FINAL REPORT
***US EPA – Gulf of Mexico Division* Agreement Number: GC-00D80021-2**

Restoration & Enhancement of Habitat for Resident & Migratory Birds in the Barataria Basin

Project Period: 09/01/2021 - 02/29/2024

Below is a summary of the Activities, Outputs and Outcomes included in the grant narrative including measurements and analysis of data

Activity 1 - Herbicide treatment of non-native, invasive vegetation on the 650-acre Woodlands Preserve property with an anticipated outcome of reduction in non-native, invasive vegetation.

Output - A forestry labor team conducted herbicide treatment on the 650-acre Woodlands Preserve property April 11, 2022 through May 4, 2022.

Outcome Measures – Outcome measures included Permanent Plot assessments, UAS Forest Monitoring, 5-meter Fixed-Radius surveys, Transect surveys.

PERMANENT PLOT ASSESSMENTS

Sixteen 20 x 20-meter permanent vegetation plots were surveyed at Woodlands Preserve to document the percent cover, stem density, and frequency of the non-native *Triadica sebifera* (previously *Sapium sebiferum*) Chinese tallow, *Ligustrum sinense* Chinese privet, and other common native and introduced species stem frequency and basal area of Chinese tallow and Chinese privet were evaluated. Our key comparison was the (2019 and 2022) pre- to (2023) post-herbicide periods.

Table 1. Stem cross-sectional area of Chinese tallow and Privet sp. in Permanent Plots at Woodlands Preserve.

Stand basal area (mean m^2/ha)	Pre-Herbicide	Pre-Herbicide	Post-Herbicide	Overall (all yrs)
Species	**March 2019**	**March 2022**	**March 2023**	**2019-2023**
Tallow	1.830	3.915	0.326	2.024
Privet sp.	0.077	0.136	0.001	0.071
Total Invasives	**0.954**	**2.026**	**0.163**	**1.048**

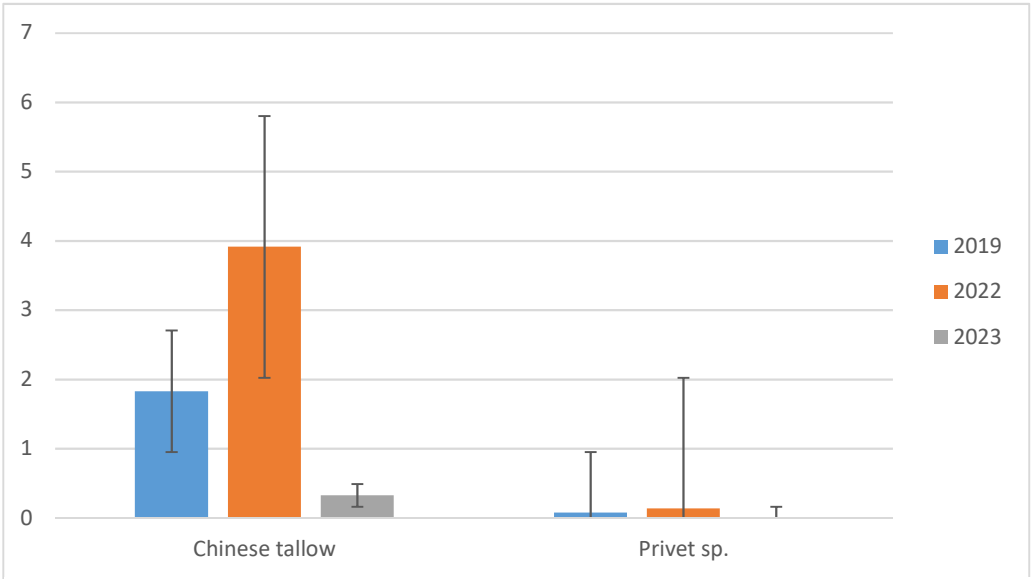


Figure 1. Basal area of Chinese tallow and Chinese privet within permanent plots at Woodlands Preserve (mean±1se).

The Basal Area data shows a 113% increase in Chinese tallow from 2019 to 2022 basal area coverage within the permanent plots and a 92% decrease in Chinese tallow from 2022 to 2023 (post-herbiciding). Thus, there was a significant reduction in Chinese tallow following herbicide treatment. The Basal Area data shows an 86% increase in Chinese privet from 2019 to 2022 basal area coverage within the permanent plots and a 99.6% decline between 2022 to 2023. Thus, there was a more than 90% decrease in basal area occupied by both Chinese tallow and Chinese privet following herbicide treatment.

Table 2. Stem density of Chinese tallow and Privet sp. in Permanent Plots at Woodlands Preserve.

Average of Density(individuals/ha)	**Column Labels**			
Row Labels	**2019**	**2022**	**2023**	**Grand Total**
Chinese tallow	1626.811784	2231.165108	2184.22955	2014.068814
Privet sp.	572.2167578	578.1043578	104.6043674	418.3084944
Grand Total	**1099.514271**	**1404.634733**	**1144.416959**	**1216.188654**

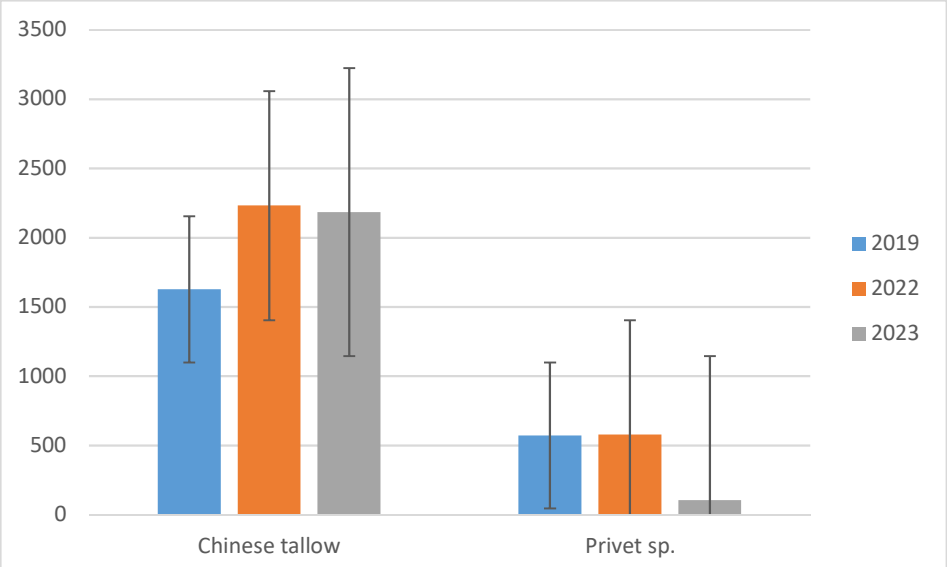


Figure 2. Frequency of Chinese and Chinese privet in Permanent Plots at Woodlands Preserve (mean ±1se).

Individual Chinese tallow within permanent plots increased 37% from 2019 to 2022 and only decreased 2% from 2022 to 2023. Chinese privet individuals increased 1% from 2019 to 2022 and then declined 82% from 2022 to 2023. In summary, there are a fewer privet individuals following treatment and those that did exist are covering a smaller basal area within the permanent plots. Tallow showed a significant decrease in basal area occupied but there continues to be a flush of individuals emerging from the seedbank but not covering a significant basal area. Trees shorter than 1.5m are assigned a DBH of zero. Herbicide treatment was repeated in 2023 following data collection and is tentatively scheduled to be repeated in 2024 to target non-native vegetation emerging from the seedbank.

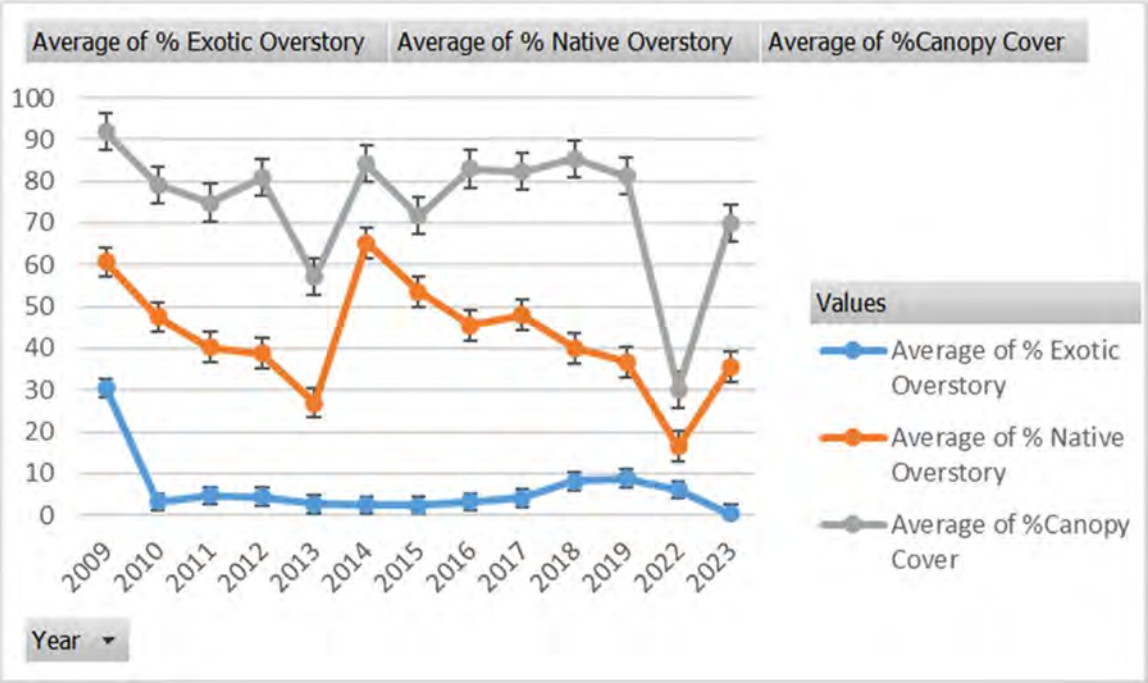


Figure 3. Summary of Exotic and Native Overstory at Woodlands Preserve 2009-2023. First blanketed herbicide treatment funding by EPA occurred in 2022 (mean ±1se).

