ACCOMACK FOREST PATCH MANAGEMENT FINAL REPORT

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Virginia Coastal Zone MANAGEMENT PROGRAM

ACCOMACK FOREST PATCH MANAGEMENT FINAL REPORT

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Virginia Coastal Zone
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EXECUTIVE SUMMARY

The acquisition of 145 tracts of land by the Virginia Department of Wildlife Resources (DWR) along the Delmarva Peninsula in Accomack County presents a significant opportunity for bird conservation in the region. These lands, previously managed by the timber industry, are crucial for supporting large numbers of passerines during fall migration and breeding populations of imperiled salt marsh specialist birds. The objectives of the acquisition include facilitating the migration of salt marsh habitat in response to sea-level rise and increasing bird "support days" for migrating passerines. Our goal with this project was to review all tracts, assign them toward marsh migration or forested songbird habitat management, and select patches for future potential studies.

Using Coastal Change Analysis Program Land Cover Data and available aerial imagery, we classified each patch for salt marsh migration or songbird forest management. Tracts projected to include tidal habitats under various sea-level rise scenarios were prioritized for salt marsh migration management, while others were earmarked for songbird forest management. A tiered ranking system was employed to prioritize management actions based on tidal habitat proportion, tract size, and accessibility.

Current land cover for the 145 tracts includes 20.7 ha of developed uplands, 320.5 ha of undeveloped uplands, 3,093.7 ha of palustrine wetlands, 27.2 ha of tidal wetlands and shoreline, and 0.4 ha of open water. Tidal habitats are currently or are projected to occur on 86 of the 145 tracts and expand to 438.9 ha under 3' SLR and 1,024.8 ha under 6’ SLR. The 59 tracts that do not currently and are not projected to include tidal habitat cover include 1,588.8 ha and are predominantly pine and mixed pine/hardwood forests.

Potential studies that could be designed include those that evaluate management actions intended to facilitate marsh migration and improve forests for migrating songbirds. Examples of marsh migration studies include evaluating how marsh migration rates respond to trees removal in adjacent forests via burning or mechanical methods. Recent research indicates that landscape modifications associated with abandoned agricultural fields, which can be found on these tracts, may modulate marsh migration and provides an additional avenue for novel research. Studies on improving forests for migratory birds could include evaluating the number of migratory bird days in response to different levels of forest thinning and reducing herbivore pressure via hunting or exclosures.

Establishing baselines and conducting various management actions on similar tracts, paired with controls, could inform the efficacy of management strategies. Our tiered rankings and tract descriptions provide a foundation for constructing an experimental design once research direction and funding availability are determined.

BACKGROUND

Context

The Virginia Department of Wildlife Resources (DWR) recently acquired 145 tracts of land formerly managed by the timber industry located along the Delmarva Peninsula in Accomack County. This area is of hemispheric importance to bird conservation. Among other roles, the area supports 1) large numbers of passerines during fall migration and 2) breeding populations of imperiled birds that are salt marsh specialists. Stated objectives for acquiring the land include active management to increase the number of bird "support days" for fall migrating passerines and to facilitate the migration of salt marsh habitat over the next 20-40 years as sea-level rise moves marshes upslope to displace current maritime forests. A third objective is to conduct management activities within an experimental framework so that responses to management (migrant passerines, saltmarsh birds) may be measured and used to inform future management decisions for the agency and beyond.

This project will be integrated with concurrent DWR Section 306A forest thinning (FY21 Task 9.01). We will identify lands that are anticipated to convert to marsh as sea level rises. These lands may benefit from more extensive thinning to increase future marsh habitat quality. Habitat patches that are projected to remain upland will also be subject to forest thinning. Generally, forest thinning is expected to increase habitat quality for migrating songbirds by allowing more sunlight to penetrate the forest floor which should lead to increased arthropod production as well as a greater opportunity for fall-fruiting shrubs and vines to establish, both of which provide fuel to migrating songbirds. However, it is not clear how different levels and techniques of thinning contribute toward migratory songbird habitat quality. This study will quantify the effects of these treatments by comparing resource abundance and migrant use among treatment and control patches.

In order to inform the management of acquired forest patches, we envision a three-phase program including Phase I – Desktop Assessment, Phase II – Study Design and Patch Selection and Phase III – Study Execution. After patches are assigned to their appropriate management endpoints (low forests to be converted to support salt marsh, upland forest supporting fall migrants), two management studies will be executed that are designed to drive forest patches to reach their management endpoints.

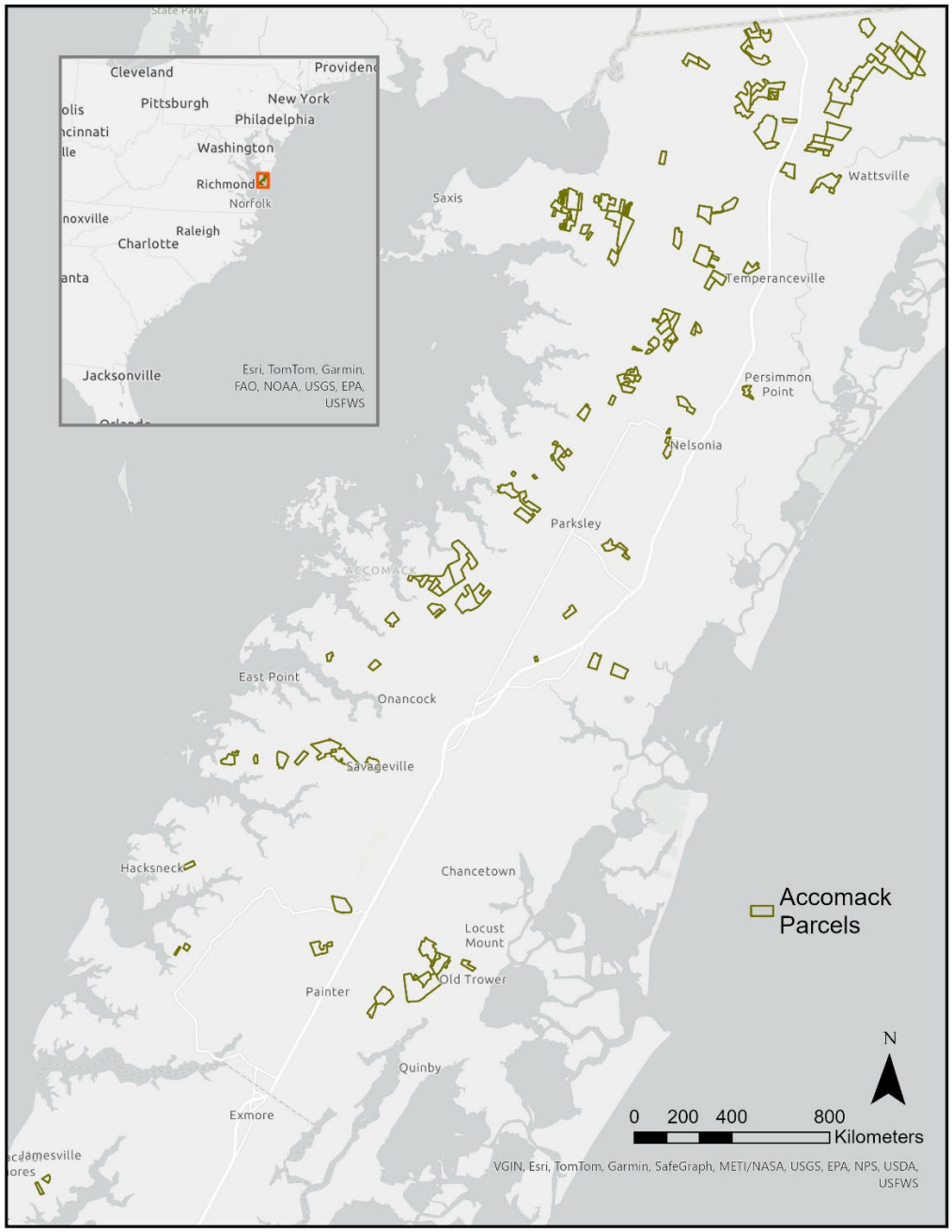
We are proposing to complete Phase I – Desktop Assessment and Phase II – Study Design and Patch Selection, with Phase III to be completed in the future. We feel that completing the initial patch-level assessments and selection are essential first steps toward working with DWR to design an appropriate management approach moving forward.

