

**DAHOMY NATIONAL WILDLIFE REFUGE  
FOREST STAND CONDITIONS AND  
HABITAT MANAGEMENT RECOMENDATIONS**

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## I. INTRODUCTION

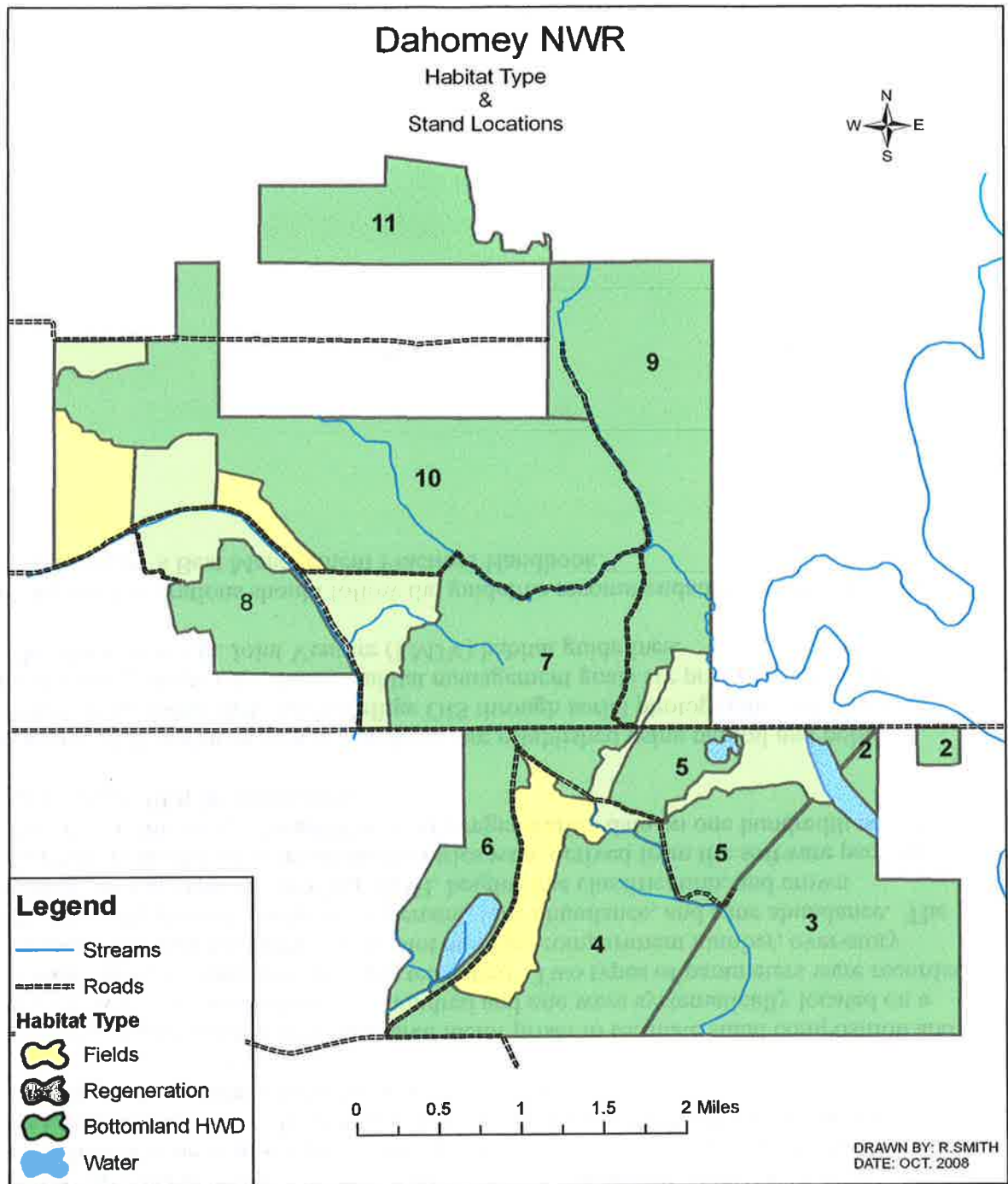
At the request of the North Mississippi Refuge Complex, the Dahomey National Wildlife Refuge was inventoried during the spring of 2008 to aid in the development of habitat management recommendations and planning. Noxubee's forestry staff, Teddy Roosevelt's forester Lamar Dorris, West Tennessee's Forester Leif Karnuth and North Mississippi's Biologist Becky Rosamond conducted a point-cruise inventory.