Analysis of the densitometer data shows and average decrease of overall Canopy Cover of 63% from 2019 to 2022 before increasing 132% from 2022 to 2023.

Exotic overstory (via visual estimates) decreased 30% from 2019 to 2022 and then 94% from 2022 to 2023. Native overstory (via visual estimates) decreased 55% from 2019 to 2022 but increased 115% from 2022 to 2023.

UNMANNED AERIAL SYSTEM (UAS) SENTINEL FOREST MONITORING

We mapped our Woodlands Preserve region with aerial drones (DJI Mavics and eBee X) to characterize the overall canopy and compare large-scale variation of canopy across our site in March and December of 2022 and 2023, although an onboard systems failure near the start of our December 2023 runs led to the crashing of our aircraft and so effectively no useful data being collected in December of 2023. Drone imagery was collected with RGB sensors (cameras) typically flying at approximately 250' above ground. Individual images were then stitched together to produce a photomosaic maps using the structure from motion tool Pix4Dmapper. Pix4D processes individual images through keypoint matching, camera optimization, point cloud densification, and finally the generation of a DSM and orthomosaic. Those Pix4D outputs were brought into ArcGIS Pro for the final step of analyses. Our high-resolution visual spectrum photomosaic map was then converted to Visible Atmospherically Resistant Index (VARI). VARI is a vegetation index designed to emphasize vegetation in the visible portion of the spectrum, while mitigating illumination differences and atmospheric effects. VARI can be used to assess vegetation health and is less sensitive to atmospheric effects compared to other indices like NDVI and particularly useful for assessing vegetation conditions over large areas. The VARI index outputs dimensionless, relative values ranging between -1 and 1, with higher values indicating more vegetation greenness. Lastly we explored the absolute greenness of three subregions of our monitoring area (the region proximate to our entrance "Trail B", the region approximately a kilometer down the main trail "Trail A," and finally the region most distal to our entrance, "Trail D").

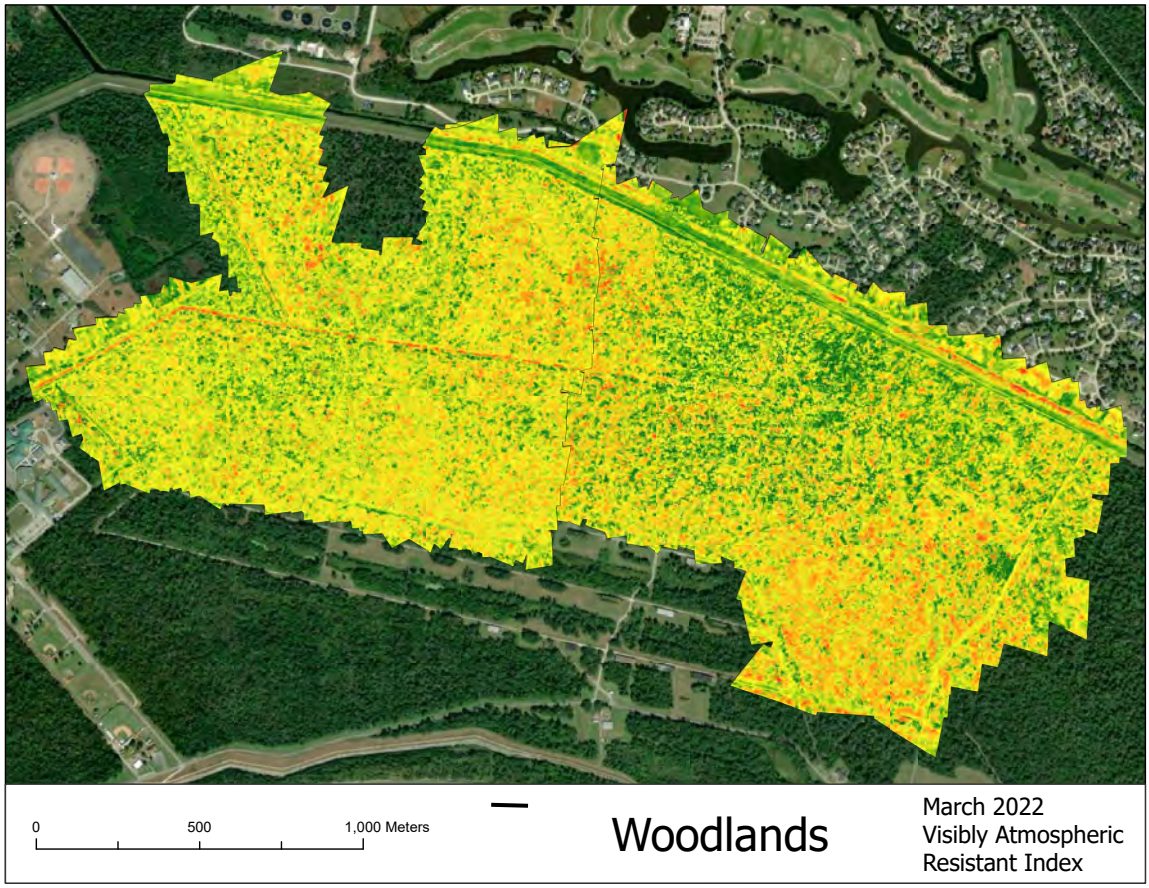
Figure 4. Location of focal Greenness measurements regions at Woodlands Preserve.

Table 3. Remotely sensed aggregate canopy condition over time via aerial mapping across Woodlands Preserve.

Woodlands Aerial Mapping-Derived Canopy Condition

	VARI Score (Relative Scale)				**Regional Greenness (**Prop of Max Green)		
	Min	Max	Mean	SD	Trail B Region	Trail A Region	Trail D Region
March 2022	-25	26	0.001	0.112	0.129	0.2	0.329
Dec 2022	-27	29	0.025	0.077	0.235	0.294	0.408
March 2023	-34	36	0.092	0.129	0.278	0.345	0.325
Dec 2023	Coverage Too Low for Calcs						

Sitewide woodland canopy VARI showed increasing greenness as we progressed over time, matching the qualitative patterns observed of post-Ida overstory recovery. For all periods monitored, the overall canopy greenness showed a pattern of least green/least intact canopy in the area nearest the property entrance (Trail B Region) increasing across the property as we move eastward (into the Trail A region and then Trail D region). This holds even through the strong seasonal difference of leaf set between early late fall and early spring. In March of 2022, Trail B was only 39% as green as our most robust canopy region of Trail D (0.129 vs 0.329 of max greenness). By December of 2022 the differences in canopy had shrunk Trail B was 58% as green as Trail D (0.235 vs 0.408 of max greenness). And by March of 2023 they were much closer to parity with the Trail B region 86% as green as the Trail D region (0.278 vs 0.325 of max greenness), with our intermediary region of Trail A actually exhibiting a greener canopy than our Trail D region. Canopy recovery and reduced overstory heterogeneity trends seems likely to continue baring additional significant canopy disturbance.



