0.26%	0.02%	0.01%	2.49%	0.00%
2010	0.00%	0.46%	0.00%	0.48%	0.02%	0.01%	0.00%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2009	0.00%	0.46%	0.00%	0.48%	0.02%	0.01%	0.00%	0.00%
2008	0.00%	0.22%	0.00%	0.45%	0.05%	0.01%	0.02%	0.01%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 5: Individual Species Cover, Merritt Canal Phase Footprints.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	4.29%	0.31%	0.06%	0.00%	0.01%	0.00%	3.99%	0.03%	0.11%	3.43%	0.07%
2013	2.84%	0.08%	0.06%	0.00%	0.01%	0.00%	4.75%	0.05%	0.10%	0.96%	0.03%
2012	2.14%	0.00%	0.03%	0.00%	0.00%	0.00%	3.65%	0.06%	0.14%	0.18%	0.01%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.02%	0.00%	0.00%	0.00%	0.00%	0.21%	0.02%	0.50%	0.54%	0.04%	1.08%
2013	0.02%	0.00%	0.00%	0.00%	0.00%	0.36%	0.02%	0.01%	0.23%	0.00%	0.01%
2012	0.00%	0.00%	0.00%	0.00%	0.00%	0.42%	0.02%	0.05%	0.08%	0.00%	0.02%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.06%	1.97%	0.01%	10.66%	6.91%	0.15%	3.44%	0.01%
2013	0.07%	1.66%	0.00%	6.48%	10.26%	0.10%	4.58%	0.00%
2012	0.03%	0.36%	0.00%	4.97%	0.50%	0.44%	5.46%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 6: Individual Species Cover, Merritt Canal Phase Demolition Sites and their Buffers.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	2.99%	0.00%	0.00%	0.03%	0.00%	0.00%	0.06%	0.03%	1.33%	0.73%	0.18%
2013	2.52%	0.00%	0.00%	0.03%	0.00%	0.00%	0.07%	0.05%	1.30%	0.74%	0.02%
2012	4.41%	0.00%	0.00%	0.03%	0.00%	0.00%	0.04%	0.07%	2.69%	0.74%	0.07%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.00%	0.00%	0.04%	0.00%	0.00%	0.05%	0.00%	0.10%	0.01%	0.00%	0.39%
2013	0.00%	0.00%	0.05%	0.00%	0.00%	0.04%	0.00%	0.00%	0.01%	0.00%	0.01%
2012	0.00%	0.00%	0.05%	0.00%	0.00%	0.02%	0.00%	0.03%	0.00%	0.01%	0.07%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.00%	0.28%	0.00%	9.54%	0.16%	0.00%	0.76%	0.00%
2013	0.00%	0.01%	0.00%	9.49%	0.11%	0.00%	0.33%	0.00%
2012	0.00%	0.00%	0.00%	9.49%	0.06%	0.00%	0.33%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 7: Individual Species Cover, Prairie Canal Logging Tram Footprints.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	7.30%	0.00%	0.16%	0.00%	0.01%	0.00%	0.45%	0.00%	0.05%	1.45%	0.00%
2013	2.28%	0.00%	0.00%	0.00%	0.01%	0.00%	0.43%	0.00%	0.05%	0.32%	0.00%
2012	1.65%	0.00%	0.00%	0.00%	0.01%	0.00%	0.98%	0.00%	0.01%	0.02%	0.00%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.01%	0.07%	0.00%	0.00%
2013	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.07%	0.00%	0.00%
2012	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.03%	0.00%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.01%	0.53%	0.00%	0.66%	0.36%	0.23%	18.89%	0.00%
2013	0.01%	0.37%	0.00%	0.52%	0.09%	0.23%	23.80%	0.00%
2012	0.01%	0.37%	0.00%	0.46%	0.07%	0.39%	26.19%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 8: Individual Species Cover, Merritt Canal Logging Tram Footprints.