The inventory method used a ten (basal area factor prism to estimate stand composition and structure of the habitat vegetation. Six-hundred and one were systematically located on a grid of 5 chains x 20 chains (one plot per ten acres). Two types of parameters were recorded plot and tree. The plot parameters were plot number, compartment number, over-story percent, mid-story percent, under-story percent, vine abundance, and cane abundance. The tree parameters were species, product, DBH, height, tree classification, and crown classification. Estimates of compartment metrics were derived from the software package Two Dog Forest Inventory. In addition viable regeneration data on one hundredth acre plots were taken every fifth inventory plot.

Compartment delineation within the Refuge were established using natural and political boundaries set up using Noxubee's Refuge GIS through aerial photographs and Dahomey Refuge boundary shape files. Forest habitat management goals are primarily aimed at following the Lower Ms. Joint Venture (LMJV) habitat guidelines.

All silvicultural operations should follow the guideline recommendations proposed by the 2008 "Mississippi's Best Management Practices Handbook."

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### III. Recommendations - DAHOMEY NWR

#### Location

Dahomey NWR is located in Bolivar County, Mississippi. The Refuge is about twelve miles west of Cleveland MS. State Highway 446 bisects the Refuge From east to west. Dahomey NWR is surrounded by agricultural farm land. From the air Dahomey NWR resembles an island of forested habitat in a sea of farmland.

#### Description

Dahomey NWR consists of 9,776 acres. The major vegetative cover types and acreage are:

<u>TYPES</u>	<u>ACRES</u>
Field and R/W	644
Mature Bottomland HWD	7,961
Old Field Regeneration	1,029
Water	<u>142</u>
Total	9,446

The Refuge is in the Delta Mississippi physiographic region. The topography is very flat with ridges having no more than a three to five foot elevation change across the area. The Refuge is composed of bottomland hardwoods. Utilizing the forest cover type descriptions, by the Society of American Foresters (SAF), the forest of Dahomey NWR is slowly changing from an Oak dominated SAF type to a more shade tolerant SAF type 93 (Sugarberry-American Elm- Green Ash text description in appendix). This is evident of the regeneration composition, as shown in the regeneration table, located in the appendix.

Past forest habitat management appears to have consisted of commercial timber harvests by the previous owner. Based on observation of current forest structure the past harvests looked like they may have been a diameter limit cut, leaving a large number of "cull trees" throughout the property. The cull trees that were left have grown to become the dominant trees in many areas of the Refuge.

## Inventory Data

The estimated commercial volumes for Dahomey NWR are as follows:

Hardwood Saw Timber	28,120	MBF(Doyle)
Hard Hardwood Pulpwood	23,844	Cords
Soft Hardwood Pulpwood	39,809	Cords

A summary stand table for Dahomey NWR is included (Table 1). Complete stand data tables and tract statistics are included in the appendix.

Substitute the word Refuge for the word Tract and word compartment for the word stand in the tree data tables in the appendix. Other tables can be generated but the included tables are the most meaningful. Compartment # 1 or stand # 1 was used for the whole Refuge regeneration data plots.

The parameters of tree classifications and crown classes have not been analyzed. The programmers for Two Dog will develop an analysis for us when requested.

The plot parameters of over-story percent coverage, mid-story percent coverage, under-story percent coverage, vine percent abundance, and cane percent abundance are presented in the appendix in a map scale form.

## Recommendations:

The following recommendations are not necessary in order of importance but all need to be considered.