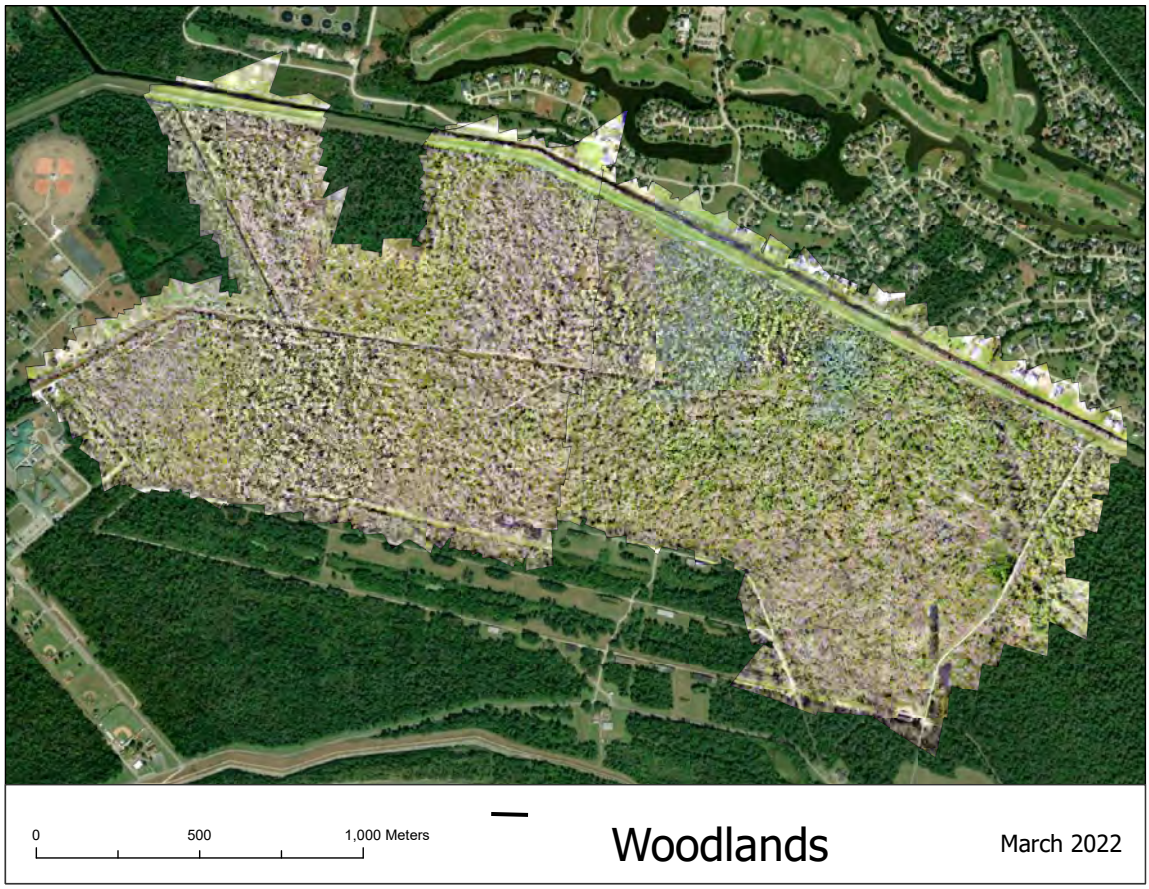


Figure 5. March 2022: Woodlands Preserve drone-derived orthomosaic of VARI (top) and visible (below) imagery. VARI scale is dimensionless; orange = less vegetation/sparse canopy, green = more vegetation/contiguous canopy.

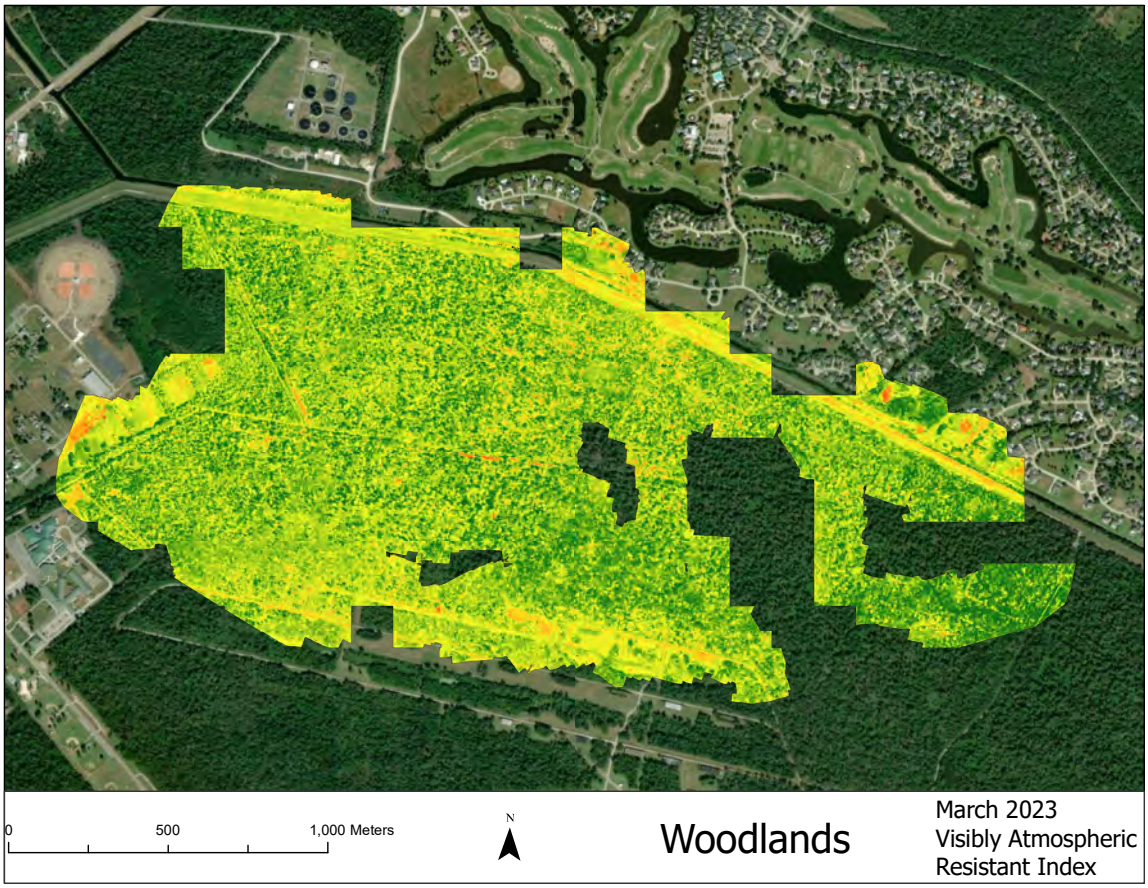


Figure 6. March 2023: Woodlands Preserve drone-derived orthomosaic of VARI (top) and visible (below) imagery. VARI scale is dimensionless; orange = less vegetation/sparse canopy, green = more vegetation/contiguous canopy.

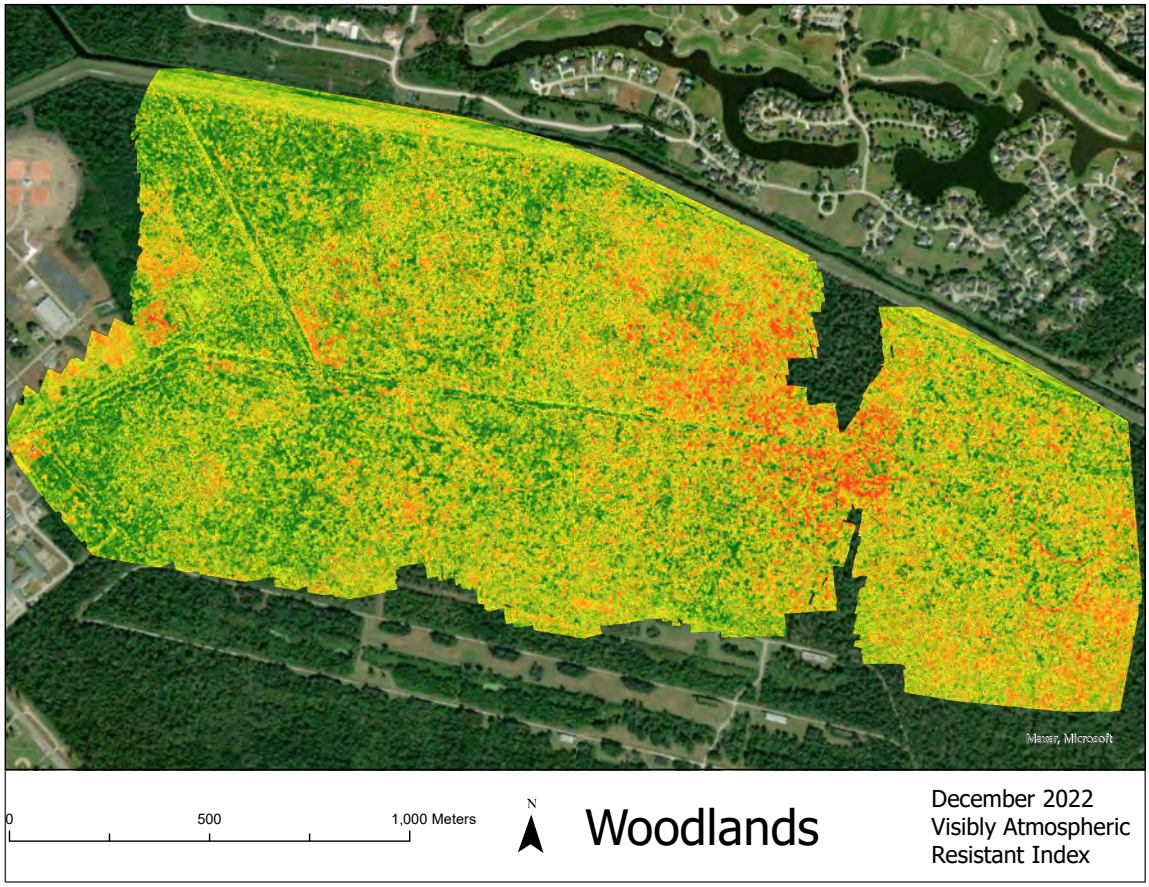


Figure 7. December 2022: Woodlands Preserve drone-derived orthomosaic of VARI (top) and visible (below) imagery. VARI scale is dimensionless; orange = less vegetation/sparse canopy, green = more vegetation/contiguous canopy.