METHODS

Study Area

The focal area for the project is in Accomack County (Figure 1) and includes 145 patches ranging in size from 3.5 to 0.4 ha (Figure 1).

Figure 1. Tracts purchased by VA DWR in Accomack County VA, USA.



Desktop Review

For all habitat patches we quantified the current land cover and projected landcover under 3’ and 6’ sea level rise scenarios using Coastal Change Analysis Program Land Cover Data (C–CAP; NOAA 2019). Due to the diverse classifications in the C-CAP dataset, certain categories were merged to streamline analysis for marsh migration or songbird forest management (Table 1). Tracts projected to be tidally influenced under the 6' sea level rise scenario were designated for marsh migration management, while others were allocated for songbird forest management.

Table 1. Specific land cover categories used by the C-CAP and more broad classifications we developed.

C-CAP Land Cover Category	Broad Habitat Type
Medium Intensity Developed	Developed
Low Intensity Developed	Developed
Developed Open Space	Developed
All Uplands	Undeveloped Upland
Palustrine Forested Wetland	Palustrine
Palustrine Scrub/Shrub Wetland	Palustrine
Palustrine Emergent Wetland	Palustrine
Brackish/Transition Wetland	Tidal
Estuarine Wetland	Tidal
Unconsolidated Shore	Tidal
Open Water	Open Water

Forest patch composition (e.g., pine, hardwood, mixed pine/hardwood) and age classes (mid, mature, mixed mid and mature) were determined using a combination of current and historical aerial imagery from Google Earth. In instances where age classification proved challenging with aerial imagery, site visits to forest patches were conducted for accurate assessment. To get a better idea about forests of different classifications, we measured DBH of the nearest tree approximately 20 m into a forest from our parking location and then measured the distance to the nearest neighboring tree.

For marsh migration projects we created four tiers based upon the total area currently or projected to include tidal habitat (Table 2). We did not consider accessibility when developing these tiers because saltwater habitats like this can be accessed via boat or walking along adjacent marsh. The first tier includes marshes that currently include >1 ha of tidally influenced habitat and is experiencing ongoing marsh migration, the second tier includes tracts that are projected to include >10 ha of tidal habitat following 3’ SLR, the third tier represents tracts that are projected to include >10 ha tidal habitat following 6’ of SLR and all other tracts were grouped into the lowest fourth tier.

For upland forest habitats, we created tiers based on accessibility and forest patch size (Table 2). The first tier includes patches that are directly accessible via adjacent roads and are >10 ha, the second tier includes patches that are accessible via adjacent DWR properties and >10 ha, the third tier includes tracts that are accessible either via an adjacent road or DWR property and are <10 ha, and the fourth tier includes all tracts that are inaccessible.

Table 2. Criteria for determining tier each tract should be fit for marsh migration and upland songbird management goals.

Tier	Marsh	Forest
1	Currently include>1 ha of tidal habitat	Tract is >10 ha and accessible via adjacent roads
2	Projected to include >10 has of tidal habitat following 3’ SLR	Tract is >10 ha and accessible via other DWR properties
3	Projected to include >10 has of tidal habitat following 6’ SLR	Tract is <10 ha but accessible via adjacent roads or other DWR properties
4	Projected to include <10 has of tidal habitat following 3’ or 6’ SLR	Tracts are inaccessible via adjacent roads and DWR properties