1) Feral hog control (eradication). Feral hogs are consuming much of the hard mast produced by the oak hardwood species. This consumption of mast not only deprives food from other wildlife species but greatly reduces the regeneration of these important tree species. The feral hog hunting program is commendable in that it reduces the number of hogs and provides quality recreational hunting opportunities; however, this action is not enough to greatly reduce or eliminate the herd. Since, Dahomey is completely surrounded by farmland with no connecting forest lands from which off site feral hogs could repopulate the Refuge, eradication by trapping (commercial or staff) should be considered.

2) Beaver control. The Refuge does a fairly good job of controlling the beaver impoundments with the use of explosives. Several areas were observed to be recently flooded by beaver activity. The flooding during the spring and into the growing season may not necessarily kill the bigger trees if the water is removed fairly quickly, but it does destroy regeneration that has just leafed out. To lessen the effect of water covering these young leafed out trees a large amount of the beavers could be removed by trapping and quick response to impounded areas. It is neither unlikely nor desirable that the beaver will be completely eliminated, but the numbers should be severely reduced with time.

3) Large cull trees. Huge trees that are remnants of the pre-Refuge forest are scattered throughout the Refuge. These huge trees mostly willow and Nuttall oaks are cull trees left from pre-Refuge commercial harvesting operations. These trees have huge crowns, which shade out, in some cases, almost a quarter of an acre. These trees produce large amounts of mast; however, the crowns prevent regeneration of shade intolerant tree species. The recommendation of Lower Miss. Valley Joint Venture Team (LMVJV) on desired forest conditions, is not to have over two of this type of tree per acre. The excess trees which are not den trees should be removed or left standing dead after a timber stand improvement (TSI) treatment, using herbicide.

4) Regeneration: Aforestation of old fields on little over one thousand acres in the Refuge was accomplished by planting oak trees. Some of the aforestation has plenty of volunteer species of trees inter-growing with the oaks, which is good. Pure oak stands should be avoided. Future plantings of old fields should incorporate other species of trees having oak occupy no more than 35% of the total species planted.

Regeneration of the forest habitat is of extreme importance. The data from the regeneration plots taken during inventory suggests that the forest is changing to a shade tolerant SAF type 93 (sugarberry – elm – ash). By opening the forest up to receive sunlight and with the combination of feral hog removal the regeneration of hard mast producing trees should increase. The opening up of the forest canopy can be accomplished by two methods. The following two recommendations describe the process a little better.

5) Commercial thinning in preferred order of entry (Comp.6, 8, 5, 2, and 7): Compartment six and eight are currently in need of a commercial thinning. The compartments have the LMAVJV keys that set the process in motion. High Basal Area (BA) and high merchantable volume are key indicators for this action. The stands should be thinned down to 50 to 65 BA. Thinning to this BA allows sunlight to hit the floor of the forest and opens up the canopy enough so that it will not close back before some regeneration can occur. The main drawback to this method is skilled markers are needed. Compartments 5, 2 and 7 are also in need of management attention. These units have a higher pulpwood volume, but less sawtimber volume. Since the overall goal is to advance, release and promote more desirable regeneration within these compartments the thinnings would rely more on the marketability of pulpwood than in compartment 6 and 8. The compartments should still have enough sawtimber volume to attract potential commercial operators and are certainly in need of management actions. The process for thinning these compartments would utilize the technique of both “thinning from below and above” to encourage the establishment and release of desirable regeneration.

Compartment 6 has 542 acres in it. To keep from having such a large operation the block could be divided into three smaller more manageable blocks of 180 acres. Compartment eight could be divided into two manageable units as well. Compartments 5 and 7 could also be further divided into manageable units.