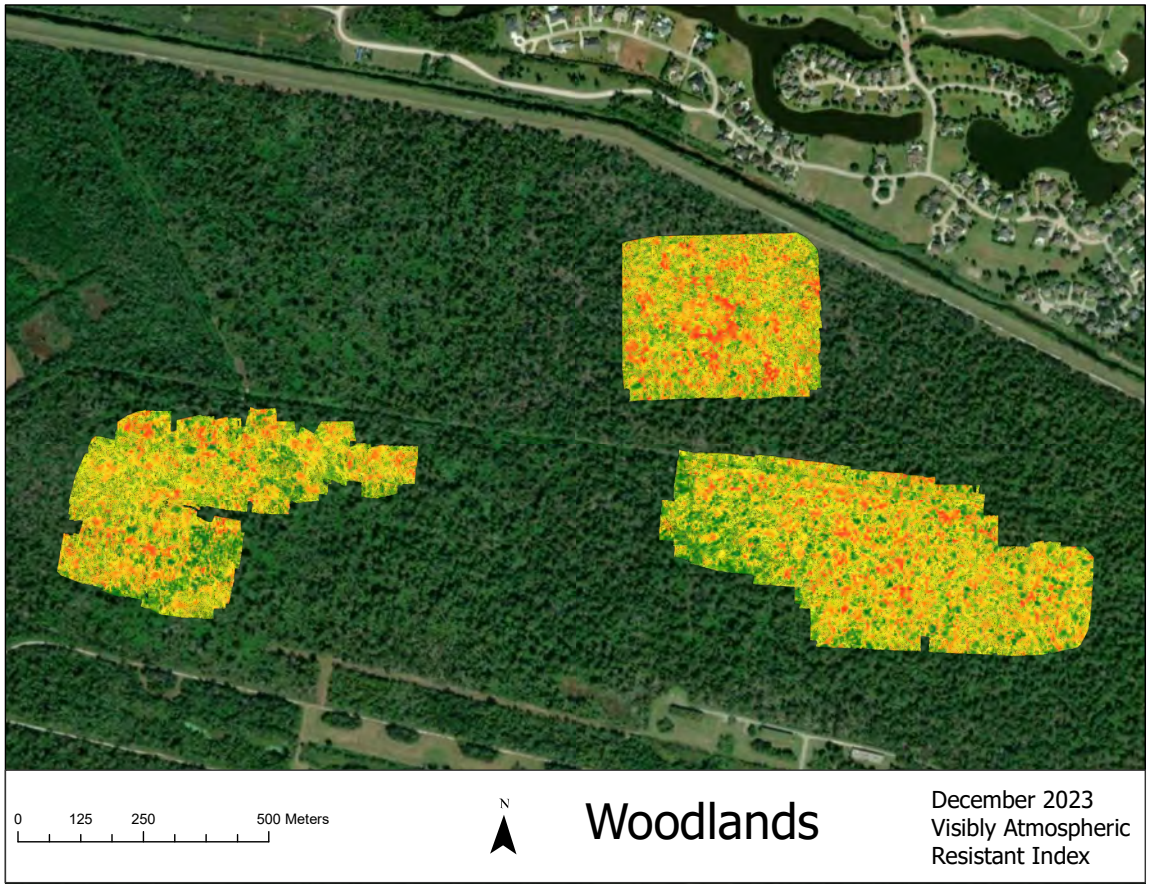


Figure 8. December 2023: Woodlands Preserve drone-derived partial orthomosaics. Note: onboard systems failure prevented full mapping runs; these maps are provided for completeness, but were not usable for quantitative analysis.

5-METER FIXED RADIUS SURVEYS

Seven (7) Fixed-5-meter Radius plots were assessed within the 650-acre Woodlands Preserve site. The sites were randomly selected within open and closed canopy areas of the forest identified visually from the drone imagery. These surveys were conducted to validate visual results of the UAV Drone imagery. 3 Test plots were assessed in the areas that appeared absent of forest canopy, i.e. No canopy plots. and 4 Control plots randomly selected in what appeared to be closed canopy areas of the forest. Two Field Biologists recorded species, DBH, height for all native and non-native woody vegetation. Additional measures included % of native and exotic overstory.

Figure 9. Map showing location of Fixed-Radius plots within Woodlands Preserve.

Results of the Fixed-Radius surveys show .08% non-native trees within the plots surveyed and 92% native trees. All plots had 100% native overstory and 0% Exotic/Non-native overstory.

TRANSECT SURVEYS

Long-term band transects conducted by California State University Channel Islands document the current state of invaders across various forest segments proximate to trails during March on an annual basis beginning in 2014. During the grant period, transect surveys were conducted March 11-19, 2022 and March 18-25, 2023.

Figure 10. Map showing location of Band Transect surveys within Woodlands Preserve.

These surveys consist of sampling woody vegetation along 2-meter wide belt transects spaced at 50-meter intervals relative to the fixed geographic feature of the existing trail system at Woodlands Preserve. This arrangement allows repeat surveys to be conducted at approximately the same spatial location when repeated. Typically transects are 100 m long (2 m wide x 100 m lengths of contiguous surveying). Occasionally circumstances (*i.e*. standing water, canals, particularly thick/impenetrable tree falls) may necessitate terminating a transect shorter than the standard 100 m. The data recorded include species, DBH and height of all woody individuals, percent native and exotic canopy cover, percent cover of fern understory, and percent cover of blackberry understory, the present of logs (defined as wood with a diameter >10 cm) and leaf and wood litter depth and presence of logs.

While we have no data during the COVID-19 peak years of 2020 and 2021 owing to travel restrictions, the overall trend has been for a continued decline in invader abundance in recent years, save for a slight uptick in the 2022 (in the wake of Hurricane Ida, the strongest post-Katrina Hurricane storm to strike our region). As measured by the relative amount of cover, our most problematic invaders have been on the decline and well below our 10% management target. While overall tallow cover (combined adults + recruits) peaked below 8% 6 months post-Hurricane Ida's disturbance (in 2022), tallow adults and recruits each covered less than 1% of our survey area by Spring of 2023. Overall Privet showed a similar 2022 increase (<1.5%), with neither Privet adults nor recruits covering more than 1% of our survey area by 2023.

Young Invaders Across Band Transects

Woody invasive recruits with no DBH (*i.e*. trees whose total height is less than 1.5 m) were poised to undergird an explosion of non-natives prior to our 2022 treatment (Figs. 11-13).

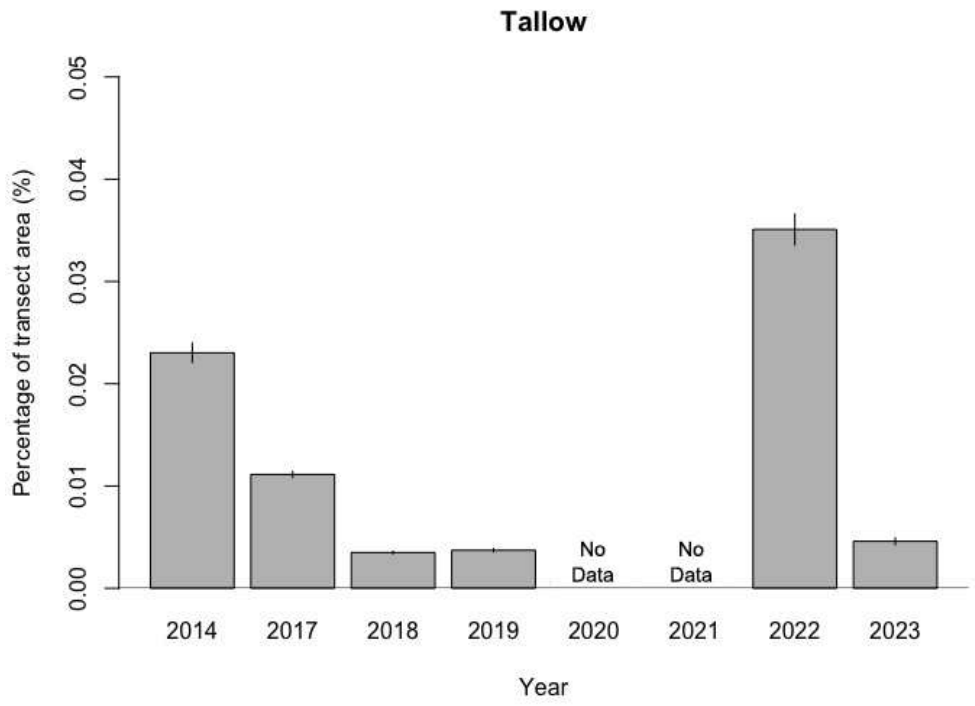


Figure 11. Juvenile (height < 1.5 m, DBH = 0 cm) tallow stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