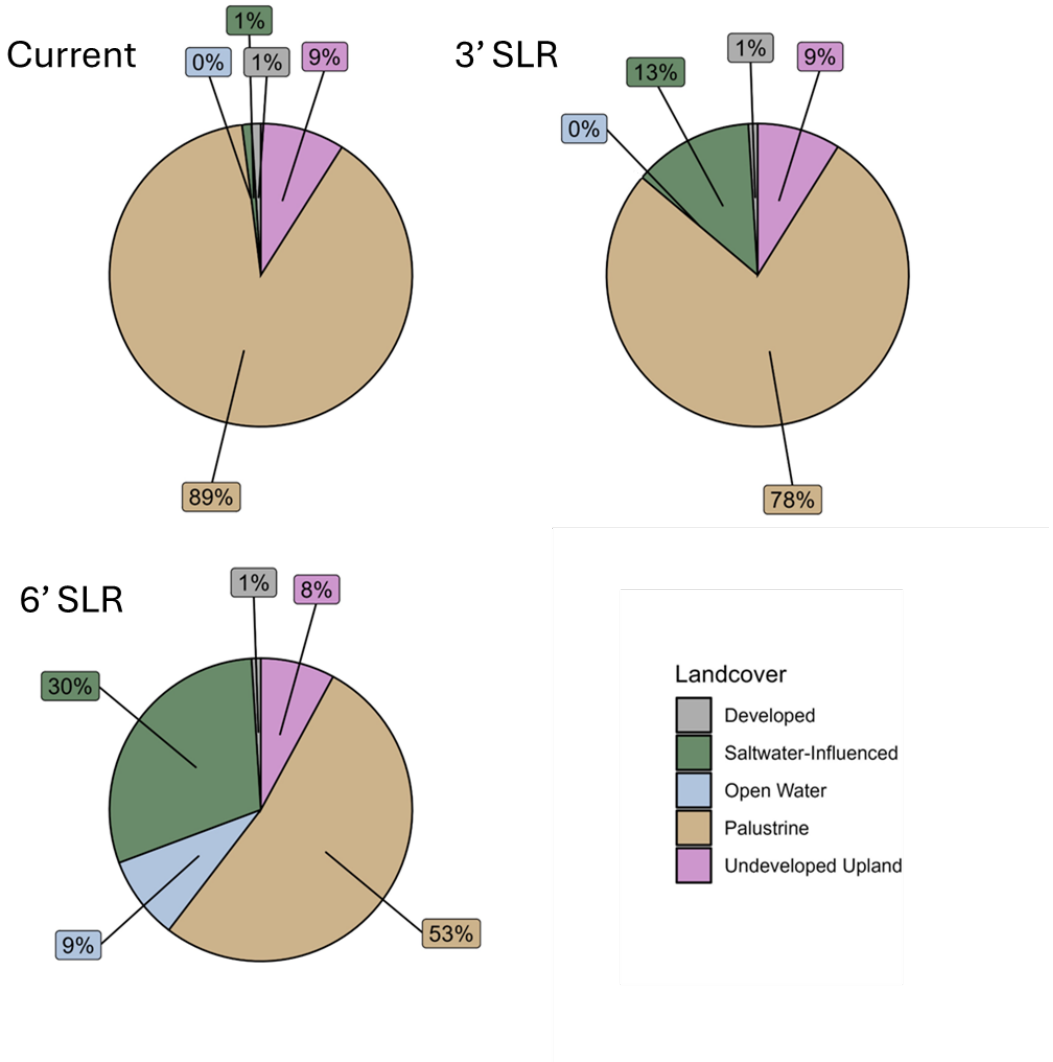
RESULTS

The DWR purchase area comprises 145 tracts and the average patch size for these tracts is 23.9 ± 2.1 ha (±SE). Access to 80 (55.2%) of the tracts is relatively straightforward, with adjacent road access (Figure 2). Additionally, 45 (31.0%) can be accessed via adjoining tracts that are part of the purchase or via Doe Creek Wildlife Management Area, leaving 20 (13.8%) tracts that are relatively isolated and only accessible via private property.

Figure 2. Parking locations alongside the road at (A) Rayfield John and an access gate at (B) Hayman, two tracts recently purchased by DWR in Accomack County, VA, USA.

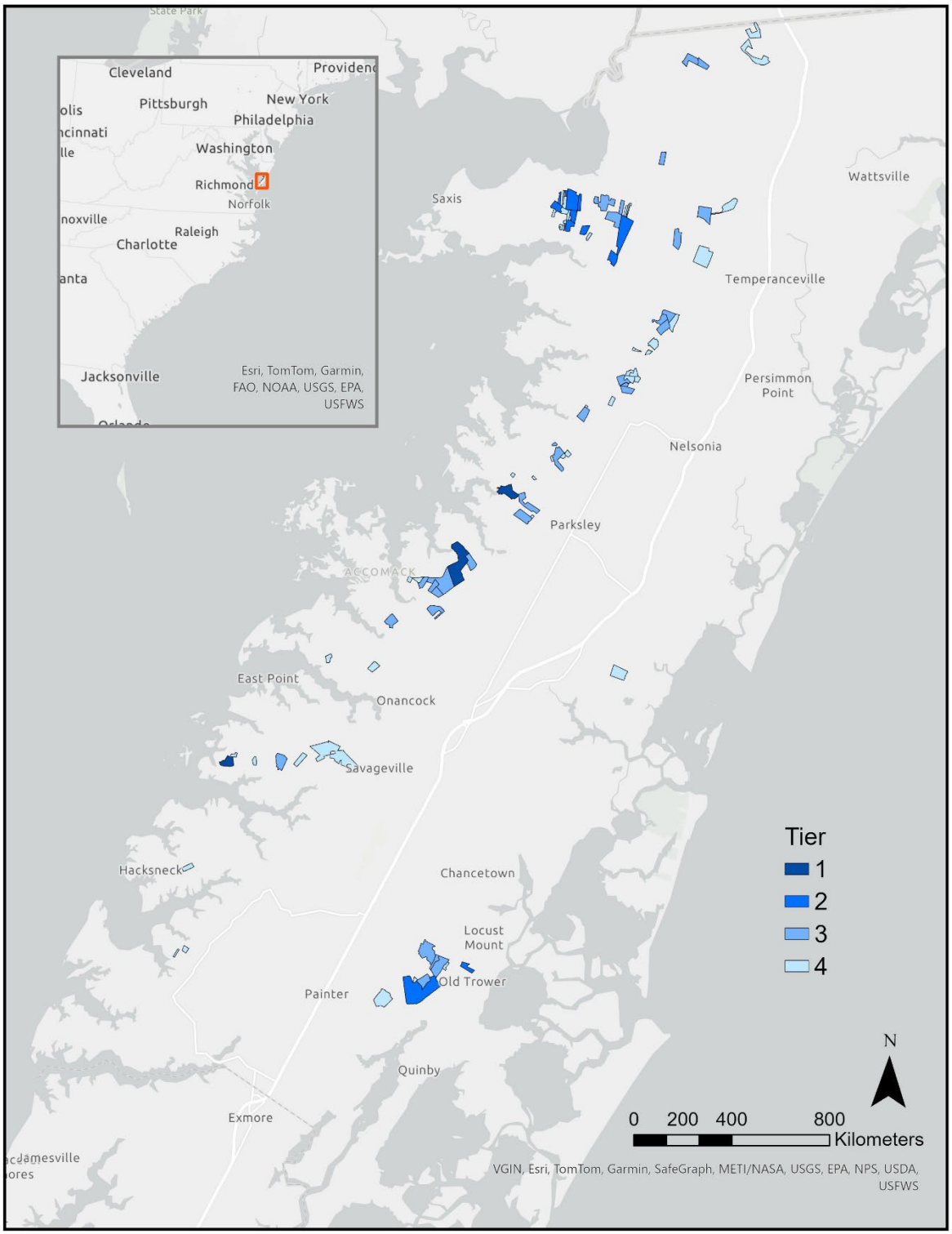
Current land cover across all 145 tracts includes 20.7 ha of developed uplands, 320.5 ha of undeveloped uplands, 3,093.7 ha of palustrine wetlands, 27.2 ha of tidal wetlands and shoreline, and 0.4 ha of open water. Under both sea level rise (SLR) scenarios, developed areas are expected to remain relatively stable, while upland and palustrine cover are projected to decrease, and tidal cover is anticipated to increase (Figure 3). Currently, tidal cover accounts for 27.2 ha found on 17 tracts, but it is projected to expand to encompass a total of 86 tracts under 3' or 6' SLR scenarios. Under a 3' SLR scenario, 438.9 ha of saltwater influenced habitat are projected to be found on 62 of the 145 tracts, including the 17 currently containing tidal habitat. Under a 6' SLR scenario, 1,024.8 ha of tidal habitat is projected to be found on 78 tracts, with all tidal habitats on 8 tracts converting to open water.

Figure 3. Pie charts depicting percentage of landcover currently found on DWR tracts, projected following 3' of SLR, and projected following 6' SLR in Accomack County, VA, USA.



Three tracts fall into Tier 1 for marsh migration projects and currently average 8.5±1.9 ha of tidal habitat per tract and are projected to average 23.5±2.9 and 29.5±16.8 ha of tidal habitat following 3' and 6' SLR. Tier two includes 10 tracts that currently average 0.1±0.0 tidal habitat and are projected to average 24.7±1.6 and 17.4±4.0 ha of tidal habitat per tract following 3' and 6' of SLR. Tier 3 includes 28 tracts that currently average approximately zero tidal habitat but are projected to average 1.4±0.1 and 22.0±0.4 ha of tidal habitat per tract following 3' and 6' of SLR. Tier 4 includes 45 marshes that currently average approximately zero marsh cover and is projected to average 1.8±0.1 and 3.2±0.1 ha of tidal habitat per tract following 3' and 6' of SLR (Figure 4).