6) A Forest Habitat Improvement technique (FHI) may be considered as an alternative in Compartment 10. FHI techniques are the same as the old TSI (Timber Stand Improvement) techniques, just a social friendlier name. Compartment ten is a prime candidate for this

method. It has a higher than desirable basal area and a large number of smaller stems. These factors may not at this time be commercial harvest friendly so the alternate FHI method could be considered. The FHI method allows the release of desirable trees, allows sunlight to get to the forest floor, reduces BA, increases regeneration, and reduces undesirable hardwoods. Other compartments could be treated by this method in the future if desired. The main drawback to this method is that it is costly (herbicide); labor intensive and skilled hand injection crews would be needed. If a pulpwood market is available or could be developed, the best option would be the use of commercial harvesting versus the FHI technique.



Table: 1

DAHOMY NWR  
Stand Data

Stand #	Acres	# Trees/ Acre	Small Trees/ Acre*	Large Trees/ Acre*	Total BA/ Acre	Small Trees BA*/Ac	Large Trees BA*/Ac	Pulp- Wood/ Acre	Bd ft/ Acre Doyle	Treatment
2	116	119	70	49	101	25	76	9.4	4,034	
3	1,232	124	82	42	90	29	61	6.7	3,445	
4	813	105	63	42	81	22	59	7.1	2,710	
5	470	152	105	47	103	35	68	9.5	4,239	TSI
6	542	151	90	61	121	30	91	9.4	6,299	Thin
7	840	121	70	51	94	23	71	7.2	3,768	
8	379	99	49	50	102	16	86	8.0	5,363	Thin
9	1,182	126	86	40	89	29	60	6.5	2,863	
10	1,873	133	86	47	97	28	69	9.9	3,037	
11	512	94	50	44	86	17	69	7.2	2,972	

\* Small trees = 6" to 10" DBH, Large trees = 12" and larger DBH

(Sensing)  
Priority  
based on  
Bd ft/Ac.

4

3

1

5

2

priority R/R

## Appendix

## DAHOMY NWR 2008 REGENERATION (trees per acre)

Species	Diameter Breast Height (inches)						Sub Total**
	1*	2	4	6	8	10	
Ash	158.6	27.0	17.1	6.7	5.9	3.7	219.0
Sugarberry	161.3	25.2	14.4	8.5	8.9	5.7	224.0
Elm	125.2	34.2	14.4	5.8	3.7	1.7	185.0
Cherrybark Oak	3.6	0.0	0.9	0.6	0.7	0.4	6.2
Water Oak	5.4	0.9	0.0	0.6	0.5	0.4	7.8
Willow Oak	5.4	2.7	0.9	0.5	0.8	0.6	10.9
Nuttall Oak	4.5	0.9	1.8	0.5	0.8	0.7	9.2
Overcup Oak	1.8	0.9	0.9	0.3	0.2	0.2	4.3
Swamp Chestnut Oak	4.5	2.7	3.6	0.9	0.8	0.4	12.9
Sweetgum	0.0	0.9	2.7	1.3	2.1	1.1	8.1
Shag Bark Hickory	0.0	1.9	0.0	0.3	0.1	0.1	2.4
Hickory Other	16.2	8.1	1.8	1.0	0.5	0.2	27.8
Bitter Pecan	0.0	2.7	1.8	0.5	0.7	0.5	6.2
Pecan	0.9	0.9	0.0	0.3	0.4	0.3	2.8
Cedar Elm	1.8	5.4	4.5	0.2	0.5	0.5	12.9
Mullberry	1.8	0.0	0.0	0.1	0.1	0.0	2.0
Honey Locust	0.9	0.0	0.0	0.2	0.0	0.0	1.1
Blackgum	0.9	0.0	0.0	0.0	0.0	0.0	0.9
Other Hardwood	44.1	15.3	5.4	1.8	1.1	0.6	68.3
<b>TOTAL</b>	<b>536.9</b>	<b>129.7</b>	<b>70.2</b>	<b>30.1</b>	<b>27.8</b>	<b>17.1</b>	<b>811.8</b>

— advanced regen

1\* = Viable regeneration - height greater than 2.5 feet and DBH  $\geq$  1.0 inches