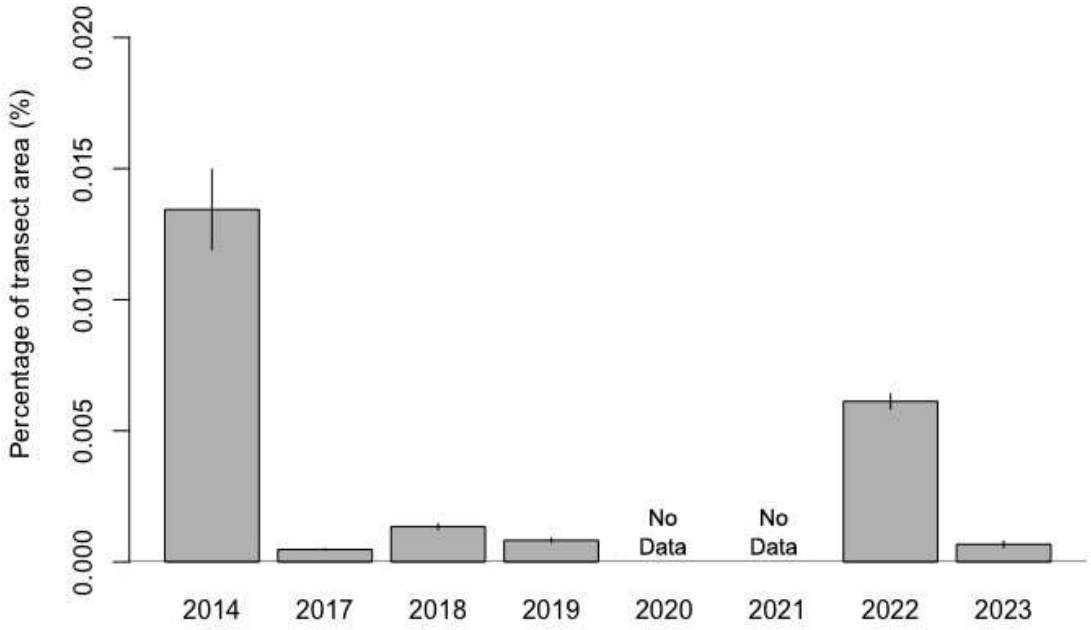


Figure 12. Juvenile (height < 1.5 m, DBH = 0 cm) Privet sp. stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

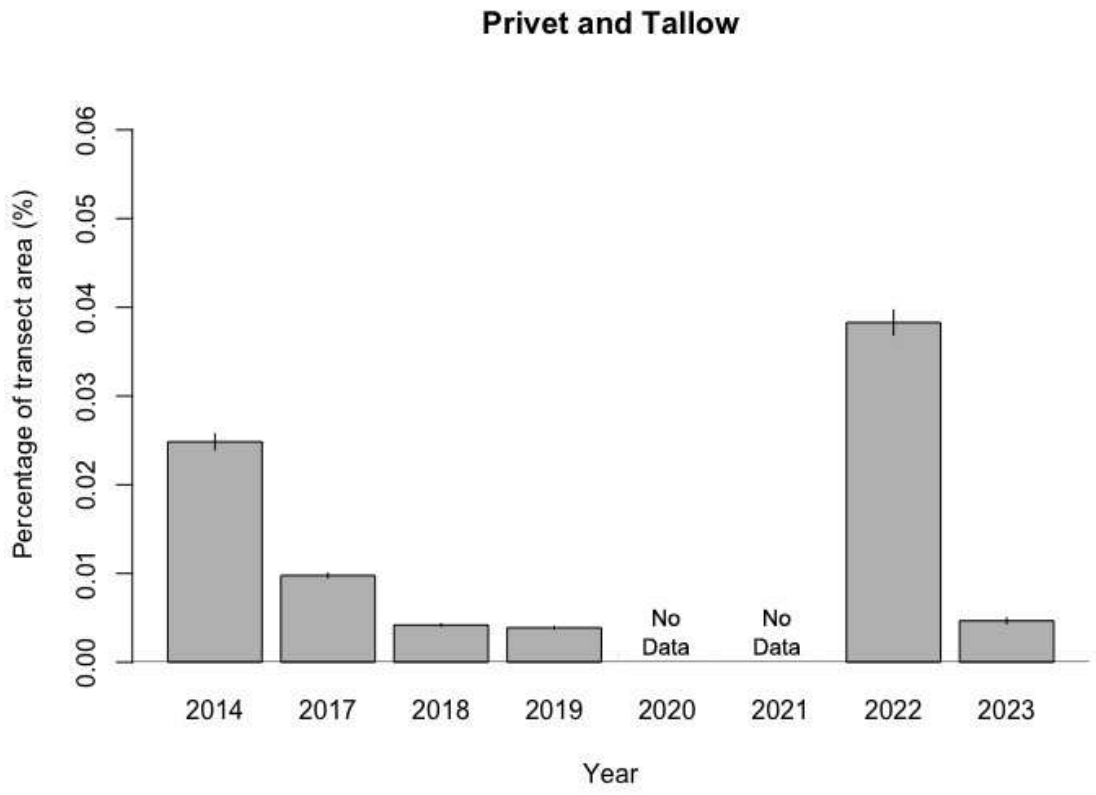


Figure 13. Aggregate young invaders: Combined juvenile (height < 1.5 m, DBH = 0 cm) Privet sp. and tallow stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

Adult Invaders Across Band Transects

Adult woody invasive recruits (*i.e.* trees taller than 1.5 m) had grown to occupy more basal area of forest by 2022, but herbicide control efforts successfully knocked them back to their recent lower background levels by 2023 (Figs 14-16).

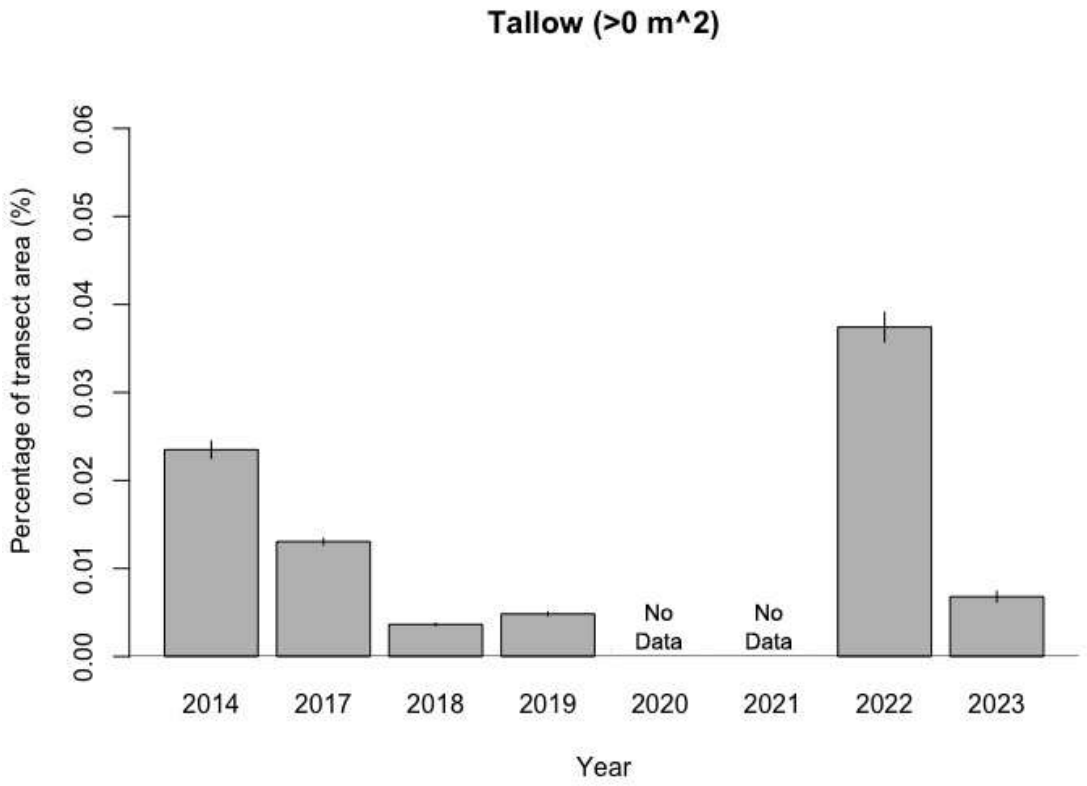


Figure 14. Adult (height ≥ 1.5 m, DBH > 0 cm) tallow stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

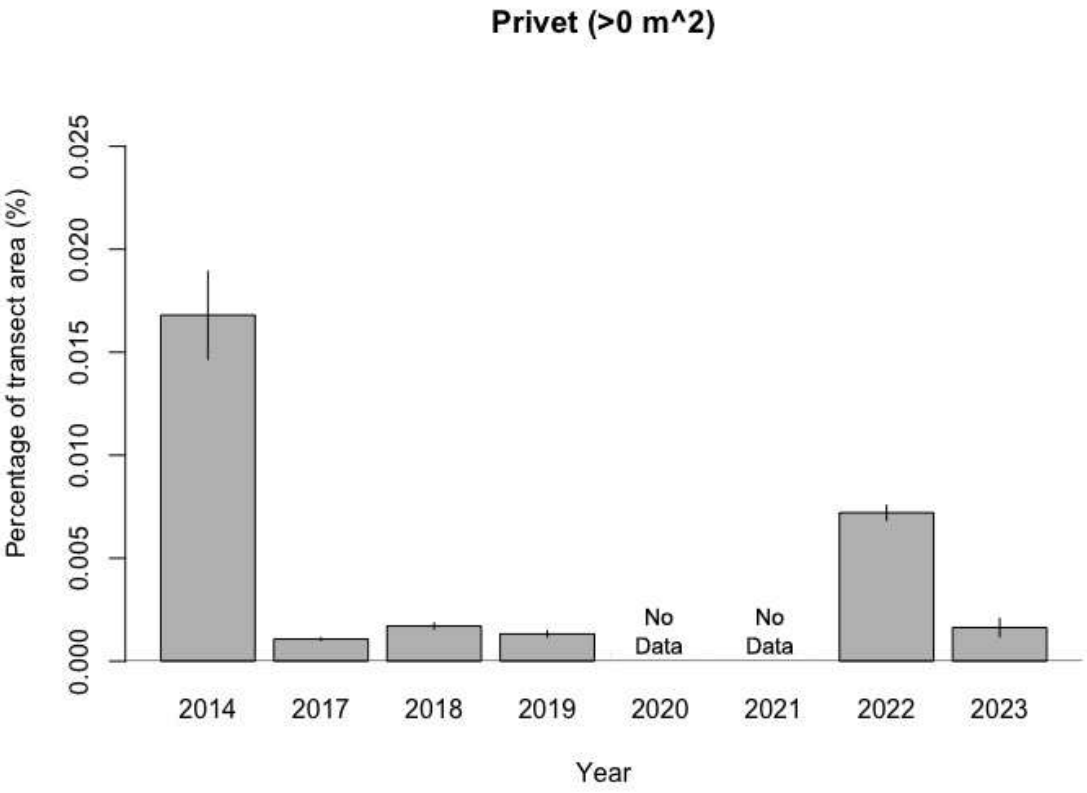


Figure 15. Adult (height ≥ 1.5 m, DBH > 0 cm) Privet sp. stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