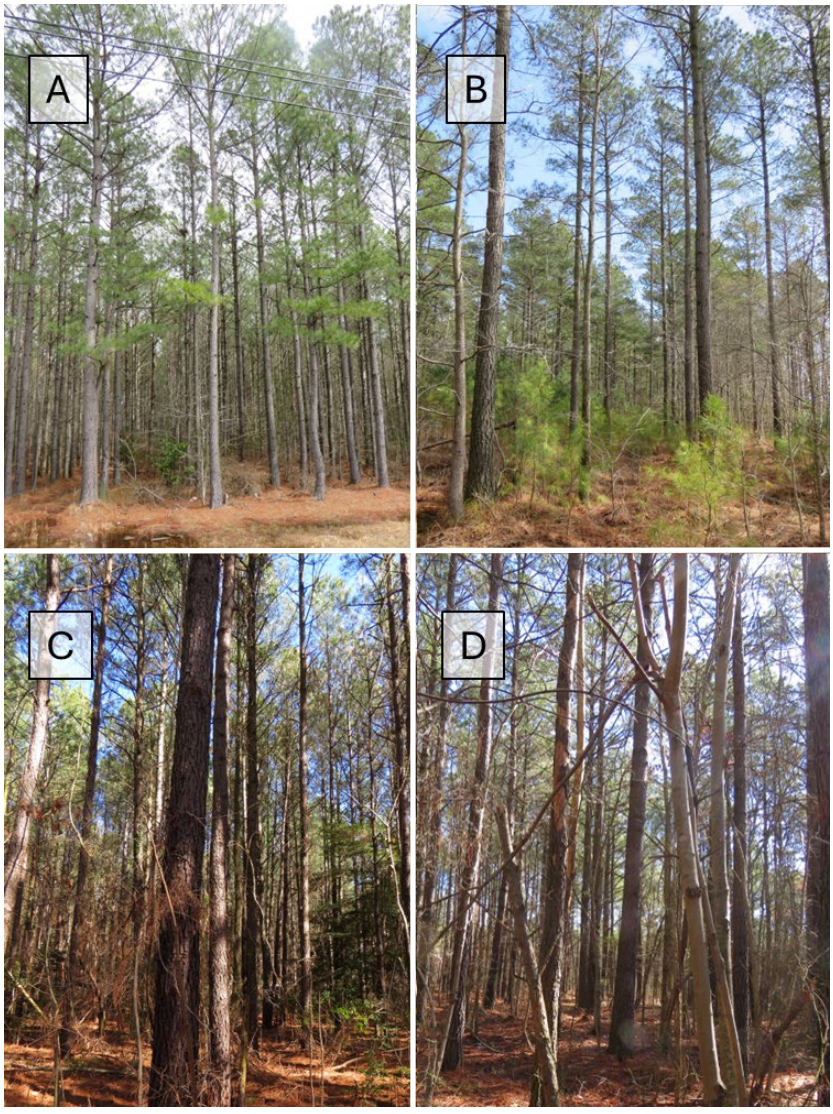
Figure 4. Parcels purchased by DWR that we recommend being managed toward marsh migration in Accomack County, VA, USA. Priority tiers are indicated by transparency of shading.



The 59 tracts that do not currently and are not projected to include tidal habitat collectively cover 1,588.8 ha and are predominantly forested. Land cover in these areas comprises 0.3 ha of open water, 6.7 ha of

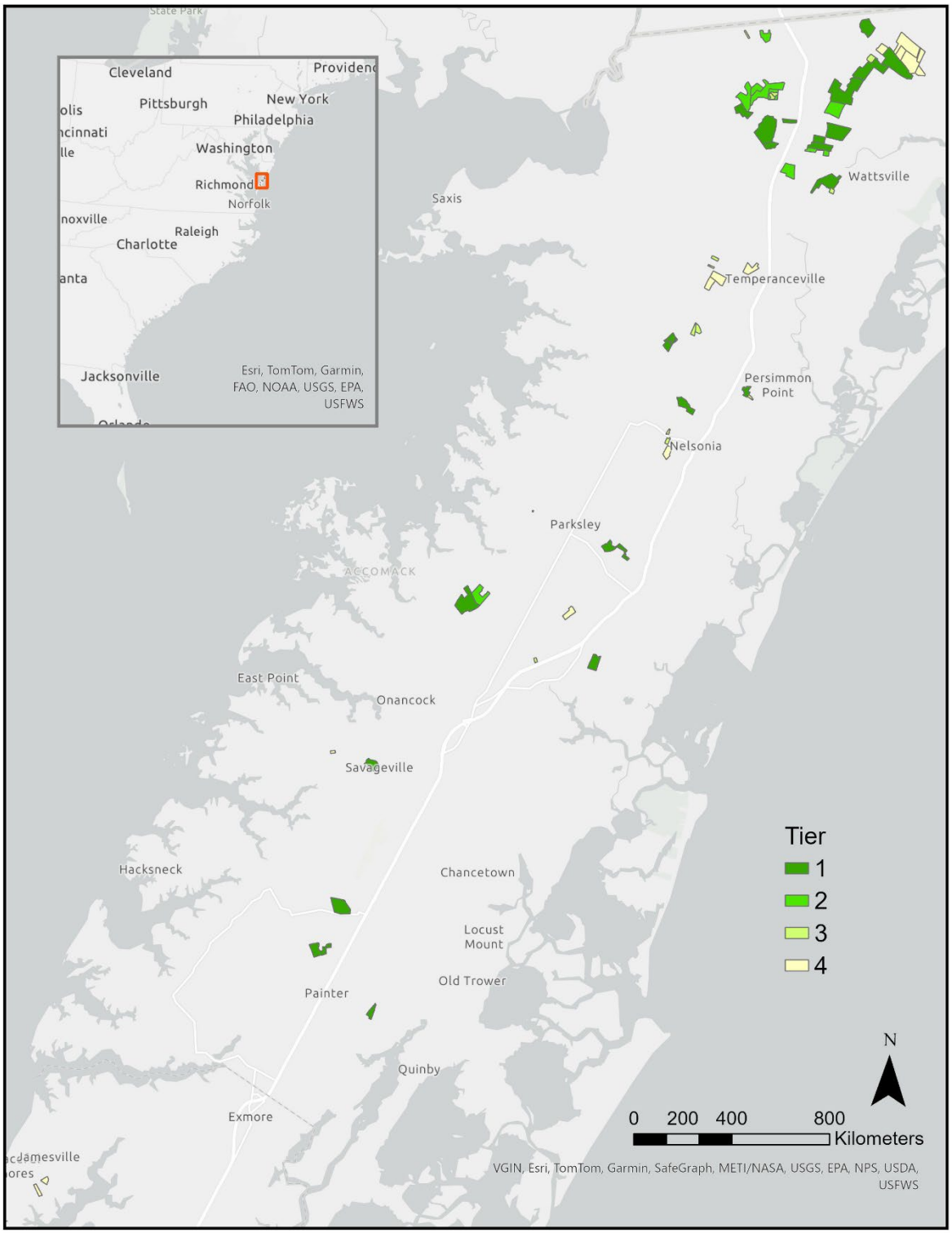
development, 1177.5 ha of forested palustrine wetland, 197.4 ha of palustrine scrub/shrub, 1.0 ha of emergent palustrine wetland, and 206 ha of unclassified uplands. A detailed examination of aerial imagery indicates that the forested portions of these tracts consist of homogeneous or nearly homogeneous pine forests at 35 tracts, 22 tracts include a mix of hardwood and pine trees, and 2 tracts are dominated by hardwoods. Timber harvest data is unavailable for determining exact forest ages, but 33 tracts are relatively mature, 22 appear mid-seral age, and four tracts contain a mix of mid and mature-aged trees (Figure 5). During site visits, mean DBH was 43.5±3.0” in mature forests compared to 37.3±2.0” in mid-aged forests. Two trees measured in mixed-age forests were 43.5” and 67” DBH. Distance to the nearest neighboring tree was 3.6±0.8 m in mature forests compared to 3.1±0.4 in mid-age forests. Both trees nearest neighbor in mixed-age forests was 2.0 m away.