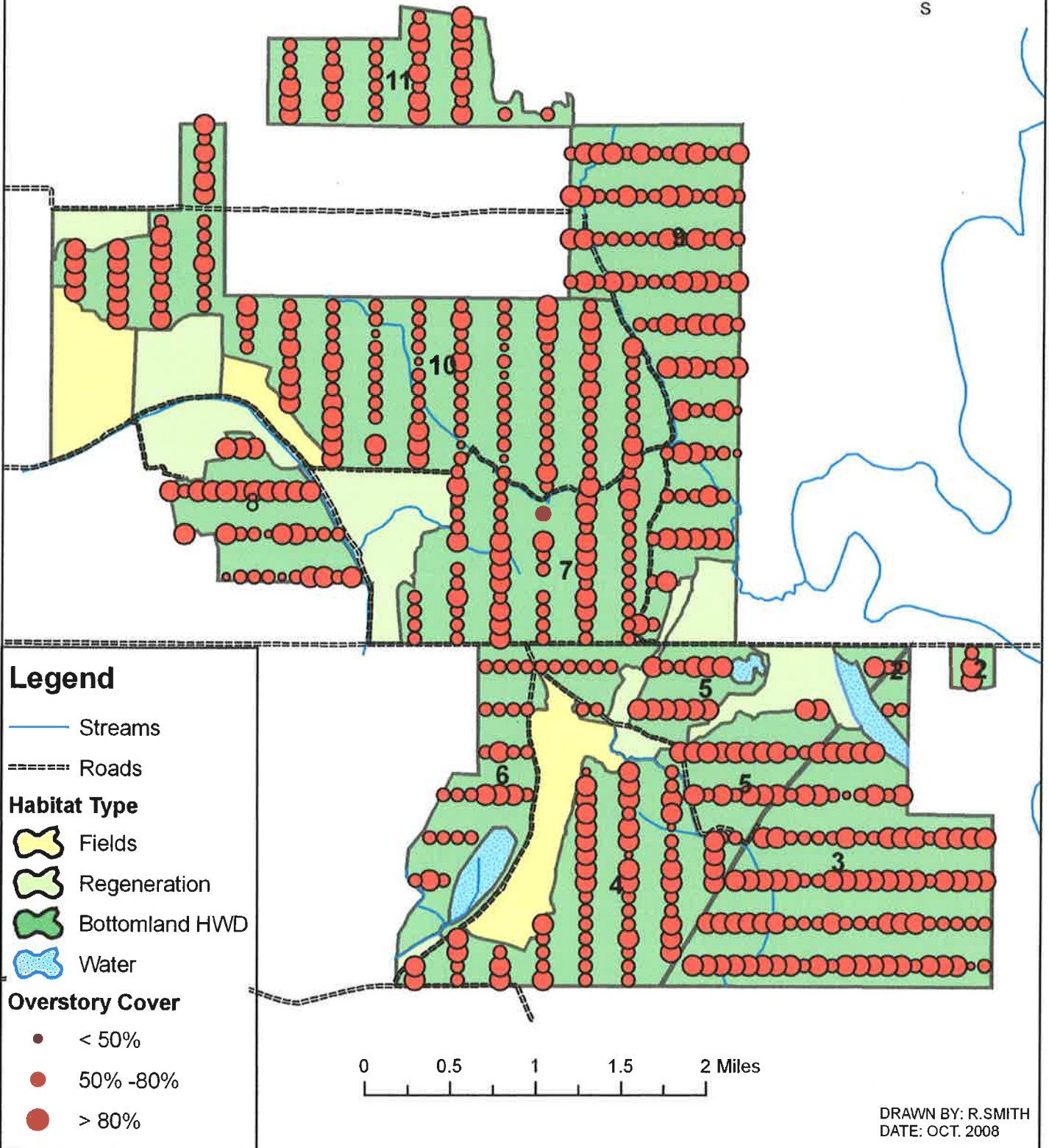
\*\* Data for DBH's 1,2,&4 consolidated from 1/100 acre plot reports