Year	Target Percent Cover (<)										
	1	N/A	5	1	5	N/A	N/A	1	1	5	1
	Schitere	Bothpert	Cynodact	Diosbulb	Eragatro	Eragbahi	Hetecont	Hyparufa	Impecyli	Lantcama	Leucleuc
2014	3.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%	0.00%	0.09%	1.49%	0.00%
2013	1.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%	0.23%	0.00%
2012	1.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%	0.15%	0.00%

Year	Target Percent Cover (<)										
	5	1	1	N/A	N/A	1	1	1	5	1	1
	Ludwperu	Lygomicr	Melaquin	Nephmult	Nephcord	Neyrreyn	Panirepe	Panimaxi	Paspurvi	Pennpurp	Pennpoly
2014	0.00%	0.00%	0.01%	0.00%	0.00%	0.03%	0.00%	0.00%	0.01%	0.00%	0.02%
2013	0.00%	0.00%	0.01%	0.00%	0.00%	0.13%	0.00%	0.02%	0.02%	0.00%	0.00%
2012	0.00%	0.00%	0.01%	0.00%	0.00%	0.13%	0.00%	0.15%	0.11%	0.00%	0.00%

Year	Target Percent Cover (<)							
	5	5	1	N/A	N/A	5	5	1
	Phraaust	Rhynrepe	Sennalat	Sporindi	Spervert	Typhdomi	Urenloba	Urocmuti
2014	0.00%	0.22%	0.00%	1.09%	1.02%	0.00%	14.06%	0.00%
2013	0.00%	0.49%	0.00%	2.06%	0.39%	0.03%	28.39%	0.00%
2012	0.00%	0.46%	0.00%	2.05%	0.11%	0.03%	28.39%	0.00%

FLEPPC Category I Species	FLEPPC Category II Species	Non-FLEPPC Species

Table 9: Approximate Costs by Treatment in FY 2014				
Treatment	Dates	Cost	Location	Total Acres
Faka Union Canal (ACOE) Foliar Application; Targets: Impecyli, Neyrreyn, Pennpoly, Paspurvi	8/8/2013 to 3/18/2014	Not available, but some cost included below	Inside Footprints, including Logging Trams, and Adjacent Impecyli Patches	866.5
			TOTAL:	849.3
Basal-bark Treatments of Logging Trams in Prairie Canal (ACOE); Targets: Schitere, Lantcama	2/3/2014 to 3/18/2014	$163,217 (includes some foliar treatment in Faka Union)	Inside Logging Tram Footprint	132.6
			50' outside footprint	31.8
			Outside Footprint	236.4
			Inside Footprint	0.3
			TOTAL:	401.1
Cut-stump Treatment of Melaleuca (FWC/SFWMD)	3/16/2014 to 6/11/2014	$100,000	Miller Canal Phase	158.1
			Belle Meade	356.9
			TOTAL:	515.0
Foliar Treatments in Footprints of Prairie Canal Phase (SFWMD); Targets: Cynodact, Impecyli, Neyrreyn, Panirepe, Panimaxi, Paspurvi, Pennpoly, Phraaust	5/10/2014 to 6/4/2014	Cost not separable from Basal Bark Treatments (below) but estimated to be much less than 25% of budget	Inside Footprint	1,267.4
			Inside Footprint Broken Wing Ditch	15.0
			Inside Logging Tram Footprint	33.5
			New Footprint	14.0
			50' outside footprint	37.0
			Outside Footprint	9.4
			Demolition Site (outside Broken Wing)	2.2
			TOTAL:	1,378.6
Basal Bark Treatments of Brazilian Pepper and Lantana in Footprints of Prairie Canal Phase (SFWMD)	5/10/2014 to 7/3/2014 (one area 8/7/2014)	$141,628	50' outside footprint	39.4
			Inside Footprint	1,460.7
			Inside Footprint Broken Wing Ditch	28.6
			New Footprint	39.9
			Inside Logging Tram Footprint	49.7
			TOTAL:	1,618.3
Basal Bark Treatments of Brazilian Pepper and Lantana at Demolition Sites of Prairie Canal Phase (SFWMD)	7/8/2014 to 9/25/2014	$180,125	Demolition Site	67.6
			Demolition Site Buffer	1,672.5
			Adjacent to Footprint	0.2
			TOTAL:	1,740.3
Basal Bark Treatments of Brazilian pepper, Leadtree, Air-potato and Lantana at Demolition Sites of Merritt Canal (SFWMD)	9/29/2014 to 10/9/2014	Not Available	Demolition Site	60.9
			Demolition Site Buffer	76.1
			Inside Footprint*	5.1
			TOTAL:	142.1
Foliar Treatments in Merritt Canal (SFWMD); Targets: included Hyparufa, Impecyli, Neyrreyn, Panimaxi, and Pennpoly	10/20/2014 to 10/30/2014	Not Available	Demolition Site	78.2
			Demolition Site Buffer	119.3
			Inside Footprint	5.1
			TOTAL:	202.7
	TOTAL:	$584,970	GRAND TOTAL:	5,934.2