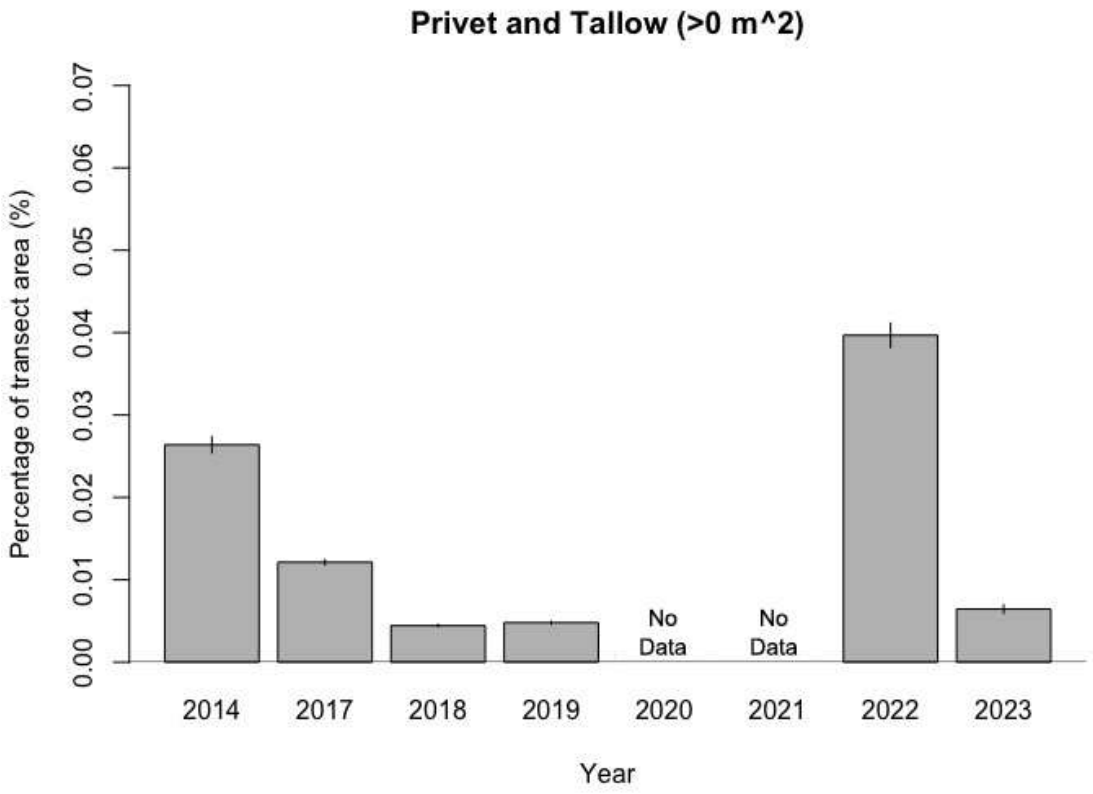


Figure 16. Aggregate adult invaders: Combined adult (≥ 1.5 m, DBH > 0 cm) Privet sp. and tallow stand basal area cover in band transects at Woodlands Preserve (select pre-monitoring years provided for context). Means ± 1se.

Activity 2 - Herbicide treatment of non-native, invasive vegetation on the 190-acre Delacroix Preserve property with an anticipated outcome of reduction in non-native, invasive vegetation.

Output - Field Biologists treated non-native, invasive vegetation at the 190-acre Delacroix beginning in March 2022 and completing the entire 190 required acreage during the second quarter of 2023.

Outcome Measures – Outcome measures included the assessment of ten (10) 20-meter x 20-meter permanent Plots within Delacroix Preserve. Surveyors recorded the species, stem density and height of all native and non-native, invasive woody species in March – April, 2022.

Table 4. Number of individual Privet and Chinese tallow identified in Permanent Plots at Delacroix Preserve.

Years	2014	2017	2022
Privet sp.	356	329	1
Chinese tallow	21	38	21
Grand Total	**377**	**367**	**22**

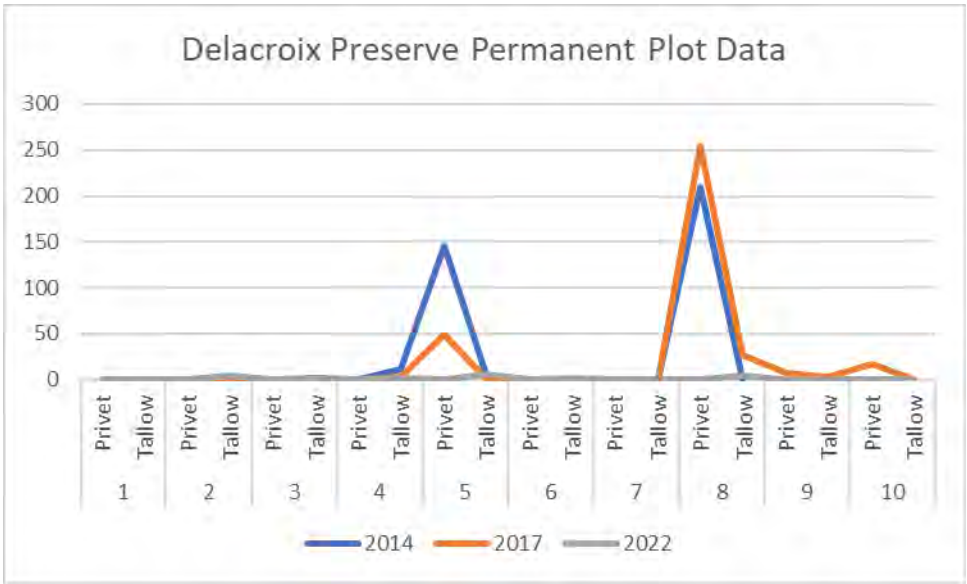


Figure 17. Delacroix Preserve permanent plot data shows a 96% deline in Chinese tallow and Chinese privet from 2017 (pre-treatment) to 2022 (Post Treatment).

A comparison of stem density for both Chinese tallow and Chinese privet show more than a 90% reduction in non-native, invasive vegetation from pre-treatment to post-treatment.

Activity 3 – Education and involvement of students and public in plantings.

Output – Two 10-acre plots planted with 200 stems per acre with a total of 4,000 seedlings/potted plants.

Outcome measures – Number of trees planted, number of volunteers and volunteer hours engaged in tree planting per sign-in sheets.

A Forestry Labor Team was hired to plant 2,940 seedlings. They planted 1,760 seedlings at Delacroix Preserve and 240 southern wax myrtle containerized plants were planted by staff to yield a total of 2,000 planted at Delacroix Preserve within a 10-acre plot.

The Forestry Labor Team planted 1,180 seedlings at Woodlands Preserve. The Volunteer Coordinator worked with volunteers to plant 820 seedlings and trees to yield a total of 2,000 individual seedlings/trees planted at Woodlands Preserve.

Per sign-in sheets, a total of 491 individuals spent a total of 1,353 hours planting trees and seedlings during the grant period.

Other Measures:

BIRD CENSUSING

Seventeen (17) bird survey sessions were held at Delacroix Preserve (DP)and Twenty-two (23) bird survey sessions were held at Woodlands Preserve (WP) during the grant period. Ten sessions that were not held were a result of SARS-CoV-2 pandemic and tropical storms. The other three sessions that were not held were a result of cancellation due to weather conditions. For the purposes of determining post-treatment changes in species richness and diversity, pre-treatment data was used as a baseline evaluation tool.

Woodlands Preserve Pre/Post Treatment Comparisons

Invasive woody plants were removed and/or treated with herbicide during April and May of 2022 and 2023. Pre-treatment (2013-2022) and post-treatment (2023-2024) species richness and diversity were compared (Tables 1.1 & 1.2; Figures 6.1 & 6.2). The median richness pre-treatment was 20, 95% CI (17, 22) and the median richness post-treatment was 12, 95% CI (4, 20). The diversity index utilized for comparison was Hurlbert's Probability of Interspecific Encounter (PIE) (Hurlbert 1971). The median diversity pre-treatment was 0.89, 95% CI (0.87, 0.95) and the median diversity post-treatment was 0.81, 95% CI (0.80, 0.82). A species accumulation curve (Figure 6.3) comparing pre and post treatment was generated using iNEXT online (Chao 2016

Table 5. Bird species richness at Woodlands Preserve.