Figure 5. Examples of forests we classified as mature pine (A), mature mixed hardwood-pine (B), mid aged pine(C), and mid-aged mixed hardwood pine (D) during winter in Accomack County VA, USA.



Considering access and patch size, we have identified 22 tracts (mean area = 42.8±1.3 ha) that fit into Tier 1 for forest management objectives which includes 7 mature pine-dominated tracts, 4 mixed mature pine/hardwood tracts, 6 mid-successional pine-dominated tracts, 3 mid-successional pine/hardwood tracts, and 1 tract each of mixed age pine and pine/hardwood tracts. We identified 9 tracts (mean area = 31.6±1.9 ha) that fit into Tier 2 which includes 3 mature pine-dominated tracts, 2 mixed mature pine/hardwood tracts, 2 mid-successional pine-dominated tracts and 1 mid-successional pine/hardwood tract, and 1 tract of mixed age pine forest. We identified 15 tracts (mean area = 4.3±0.2 ha) that fit into Tier 3 which includes 4 mature pine-dominated tracts, 4 mature pine/hardwood tracts, 3 mid-successional pine-dominated tracts, 3 mid-successional pine/hardwood tracts and 1 mixed age pine-dominated tract. We identified 13 tracts that fit into Tier 4 (mean area = 22.9±1.7 ha) which includes 3 mature pine-dominated tracts, 6 mature pine/hardwood tracts, 3 mid-successional pine-dominated tracts and 1 mid-successional pine/hardwood tract (Figure 6).

Figure 6. Parcels purchased by DWR that we recommend being managed toward migratory songbird forest management in Accomack County, VA, USA. Priority tiers are indicated by transparency of shading.



DISCUSSION

The acquisition of lands by the Department of Wildlife Resources (DWR) could yield extensive benefits for avian biodiversity across the Delmarva Peninsula. Notably, these acquired lands may serve as critical stopover points for a diverse array of migrating songbirds, providing essential resting and refueling areas along their arduous journeys. Furthermore, the preservation and enhancement of saltmarsh habitats within these acquired lands will offer indispensable sanctuaries for numerous bird species that rely on these unique ecosystems for nesting, foraging, and shelter. However, the extent of benefits to birds will hinge upon the management actions undertaken to steward these lands appropriately.

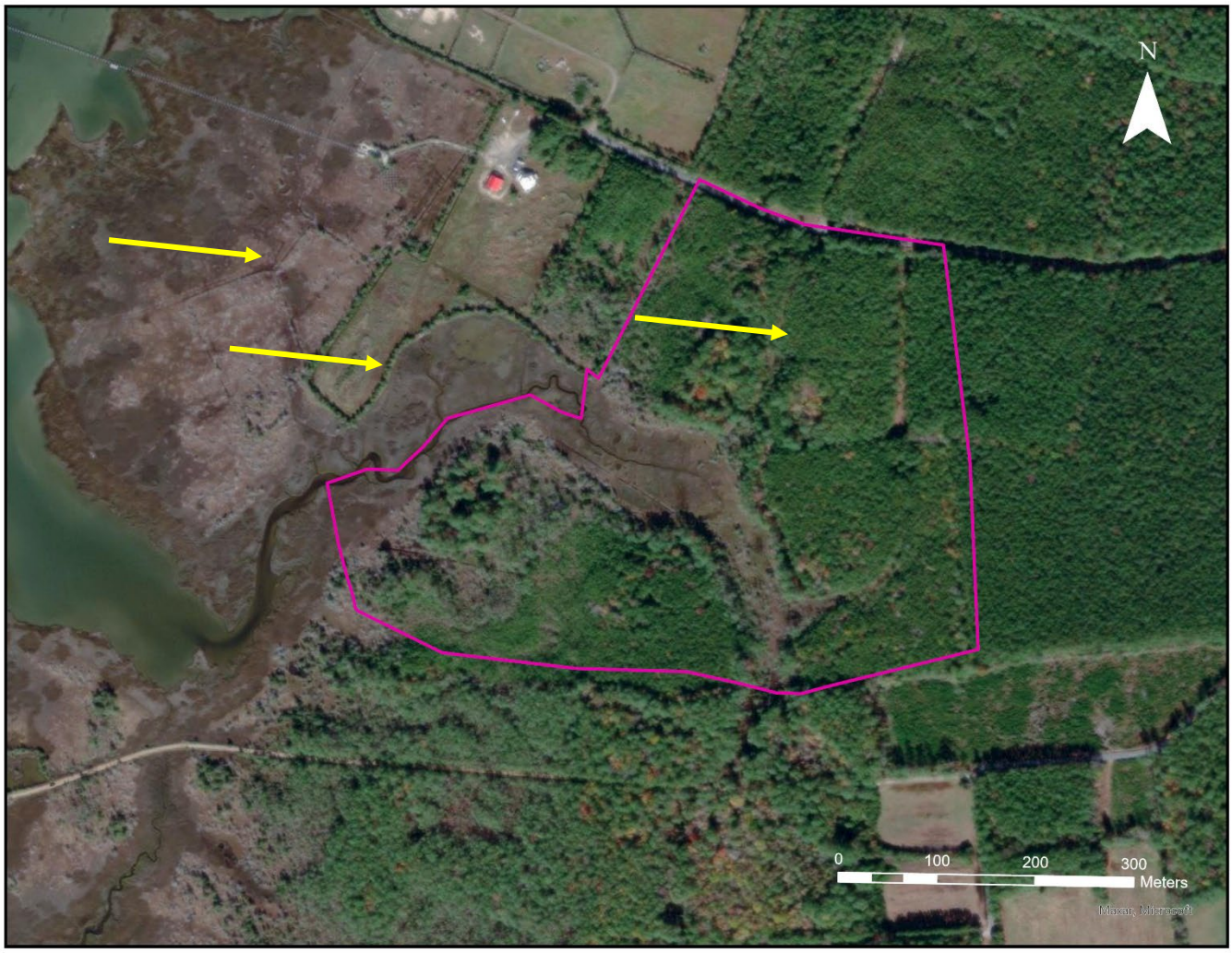
Forested lands are becoming increasingly scarce, so improving the remaining stands is a priority to enhance habitat quality for migrating songbirds. While past research has emphasized the importance of mature forests with a broken canopy (Watts and Wilson 2013), little management has occurred in the area to improve existing forests toward that endpoint. There are several management actions that could promote these conditions and periodic thinning is among those. However, thinning alone may not be sufficient to increase habitat quality for many migrants. Many of these songbirds depend on ripe fruits to fuel migration. However, herbivore density (primarily deer in this instance) limits the availability of fruits by browsing young plants and preventing the establishment as well as competing directly with birds for fruit near the forest floor (Averill 2014, Endress and Averitt 2020). Experimental deer exclusion areas and varying the degree of removal via hunting would help quantify the effects of grazing and reveal how to best promote the establishment of fleshy fruit-producing plants.