Table 10: Acres Covered by Foliar Treatment of Primary Targets* in Faka Union Phase at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95%	Total Acres
Faka Union Canal (ACOE)	8/8/2013 to 3/18/2014	Inside Footprints, including Logging Trams, and Adjacent Impecyli Patches	305.2	120.6	283.3	104.3	16.2	10.3	9.3	17.2	866.5
		TOTAL:	305.2	120.6	283.3	104.3	16.2	10.3	9.3	17.2	866.5

* Species Targeted included Impecyli, Neyrreyn, Pennpoly, Paspurvi

Table 11: Acres Covered by Treatment of Brazilian pepper and Lantana in Logging Trams in Prairie Canal Phase at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95%	Total Acres
Basal-Bark (ACOE)	2/3/2014 to 3/18/2014	Inside Logging Tram Footprint	2.3	5.2	52.3	65.5	7.3				132.6
		50' outside footprint	0.2	21.6	6.2	0.5	3.2	0.1			31.8
		Outside Footprint	24.8	10.9	46.3	74.2	27.7	28.7	23.9		236.4
		Inside Footprint		0.3							0.3
		TOTAL:	27.2	38.1	104.8	140.1	38.2	28.8	23.9		401.1

Table 12: Acres Covered by Treatment of Melaleuca at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95%	Total Acres
Cut-stump (FWC/SFWMD)	3/16/2014 to 6/11/2014	Miller Canal Phase	3.9	42.8	66.2	6.5	0.6	14.2	23.8		158.1
		Belle Meade	57.6	121.9	106.8	63.0	3.7	2.1	1.9		356.9
		TOTAL:	61.5	164.7	173.0	69.5	4.3	16.3	25.8		515.0

Table 13: Acres Covered by Foliar Treatment of Primary Targets* in Prairie Canal Phase Footprints at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95%	Total Acres
Foliar Prairie Canal (SFWMD)	5/10/2014 to 6/4/2014	Inside Footprint	574.9	427.5	245.1	17.3	2.7				1,267.4
		Inside Footprint Broken Wing Ditch	8.5	4.6	2.0						15.0
		Inside Logging Tram Footprint	26.8	3.0	2.7	0.3	0.7				33.5
		New Footprint	14.0	0.0							14.0
		50' outside footprint	28.4	3.6	2.9	2.1					37.0
		Outside Footprint	0.8	0.4	4.7	2.0		1.3	0.1		9.4
		Demolition Site (outside Broken Wing)	2.2								2.2
		TOTAL:	655.7	439.0	257.4	21.7	3.4	1.3	0.1		1,378.6

* Species Targeted included Cynodact, Impecyli, Neyrreyn, Panirepe, Panimaxi, Paspurvi, Pennpoly, Phraaust

Table 14: Acres Covered by Treatment of Brazilian pepper and Lantana in Prairie Canal Phase Footprints at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95%	Total Acres
Basal-Bark Prairie Canal (SFWMD)	5/10/2014 to 8/7/2014	50' outside footprint	1.6	26.6	10.2	0.6	0.3				39.4
		Inside Footprint	284.1	472.7	456.3	210.0	37.2	0.4			1,460.7
		Inside Footprint Broken Wing Ditch	1.3	2.5	14.0	4.8	6.1	0.0			28.6
		New Footprint	3.7	12.7	13.7	5.1	4.1	0.5			39.9
		Inside Logging Tram Footprint	23.1	5.3	7.6	10.2	2.4	1.1			49.7
		TOTAL:	313.9	519.9	501.8	230.7	50.1	1.9	0.0		1,618.3