Treatment Period	N	Species Richness (median)	Lower 95% CI	Upper 95% CI
Pre (2013-2022)	10	20	17	22
Post (2023-2024)	2	12	4	20

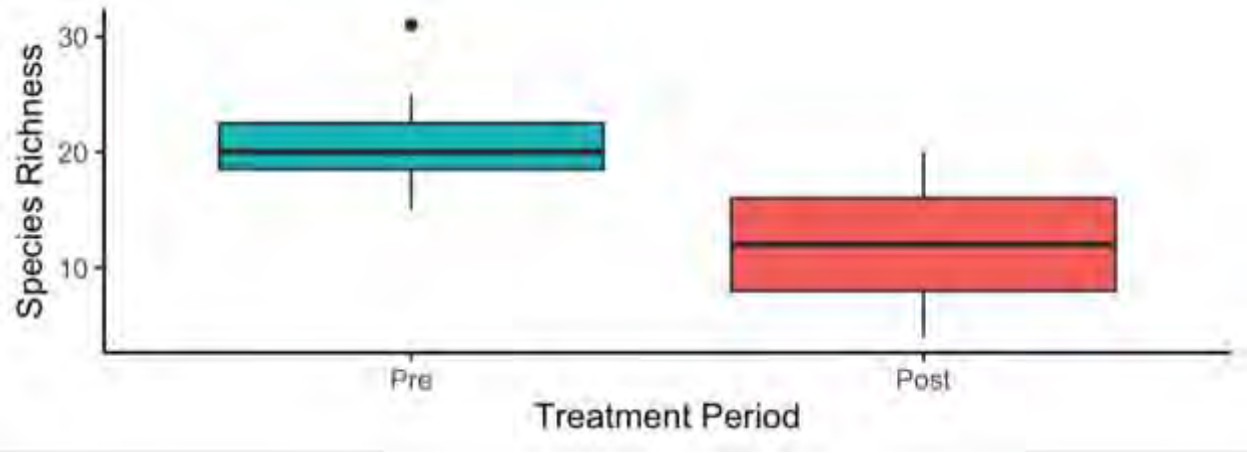


Figure 18. Bird species richness at Woodlands Preserve by Treatment Period

The median species richness decreased 40.0% among the bird species banded in the months after treatment to remove non-native vegetation at Woodlands Preserve. The likelihood of the result being significant is reduced by the small sample size (n = 2) post-treatment.

Table 6. Bird species diversity indices at Woodlands Preserve by treatment period.

Treatment Period	N	PIE (median)	Lower 95% CI	Upper 95% CI
Pre (2013-2022)	10	0.89	0.87	0.95
Post (2023-2024)	2	0.81	0.80	0.82

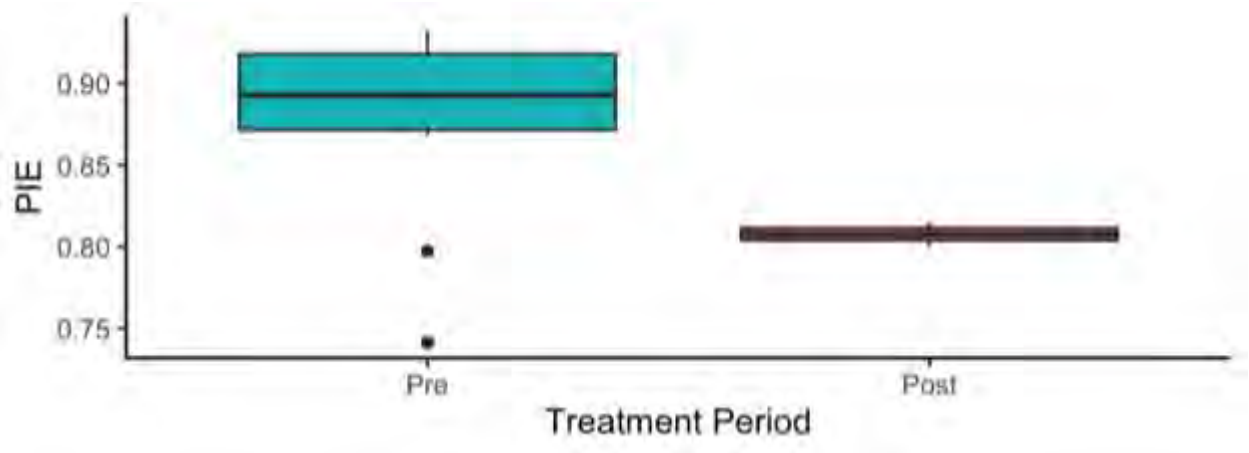


Figure 19. Woodlands Preserve Species Diversity by treatment period.

A species diversity index determined by Hurlbert's Probability of Interspecific Encounter (PIE) showed a 9.0% decrease in the median diversity among the bird species banded in the months after treatment to remove non-native vegetation at Woodlands Preserve.

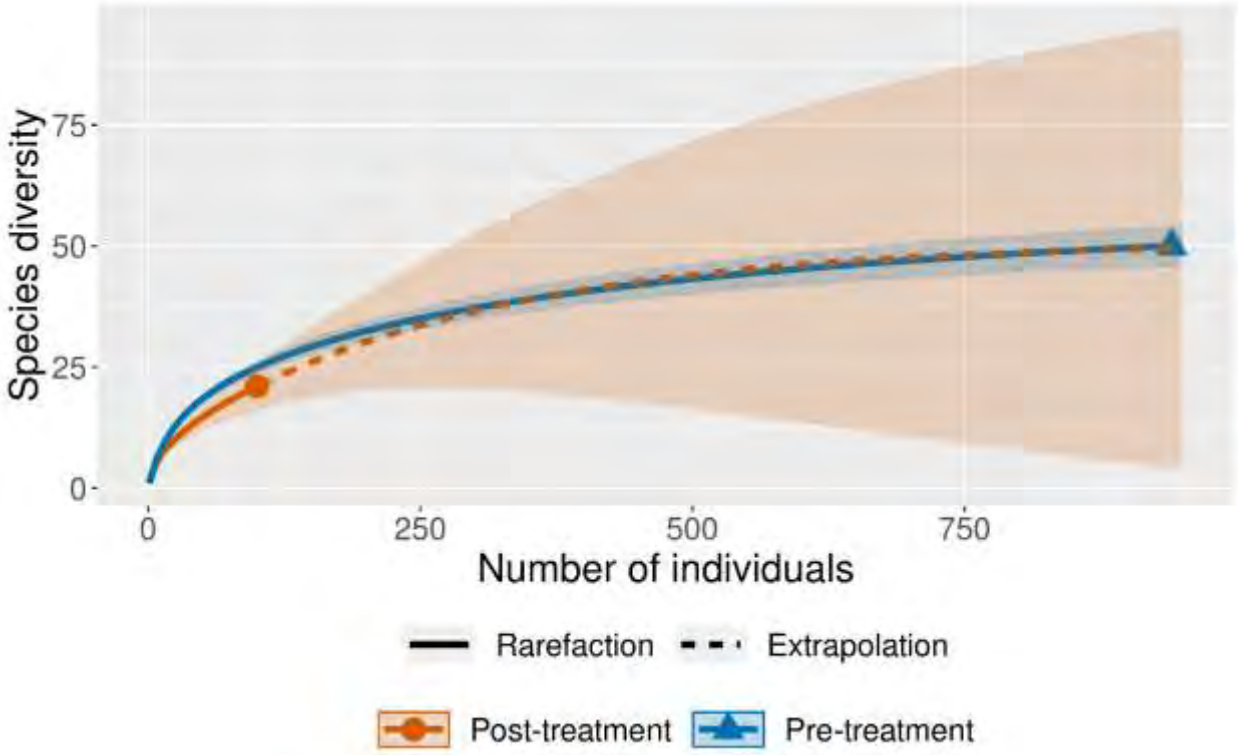


Figure 20. Bird species accumulation curves at Woodlands Preserve by treatment period.

Increased sampling post-treatment is likely to show little difference in species diversity compared to pretreatment species diversity. There is high uncertainty in the result due to the small sample size (n = 2) post-treatment.

SUPPLEMENTAL FUNDING

Past hurricane activity resulted in downed trees. That impact combined with successful herbicide treatment of non-native vegetation led to increases open canopy areas within the forest. Those open canopy gaps in turn facilitated recruitment and rapid spread of blackberry/briar (*Rubus* spp.). The significant increase in *Rubus* spp. made access through the forest for assessment, treatment, and planting overly challenging which led to a request for supplemental funding.

Analysis of briars within the Permanent Plots showed an average decrease in *Rubus* spp. of 10% from 2019 to 2022 and an average of 140% increase in briars from 2022 to 2023.

Supplemental funding of $40,000 helped address this new challenge within the forest understory. The awarded supplemental funding was used to fund herbicide treatment of briars, leasing of a tractor to clear fallen trees and dead briars, and fund a field technician/equipment operator to operate the tractor and utilize herbicides for treatment.