Many of the parcels projected to convert to saltmarsh habitats may also be managed to promote marsh migration into adjacent uplands to offset marsh loss at marsh-saltwater interfaces. This is crucial because saltmarsh supports a unique assemblage of plants and animals. It also serves as one of the most efficient storers of carbon (McLeod et al 2011). Promoting the conversion of uplands to marshlands can increase the capacity of the marsh to store carbon but can also provide more habitat for saltmarsh specialist birds, many of whom are experiencing population declines (ACJV 2020). Methods such as fire treatment have effectively facilitated marsh migration into adjacent uplands by boosting the productivity of salt marsh and understory vegetation in ecotone and upland forests, while also stunting tree height growth due to increased salinity stress (Jen 2022). However, the use of fire is not always feasible due to the proximity of urban and other developed lands. Nonetheless, the removal of tree stems, via mechanical or other means, may offer similar benefits for marsh transgression into uplands.

Whatever management actions are conducted to promote saltmarsh transgression, some features may limit the benefit for saltmarsh specialist if not accounted for. Many of these parcels have a legacy of historic agricultural use, with remnants such as berms and ditches still present. These features may impede tidal inundation resulting in reduced sediment deposition and they also may impound rainwater (Hall et al. 2022). Areas with an agricultural legacy tend to support plants like the invasive *Phragmites australis australis* over the

more salt-tolerant *Sporobolus alterniflorus* (formerly *Spartina alterniflora*) and are also less conducive to supporting saltmarsh-obligate birds (Hines et al. in review). The berms and ditches associated with an agricultural legacy are ubiquitous within the zone that is currently converting from upland to saltmarsh and the projected path of the future marsh-upland ecotone in Accomack County (Figure 7). Therefore, managing these landscape features may be just as crucial as promoting the conversion of uplands to saltmarsh habitats. Management options like mechanical removal of berms may be effective but removal of berms currently or near the marsh may difficult given the terrain and may lead to habitat degradation. Breaching berms in strategic locations combined with runnelling may be a more cost-effective option that is also less destructive to the existing marsh.

Figure 7. Map of Hayman that shows the berms and ditches associated with an agricultural legacy in Accomack County VA, USA. The purple line outlines the tract boundaries while the yellow arrows point to berms that surrounded agricultural fields from different eras of past use. The left most arrow points to berms that are from the most distant past and these farms were abandoned prior to 1937. The middle arrow points to the perimeter of farms that were active in 1937 but have already converted to saltmarsh. The rightmost arrow points to the perimeter of fields that were active in 1937 but have not yet converted to saltmarsh.



While it is not clear which management strategies would best work, we have developed a tiered database of tracts that could be used to set up experiments. Ideally, baselines would be established and different management actions could be conducted on tracts that are relatively similar (e.g., same general forest composition and age) and paired with a control to evaluate the efficacy of management. Given the amount of land purchased by DWR, experimental actions could vary to find the relationship between the magnitude of the action and the response. For example, various degrees of thinning could be implemented in similar forests and the number of migratory bird days could be used to evaluate which thinning regimen resulted in the greatest increase in migrant songbird density. Another example could be evaluating the effect of different burn regimens or tree removal methods on marsh migration rates. Whatever the design ultimately is, the implementation of such experimental actions offers a promising avenue for understanding the nuanced relationship between management and their outcomes.

ACKNOWLEDGMENTS

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APPENDICES

Appendix I. Table of tracts purchased by DWR in Accomack County, VA, USA.

Tract	Patch Age	Forest Comp-osition	Primary Access	Secondary Access	Total Area (ha)	Management Designation	Tier	Current Tidal Habitat (ha)	3' SLR Tidal Habitat (ha)	6' SLR Tidal Habitat (ha)
AMES	Mid	Mixed	Yes	NA	137.8	Marsh	2	0.2	52.5	126.5
AYRES	Mature	Mixed	Yes	NA	4.3	Marsh	4	0.0	4.2	0.0
BAILEY NECK	Mid	Pine	Yes	NA	34.8	Marsh	4	0.0	1.5	3.0
BELOTEb	Mature	Mixed	Yes	NA	19.7	Forest	1	0.0	0.0	0.0
BELOTEBELOTE	Mature	Pine	Yes	NA	10.2	Forest	1	0.0	0.0	0.0
BLOXOM EULA R	Mid	Pine	No	No	27.1	Marsh	3	0.0	0.0	26.2
BLOXOM LAURA	Mid	Pine	Yes	NA	21.1	Marsh	3	0.1	9.4	19.4
BOTT,BILL	Mid	Pine	Yes	NA	13.5	Forest	1	0.0	0.0	0.0
BRIMER ESTATE	Mature	Mixed	Yes	NA	14.3	Marsh	3	0.0	0.0	12.4
BROADWATER	Mid	Pine	Yes	NA	10.5	Marsh	2	0.1	10.4	0.0
BROUGHTON BERNICE	Mature	Mixed	No	No	26.5	Forest	4	0.0	0.0	0.0
BULL FARM	Mid	Pine	Yes	NA	28.0	Forest	1	0.0	0.0	0.0
BURTON ESTATE A S	Mid	Pine	No	No	57.0	Forest	4	0.0	0.0	0.0
BURTON ESTATE E S	Mid	Pine	No	Yes	35.3	Marsh	3	0.0	0.0	35.1
BYRD NOLAN	Mature	Pine	No	Yes	11.1	Marsh	4	0.0	0.3	9.2
BYRD SALLY	Mature	Pine	Yes	NA	23.2	Marsh	3	0.0	0.0	15.5
BYRD W S	Mid	Pine	No	Yes	6.4	Marsh	4	0.0	0.0	1.4
C C BELOTE #2	Mixed	Pine	No	Yes	4.0	Forest	3	0.0	0.0	0.0
C F BYRD	Mature	Pine	Yes	NA	4.3	Forest	3	0.0	0.0	0.0
CAMPBELL	Mid	Mixed	Yes	NA	53.9	Marsh	3	0.0	0.0	22.1
CHASE CLEO C	Mature	Mixed	Yes	NA	3.3	Marsh	4	0.0	0.0	2.7
CLARENCE TAYLOR	Mature	Pine	No	No	16.1	Forest	4	0.0	0.0	0.0
COATSOLONIA	Mid	Pine	No	Yes	3.9	Marsh	4	0.0	3.9	0.0