Table 15: Acres Covered by Treatment of Brazilian pepper and Lantana at Prairie Canal Demolition Sites and their Buffers at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95 %	Total Acres
Basal-bark Prairie Canal (SFWMD)	7/8/2014 to 9/25/2014	Demolition Site	1.3	14.8	34.3	13.9	1.1	1.7	0.5		67.6
		Demolition Site Buffer	33.4	895.8	324.3	303.7	114.5	0.8			1,672.5
		Adjacent to Footprint						0.1	0.1		0.2
		TOTAL:	2.5	29.6	358.7	317.6	115.6	2.5	0.6		1,740.3

Table 16: Acres Covered by Treatment of Brazilian pepper, Leadtree, Air-potato and Lantana at Merritt Canal Demolition Sites and their Buffers at PSRP, end of FY 2014											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95 %	Total Acres
Merritt Canal (SFWMD)	9/29/2014 to 10/9/2014	Demolition Site	1.1	0.9	22.5	31.8	4.6				60.9
		Demolition Site Buffer	3.0	5.6	41.9	25.5					76.1
		Inside Footprint*	1.2	1.9		2.0					5.1
		TOTAL:	5.3	8.4	64.4	59.3	4.6	0.0	0.0		142.1

* road footprint with leadtree adjacent to homesite

Table 17: Acres Covered by Foliar Treatment* at Merritt Canal Demolition Sites and their Buffers at PSRP, end of FY 2014.											
Treatment	Dates	Location	0	0-<1%	1-5%	5-25%	25-50%	50-75%	75-95%	>95 %	Total Acres
Merritt Canal (SFWMD)	10/20/2014 to 10/30/2014	Demolition Site	39.1	20.8	10.6	7.3	0.4				78.2
		Demolition Site Buffer	94.8	11.3	6.0	4.2		3.0			119.3
		Inside Footprint	3.6	1.5							5.1
		TOTAL:	137.5	33.7	16.6	11.6	0.4	3.0	0.0		202.7

* Species Targeted included Hyparufa, Impecyli, Neyrreyn, Panimaxi, and Pennpoly

Appendix 1: Acceptable Maintenance Levels of Picayune Nuisance Exotic and Native Plant Species

Scientific Name	Common Names	Target Ground Cover (%)	Wetland (W) Upland (U)	FLEPPC Category I or II	Ability to Control Based on Our Treatment Control since 2008	Maintenance Treatment Schedule	Monitoring Schedule
Dioscorea bulbifera	Air potato	<1	U	I	Multiple retreatments every ** For years	1X/Yr	1X/Yr
Hymenachne	West Indian Marsh Grass	<1	W	I	But where downstream and untreated Hymenachne - No	1X/Yr	1X/Yr
Imperata cylindrica	Congongrass, Cogongrass	<1	U	I	Requires multiple treatments - some areas to 0 now took >10 treatments	1-2X/Yr	1X/Yr
Lygodium spp.	Climbing fern	<1	W	I		Opportunistic	Opportunistic
Melaleuca quinquenervia	Punktree	<1	W	I	After get control of large trees, establish a 3-year cycle of retreatment for new seedlings; if miss a cycle, have to plan on a more frequent cycle to catch up	3 Yr	3 Yr
Neyraudia reynaudiana	Burmareed, Silkreed	<1	U	I		3 Yr	3 Yr
Panicum repens	Torpedo grass	<1	W	I		1-2X/Yr	1-2X/Yr
Pennisetum purpureum	Napier grass, Elephantgrass	<1	U	I		3 Yr	3 Yr
Schinus terebinthifolius	Brazilian-pepper	<1	U	I		3-5 Yr	3-5 Yr
Senna pedula		<1	U	I		Opportunistic	Opportunistic
Urochloa mutica	Paragrass	<1	W	I	Treated one patch and it's gone; more exists along Faka Union Canal	?	?
Lantana camara	Shrubverbena	<5	U	I	Should be timed with the pepper treatments, but can be foliar treated if do all leaves	3-5 Yr	3-5 Yr