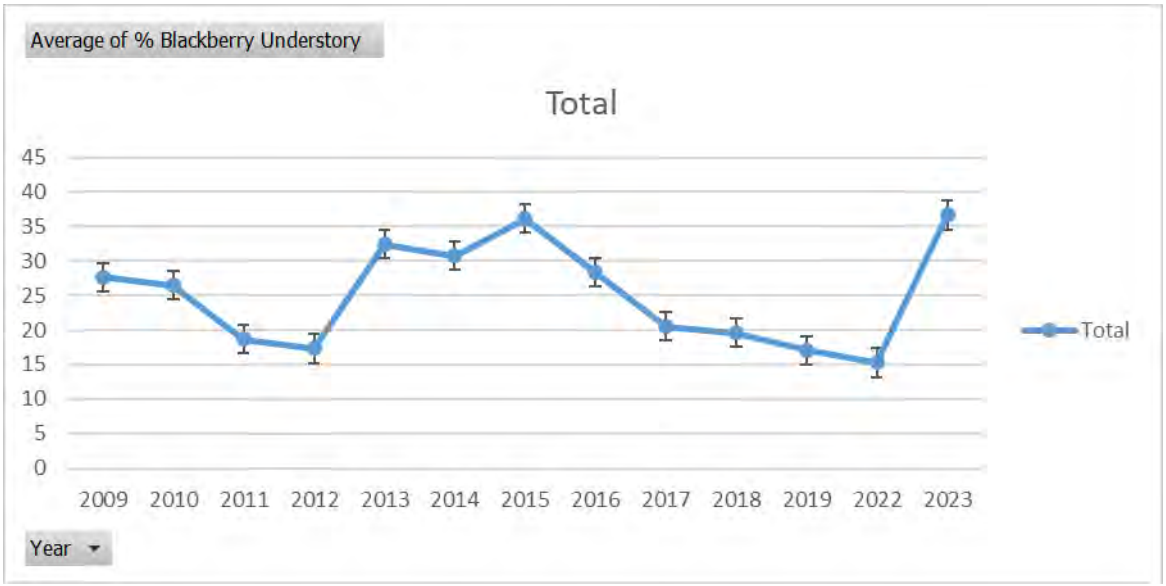


Figure 21. Long-term pattern of blackberry/briar (Rubus spp.) understory percent cover within Permanent Plots at Woodlands Preserve 2009-2023. Data shows a very strong increase in understory briar cover following downed trees resulting from hurricane activity and effective herbicide treatment of adult non-natives in 2022.

MATCH/COST SHARE

Woodlands Conservancy provided $263,049 as a required match. This figure includes the $40,000 match as a result of the $40,000 supplemental award. Below is a summary table of the match amounts provided within the budget categories followed by a narrative description.

BUDGET SUMMARY

Personnel	$22,453
Supplies	$27,626
Contractual	$4,263
Other	$189,288
Indirect Costs	$19,419
TOTAL	$263,049

Personnel – The $22,453 in Personnel was cash provided by Woodlands Conservancy including $3,088 for Project Management and $19.365 to partially cover work performed on the project by the Volunteer Coordinator.

Supplies – The $27,626 in supply match was comprised of $6,178 in cash provided for tables used for Outreach activities and fuel for equipment. The remaining sum of $21,488 was provided by in-kind supplies and/or use of equipment. There was a $480 overage in cost of seedlings provided as a match in the Supply category.

DESCRIPTION	MATCH	OVERAGE
Table for Outreach sessions	$5,928	
Fuel for equipment	$250	
300 – 3-gallon trees @$10/each	$3,000	
Bareroot seedlings	$3,200	$480
In-kind mist net and banding supplies	$1,338	
In-kind potted plants @ $5/each	$2,500	
In-kind potted plants @$10/each	$2,410	
In-kind herbicide and application equipment	$4,000	
In-kind Planting supplies and maintenance tools	$2,500	
In-kind use of GPS equipment & mapping of plantings	$2,500	
TOTAL	**$26,626**	**$480**

Contractual – The $4,263 in match provided included $3,063 in cash provided to partially cover the costs of the Avian Specialist conducting bird surveys. The remaining $1,200 covered the cash provided for bird survey analysis.

Other – The $189,288 in match provided in the Other category was met and surpassed by a value of $48,699. Below is a listing of in-kind services, description, value and overage.

DESCRIPTION	MATCH	OVERAGE
In-kind – CSUCI, OSU, UCLA permanent plot assessments 128.5 days @ $600/day	$53,900	
In-kind - Transect surveys by students (1200 hrs. x $28.54/hr.	$34,248	$23,954
In-kind - Master Bander supervision	$3,600	
In-kind - Planting and planting plot clean-up (250 hrs. @ $28.54)	$36,905	$14,525
In-kind - Bird Banding Volunteers @ $28.54)	$18,135	$2,094
In-kind - Use of ATV & UTV based on rental rates of $500/day x 15 days	$37,704	$4,577
In-kind Use of Bushhog; forestry mulcher; dozer based on rental rates: Mulcher@ $8500/wk; Dozer @$615/day x 10 days; Tractor w/ bush hog @ $273/day x 10 days	$4,796	$3,549
TOTAL	$189,288	$48,699

Note: Volunteer rate increased to $29.95 beginning 10/01/22 after Federal rate increased in April 2022.

Indirect Costs - $19,419 was a cash match for Indirect Costs provided by Woodlands Conservancy.

RESTORE METRICS

Metric HR008 Removal of invasive species – Acres where invasive species removed and restored (restoration planting is included in this metric)
Target: 840
Cumulative: 840

All 840-acres of forested wetlands were treated with herbicide to target non-native, invasive vegetation during the grant period. Analysis of permanent plots data shows <10% non-native, invasive vegetation. Thus, the goal of 90% reduction was met.

PRM006 Monitoring –
Number of streams/sites being monitored
Target: 2
Cumulative: 2

Bird surveying was conducted at both Delacroix Preserve in Orleans Parish and Woodlands Preserve in Plaquemines Parish.

PRM007 Monitoring –
Acres being monitored
Target: 840
Cumulative: 840

Vegetation was monitored via permanent plot assessments at both Delacroix Preserve and Woodlands Preserve. Additionally, the current report reviews the results of 5-meter Radius surveys and transect surveys at Woodlands Preserve. UAS imagery was conducted at both sites.

Metric PRM009 Research – number of studies completed whose findings are reported to management
Target: 1
Cumulative to Date: 1

The current report contains tables, figures and narrative reporting on the analysis of vegetation surveys, drone surveys and bird banding data. A summary of portions of this data were also reported in summaries to BTNEP and NRCS.

Metric COI005 Volunteer participation – Number of volunteers participating
Target: 150
Cumulative to Date: 883

883 individuals volunteered for grant activities during the grant period. 173 individuals volunteered during bird banding sessions; 491 individuals volunteered for tree planting; and 219 individuals volunteered for planting plot maintenance.

QUARTER	1	2	3	4	5	6	7	8	9	10	TOTAL
Bird Banding	9	35	0	35	13	12	20	18	25	6	173
Planting	0	184	0	0	9	298	0	0	0	0	491
Plot Main.	49	25	17	17	44	15	34	0	18	0	219
											883

Metric COI103 Economic benefits –Number of temporary jobs created
COI103 Economic benefits –Number of temporary jobs created (Biologist and Volunteer Coordinator)
Target: 2
Cumulative to Date: 3

Two temporary jobs were created to conduct grant activities during the course of the grant period including a Field Biologist and a Volunteer Coordinator. An Equipment Operator job was created during the implementation of activities funded through the award supplement.

Metric COI104 Economic benefits –
Number of local contracts
Target: 1
Cumulative to Date: 1

One local contract was executed with Union Forestry Labor to implement herbicide treatment of the 650-acre Woodlands Preserve property.

Metric COI002 Outreach/ Education/Technical Assistance –The number of people reached (number of participants in outreach sessions)
Target: 50
Cumulative to Date: 115+

Outreach events were held on 6/11/2022, 03/04/2023 and 09/30/2023. Seven people attended the first outreach event, nine people attended the second outreach event and 99 people sign-in for the third outreach event. Additionally, more than 50 children accompanied individuals who signed in for the third outreach event.

SUMMARY AND CHALLENGES

We met the goals of Restoration & Enhancement of Habitat for Resident & Migratory Birds in the Barataria Basin:

- 840 acres were treated to target the removal of non-native, invasive vegetation
- We exceeded the goal of 150 volunteers participating by 733
- 2000 trees/seedlings were planted in two, 10-acre plots
- Bird banding and surveys tracked changes in bird diversity and abundance. As predicted in the grant application, there was a decrease in bird abundance following the removal of non-native vegetation
- Permanent plot data showed a more than 90% decline in non-native species
- Interim progress reports and the Final Report were submitted as scheduled.

We managed to implement the project with few unexpected events in terms of restoration outputs. Some minor issues such as weather and illness necessitated rescheduling or canceling bird banding sessions. Our biggest challenge was being dependent on partners from another state as travel plans were made in

advance and issues occurred that could not be easily predicted or resolved. For example, weather at times limited what could be accomplished in a trip necessitating scheduling additional trips. The drone crashed on one occasion and thus the acreage covered with imagery was not totally complete. However, more drone imagery sessions were held than were committed to in the grant. As drone imagery was not analyzed until the end of the grant period, some processing errors occurred resulting in not being able to report on imagery for the Delacroix Preserve at the time of this report. Efforts are continuing to address those processing challenges.

Following an initial survival rate of 75% of trees/seedlings planted, the severe heat and drought during the Summer of 2023 resulted in some of the seedlings dying that were planted at Woodlands Preserve. Seedlings/trees that died were replaced during the 2023/2024 planting season. Additionally, a 100-gallon water tank was purchased in order to provide supplemental water should we have repeat weather conditions in the future. We far exceeded our match requirements for the provision of in-kind services provided by volunteers and will take this into consideration in future proposals.