Tract	Patch Age	Forest Comp-osition	Primary Access	Secondary Access	Total Area (ha)	Management Designation	Tier	Current Tidal Habitat (ha)	3' SLR Tidal Habitat (ha)	6' SLR Tidal Habitat (ha)
COME BY CHANCE	Mid	Mixed	No	No	81.2	Forest	4	0.0	0.0	0.0
CORBIN	Mid	Mixed	No	Yes	18.9	Marsh	2	0.0	18.8	0.1
CORBIN FISH & STAN	Mature	Pine	Yes	NA	53.5	Marsh	2	0.0	53.2	0.0
COSTELLO	Mature	Pine	No	Yes	5.9	Marsh	4	0.0	0.2	5.9
DAVIS #1	Mid	Mixed	Yes	NA	39.5	Marsh	3	0.0	6.9	38.6
DAVIS NO 2	Mid	Mixed	No	Yes	4.9	Marsh	4	0.0	3.3	4.9
DEEP CREEK	Mature	Pine	No	Yes	66.2	Marsh	3	0.0	2.7	62.9
DRUMMOND-CORDREY	Mature	Pine	Yes	NA	17.2	Forest	1	0.0	0.0	0.0
EHRNWALD	Mid	Mixed	Yes	NA	66.9	Marsh	2	0.0	33.2	34.4
EWELL ANNIE	Mature	Pine	Yes	NA	2.1	Marsh	4	0.0	2.0	1.7
EWING-CASHVILLE	Mid	Pine	Yes	NA	28.7	Marsh	3	0.0	0.0	28.3
EWING-CLAM	Mature	Mixed	No	No	33.6	Marsh	3	0.0	4.9	32.3
EWING-DOE CREEK	Mid	Mixed	No	Yes	104.6	Marsh	1	2.9	24.7	87.7
EWING-DRUMMOND	Mature	Pine	Yes	NA	6.2	Marsh	4	0.0	0.0	2.3
EWING-EWELL	Mid	Mixed	Yes	NA	2.7	Marsh	4	0.0	2.7	0.0
EWING-HOPKINS	Mid	Mixed	No	No	15.4	Marsh	4	0.0	0.0	2.9
EWING-MASON	Mid	Pine	Yes	NA	32.7	Forest	1	0.0	0.0	0.0
EWING-MATHEWS	Mid	Mixed	Yes	NA	36.3	Marsh	3	0.0	1.7	13.4
EWING-NEW CHURCH	Mature	Pine	Yes	NA	115.6	Forest	1	0.0	0.0	0.0
EWING-PARKS	Mid	Mixed	Yes	NA	28.7	Marsh	3	0.0	0.0	24.9
EWING-REW	Mid	Mixed	No	Yes	37.0	Forest	2	0.0	0.0	0.0
EWING-SOMERS	Mature	Pine	Yes	NA	7.7	Marsh	4	0.0	0.1	7.4
EWING-WEBB	Mid	Mixed	Yes	NA	69.9	Forest	1	0.0	0.0	0.0
FLETCHER	Mid	Pine	Yes	NA	4.5	Marsh	4	0.0	4.4	0.0
FLETCHER Johnson	Mature	Pine	Yes	NA	30.7	Forest	1	0.0	0.0	0.0
FROGSTOOL	Mature	Mixed	Yes	NA	3.2	Marsh	4	0.0	0.0	2.7
GEORGE FOSQUE	Mid	Pine	Yes	NA	73.4	Forest	1	0.0	0.0	0.0

Tract	Patch Age	Forest Comp-osition	Primary Access	Secondary Access	Total Area (ha)	Management Designation	Tier	Current Tidal Habitat (ha)	3' SLR Tidal Habitat (ha)	6' SLR Tidal Habitat (ha)
GILLESPIE	Mature	Mixed	No	Yes	2.7	Forest	3	0.0	0.0	0.0
GORDY	Mature	Pine	No	Yes	17.6	Marsh	3	0.0	0.0	16.3
HAISLIP CORBIN	Mid	Mixed	Yes	NA	8.3	Forest	3	0.0	0.0	0.0
HAISLIP DEEP CREEK	Mature	Pine	No	Yes	12.9	Marsh	3	0.0	0.9	11.8
HAISLIP HALL	Mature	Pine	No	No	16.0	Forest	4	0.0	0.0	0.0
HAISLIP KERR	Mature	Mixed	Yes	NA	2.6	Forest	3	0.0	0.0	0.0
HALES	Mature	Pine	No	Yes	14.3	Marsh	3	0.0	0.0	14.1
HALL REVEL C	Mature	Pine	No	Yes	17.5	Forest	2	0.0	0.0	0.0
HANCOCK,WILLIAM	Mid	Mixed	No	Yes	4.3	Forest	3	0.0	0.0	0.0
HARRY HALL	Mature	Mixed	No	Yes	18.2	Marsh	4	0.1	0.1	2.2
HAYMAN	Mature	Pine	Yes	NA	22.3	Marsh	1	8.3	14.3	0.0
HICKMAN BROS	Mature	Mixed	No	Yes	16.0	Forest	2	0.0	0.0	0.0
HICKMAN RICHARD	Mature	Pine	No	No	16.3	Forest	4	0.0	0.0	0.0
HICKMAN,ELWOOD	Mature	Pine	No	Yes	5.2	Forest	3	0.0	0.0	0.0
HOPE SUSAN B	Mature	Mixed	Yes	NA	4.6	Forest	3	0.0	0.0	0.0
HOPE W H	Mature	Pine	Yes	NA	25.1	Marsh	4	0.0	0.0	0.3
HOPKINS-HANCOCK	Mature	Mixed	Yes	NA	127.0	Marsh	4	0.0	0.0	0.1
HORNTOWN	Mature	Mixed	Yes	NA	88.2	Forest	1	0.0	0.0	0.0
JAMES	Mid	Mixed	Yes	NA	31.8	Marsh	3	0.0	1.4	30.4
JOHNSON ALBERT F	Mature	Pine	Yes	NA	64.5	Forest	1	0.0	0.0	0.0
JUSTICE	Mixed	Mixed	Yes	NA	54.3	Forest	1	0.0	0.0	0.0
KELLEY	Mature	Mixed	No	No	17.6	Forest	4	0.0	0.0	0.0
KILLMON	Mature	Pine	No	Yes	1.2	Marsh	4	0.0	0.3	1.2
L.W. WHITE	Mixed	Pine	No	Yes	5.1	Marsh	4	0.0	5.1	0.0
LARSON	Mid	Pine	Yes	NA	10.8	Marsh	4	0.0	8.8	4.7
LASSITER	Mature	Pine	Yes	NA	49.2	Forest	1	0.0	0.0	0.0
LASSITER # 3	Mature	Pine	No	Yes	45.0	Forest	2	0.0	0.0	0.0