Scientific Name	Common Names	Target Ground Cover (%)	Wetland (W) Upland (U)	FLEPPC Category I or II	Ability to Control Based on Our Treatment Control since 2008	Maintenance Treatment Schedule	Monitoring Schedule
Ludwigia peruviana	Peruvian primrosewillow	<5	W	**I**		Undetermined	Undetermined
Melinis repens	Rose Natalgrass	<5	U	**I**	Grows fast; flowers fast; need to find contractors who recognize it without flowers	1-2X/Yr	1-2X/Yr
Urena lobata	Caesarweed	<5	U	**I**	timing with fire or clearing (i.e. 1st year)	Opportunistic	Opportunistic
Nephrolepis cordifolia	Tuberous sword fern	Undetermined	U	**I**	May hybridize with Nephrolepis exal/lois (natives); may be lost cause? Non-target damage?	Undetermined	Undetermined
Nephrolepis multiflora	Asian sword fern	Undetermined	U	**I**	May hybridize with Nephrolepis exal/lois (natives); may be lost cause? Non-target damage?	Undetermined	Undetermined
Hemarthria altissima		<1	W	**II**	According to ove & Ellen's colleagues	Undetermined	Undetermined
Hyparrhenia rufa	Jaraguá	<1	U	**II**	Seed bank? Yes- so far all patches treated since 2009 still have little bit left	1X/Yr	1X/Yr
Panicum maximum	Guineagrass	<1	U	**II**	But can re-emerge after years of 0; seedbank	1X/Yr	1X/Yr
Albizia lebbeck, Leucaena leucocephala, etc	Leadtree & other hard-to-kill	<1	U	**I,II**	Treatable; save vague: higher concentration of chemical	3-5 Yr	3-5 Yr
Dactyloctenium aegyptium	Crow's-foot grass, Durban crowfootgrass	<5	U	**II**	Not applicable - hope it goes away with succesion. Has been reduced along Prairie Canal	NA	NA
Pennisetum polystachion	West Indian Pennisetum	<1	U			1X/Yr	1X/Yr
Rottboellia cochinensis	Itchgrass	<1	U		Retreatments - multiple	Opportunistic	Opportunistic
Senna alata	Candlestick plant	<1	U		Takes retreatments	1X/Yr	1X/Yr

Scientific Name	Common Names	Target Ground Cover (%)	Wetland (W) Upland (U)	FLEPPC Category I or II	Ability to Control Based on Our Treatment Control since 2008	Maintenance Treatment Schedule	Monitoring Schedule
Cynodon dactylon	Bermuda grass	<5	U		Hard to kill - word from LA that it is controllable, but we have lost ground so far	1X/Yr	1X/Yr
Eragrostis atrovirens	Thalia love grass	<5	W		Too much trouble to train crews so far		
Paspalum urvillei	Vasey grass	<5	Both		Expanded extent, not cover despite treatment	1X/Yr	1X/Yr
Phragmites australis	Common reed	<5	W		Hard to kill; requires heavy dose of herbicide	1-3 Yr	1X/Yr
Typha domingensis	Southern cattail	<5	W		Maybe okay if greater than 1-5? ; in some brackish marsh (Mfs) -maybe not controllable		1X/Yr
Bothriochloa pertusa	Pitted bluestem, Pitted beardgrass X	Undetermined	U		Only in disturbed footprints; Along actual roads	Undetermined	Undetermined
Eragrostis bahiensis	lovegrass X	Undetermined	U		Had some preliminary success at soil remediation sites, then budget cut		
Heteropogon contortus	Tanglehead X	Undetermined	U		Had some success, then stopped first year		
Spermacocea verticillata	Buttonweed	Undetermined	U		Hard to kill	Undetermined	Undetermined
Sporobolus indicus var. pyramidalis	West Indian dropseed, smutgrass X	Undetermined	U			Undetermined	Undetermined
	X - Problem in footprints, but not in woods Hl						

Scientific Name	Common Names	Target Ground Cover (%)	Wetland (W) Upland (U)	FLEPPC Category I or II	Ability to Control Based on Our Treatment Control since 2008	Maintenance Treatment Schedule	Monitoring Schedule
Anticipated Species (BOLO)							
Mikania micrantha	Mile-a-Minute Vine		U	**II**		Opportunistic	Opportunistic
Scirpus cubensis	Cuban bulrush		W			Opportunistic	Opportunistic
Scleria lacutris	Wright's nutsedge		W	**I**		Opportunistic	Opportunistic
Urochloa sp.	Sig Walker Grass		W			Opportunistic	Opportunistic