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LASSITER #4	Mid	Pine	No	No	5.8	Marsh	4	0.0	0.0	5.7
LASSITER1	Mature	Pine	Yes	NA	21.9	Marsh	3	0.0	0.1	21.0
LASSITER-CHURCH	Mature	Pine	Yes	NA	10.7	Marsh	3	0.0	0.0	10.4
LEWIS	Mature	Pine	Yes	NA	1.6	Marsh	4	0.0	0.0	0.1
LEWIS-NOCK	Mature	Mixed	No	No	21.4	Forest	4	0.0	0.0	0.0
LIDA MEARS	Mature	Mixed	Yes	NA	3.2	Marsh	4	0.0	0.0	3.1
LINTON	Mature	Mixed	No	Yes	31.6	Forest	2	0.0	0.0	0.0
LINTON #2	Mature	Pine	No	No	13.8	Marsh	3	0.0	0.0	13.7
LIZZIE WEST	Mid	Mixed	Yes	NA	35.0	Forest	1	0.0	0.0	0.0
LOVELACE #1	Mid	Pine	Yes	NA	25.4	Forest	1	0.0	0.0	0.0
MAKEMIE PARK	Mixed	Mixed	Yes	NA	42.3	Marsh	3	0.0	0.0	41.7
MARGARET SOMERS	Mature	Mixed	Yes	NA	27.8	Forest	1	0.0	0.0	0.0
MARSHALL	Mid	Pine	Yes	NA	15.3	Marsh	2	0.0	15.2	0.3
MASON	Mature	Pine	No	Yes	9.0	Marsh	4	0.0	0.0	8.6
MASSEY	Mature	Pine	No	Yes	12.3	Forest	2	0.0	0.0	0.0
MCKAYDoe	Mid	Mixed	Yes	NA	13.3	Marsh	3	0.0	1.7	13.1
MCKAY-HH	Mid	Pine	No	No	2.7	Forest	4	0.0	0.0	0.0
MEARS SIDING	Mature	Pine	No	Yes	15.4	Marsh	3	0.0	0.0	15.1
MEINSTER	Mature	Mixed	No	Yes	9.8	Forest	3	0.0	0.0	0.0
MILBOURNE	Mid	Pine	No	Yes	3.1	Marsh	4	0.0	0.0	3.1
MILBOURNE NO 2	Mid	Pine	Yes	NA	3.1	Marsh	4	0.0	0.0	3.0
MILLS	Mid	Pine	Yes	NA	36.3	Marsh	1	14.2	31.5	0.9
MINK FARM	Mature	Pine	No	Yes	4.8	Marsh	4	0.0	4.6	3.5
MOORE	Mid	Pine	No	Yes	18.2	Forest	2	0.0	0.0	0.0
MUDDY CREEK	Mature	Pine	Yes	NA	20.9	Marsh	3	0.0	3.2	17.7
NELLY AYRES	Mature	Pine	Yes	NA	17.1	Marsh	2	0.0	17.1	0.1
OWENS	Mixed	Mixed	Yes	NA	40.9	Marsh	4	0.0	0.0	5.1

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PARADEE	Mid	Mixed	Yes	NA	2.9	Forest	3	0.0	0.0	0.0
PHILLIPS	Mature	Pine	No	Yes	0.4	Forest	3	0.0	0.0	0.0
POLLY HALL #2	Mid	Pine	No	Yes	7.3	Forest	3	0.0	0.0	0.0
PORTER HARDY	Mid	Pine	Yes	NA	21.5	Marsh	3	0.0	0.0	20.2
POULSON #1	Mature	Pine	No	No	15.2	Forest	4	0.0	0.0	0.0
RAYFIELD JOHN L	Mid	Pine	Yes	NA	12.3	Forest	1	0.0	0.0	0.0
RAYNOR	Mature	Pine	Yes	NA	3.0	Marsh	4	0.0	2.8	0.0
RHODES ESTATE	Mature	Pine	No	Yes	23.2	Marsh	3	0.0	0.0	23.1
ROBINHOLE	Mid	Mixed	No	No	3.6	Marsh	4	0.0	0.0	3.4
ROSS	Mature	Pine	Yes	NA	13.1	Marsh	2	0.0	13.0	0.0
SAVAGE	Mid	Mixed	Yes	NA	46.4	Marsh	4	0.0	0.0	9.6
SCARBOROUGH FARM	Mid	Pine	Yes	NA	24.7	Marsh	3	0.0	1.4	10.1
SELBY	Mature	Pine	Yes	NA	15.5	Forest	1	0.0	0.0	0.0
SHORT WOODS	Mid	Pine	No	Yes	61.1	Forest	2	0.0	0.0	0.0
SHREAVES W T	Mature	Pine	Yes	NA	2.4	Forest	3	0.0	0.0	0.0
SMITH,CECIL	Mid	Pine	No	No	7.4	Forest	4	0.0	0.0	0.0
SOMERS	Mid	Pine	No	Yes	4.8	Marsh	4	0.1	0.1	4.7
SOMERS #2	Mid	Mixed	Yes	NA	16.3	Marsh	3	0.0	0.0	10.5
SOMERS MEARS	Mature	Hardwood	No	Yes	20.3	Marsh	4	0.0	0.0	8.9
SPARROW 1&2	Mid	Pine	Yes	NA	10.2	Marsh	4	0.0	6.0	5.0
STANT-BLOXOM	Mid	Pine	No	Yes	8.4	Marsh	4	0.0	8.3	0.0
STEWART	Mature	Pine	No	No	8.4	Forest	4	0.0	0.0	0.0
TAYLOR	Mid	Pine	Yes	NA	30.1	Marsh	3	0.5	4.2	16.5
THOMAS FARM	Mid	Mixed	Yes	NA	92.3	Forest	1	0.0	0.0	0.0
THOMAS NOCK #2	Mature	Hardwood	Yes	NA	27.5	Marsh	4	0.0	0.0	0.0
THORNTON JAMES LEE	Mid	Pine	No	No	2.6	Marsh	4	0.0	0.2	2.6
TIFFANY	Mature	Mixed	Yes	NA	26.9	Forest	1	0.0	0.0	0.0

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TULL	Mixed	Pine	Yes	NA	38.8	Forest	1	0.0	0.0	0.0
VAN KESTEREN	Mid	Pine	Yes	NA	7.9	Marsh	4	0.1	5.5	3.1
VASTINE	Mid	Mixed	No	No	13.7	Marsh	2	0.2	13.4	12.8
VIOLET LINTON	Mid	Pine	No	Yes	4.4	Forest	3	0.0	0.0	0.0
W.T. & NEELY HALL	Mid	Mixed	Yes	NA	59.4	Marsh	4	0.0	0.0	7.2
WALLOP	Mature	Pine	No	No	12.5	Forest	4	0.0	0.0	0.0
WATSON	Mid	Mixed	Yes	NA	14.3	Marsh	4	0.0	0.0	8.8
WEST	Mature	Pine	No	Yes	7.6	Marsh	4	0.0	4.5	7.0
WHITE	Mid	Pine	No	Yes	8.3	Marsh	4	0.0	8.3	0.0
WHITE #2	Mid	Pine	No	Yes	3.9	Marsh	4	0.1	3.9	0.0
WILKERSON	Mixed	Pine	No	Yes	45.4	Forest	2	0.0	0.0	0.0
WILLIAM NO 2	Mid	Pine	No	Yes	1.4	Marsh	4	0.0	1.4	0.0
WILLIAMS	Mid	Pine	Yes	NA	2.0	Forest	3	0.0	0.0	0.0
WILMES NOCK	Mature	Pine	Yes	NA	20.7	Marsh	2	0.3	20.0	0.0