\*\* Data for DBH's 6, 8, and 10 consolidated from prisim plot reports

regen data based on every fifth plot  $\rightarrow$  total of ~120 plots vs. 600 for entire

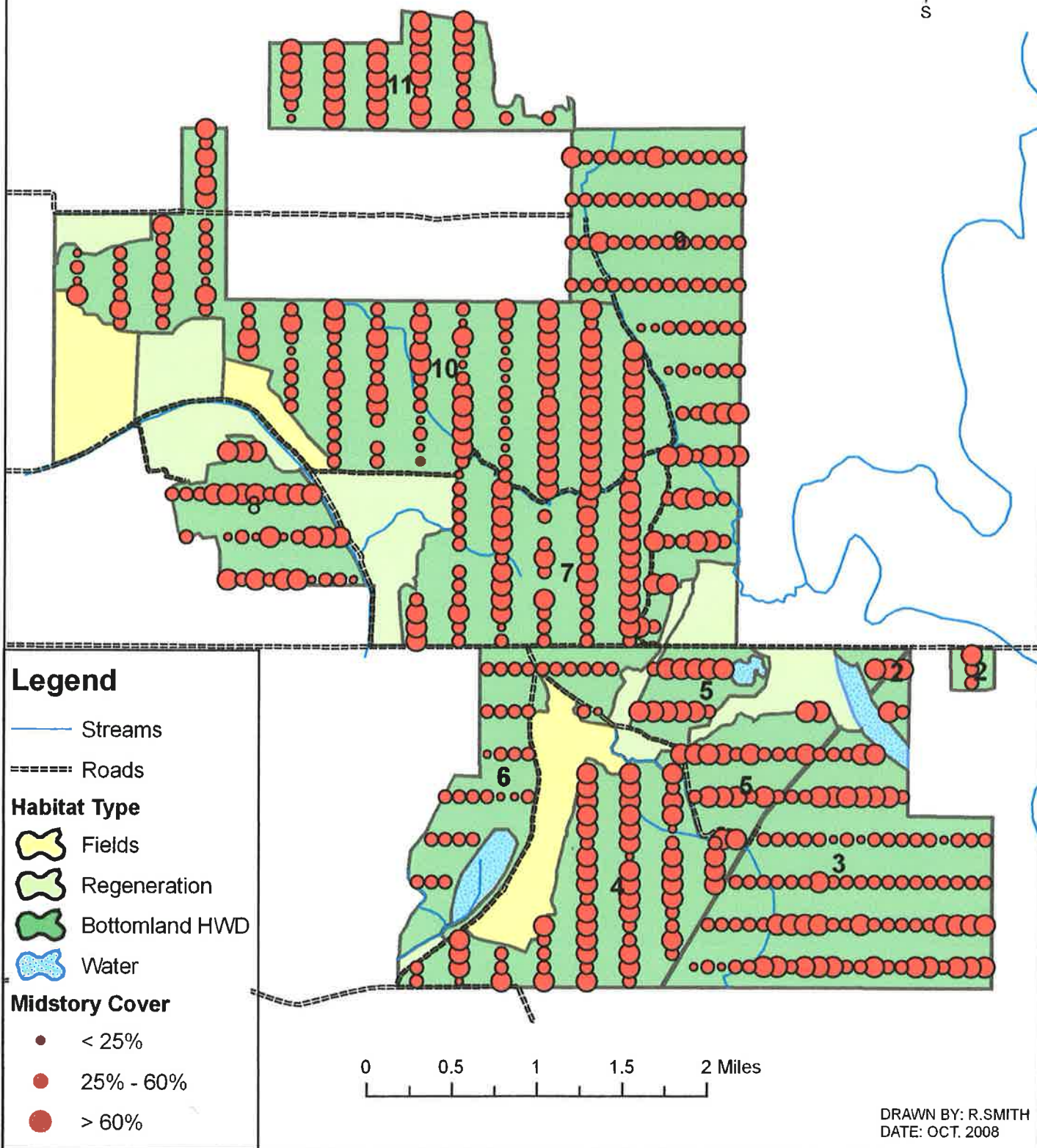
# Dahomey NWR

## Overstory Cover



# Dahomey NWR

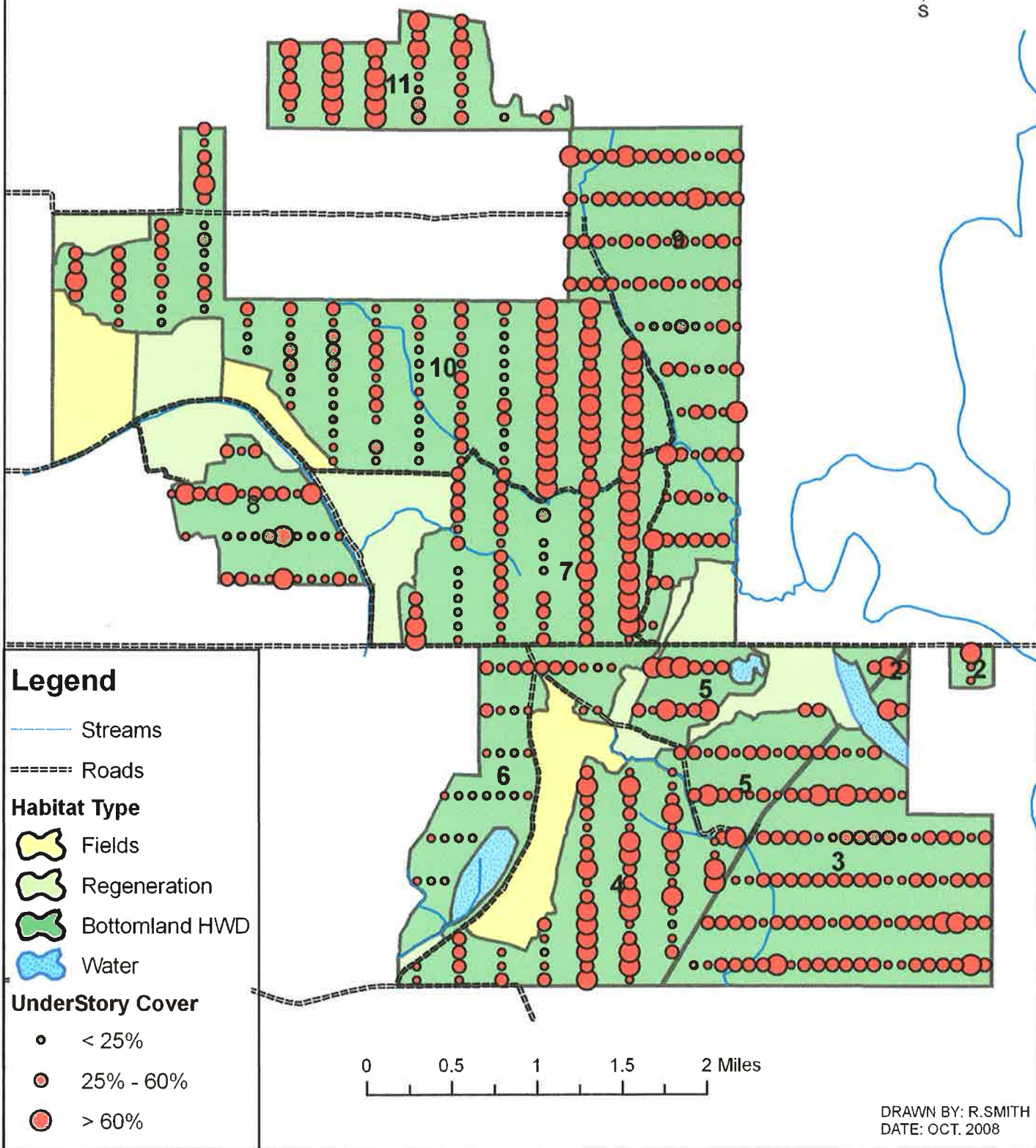
## Midstory Cover





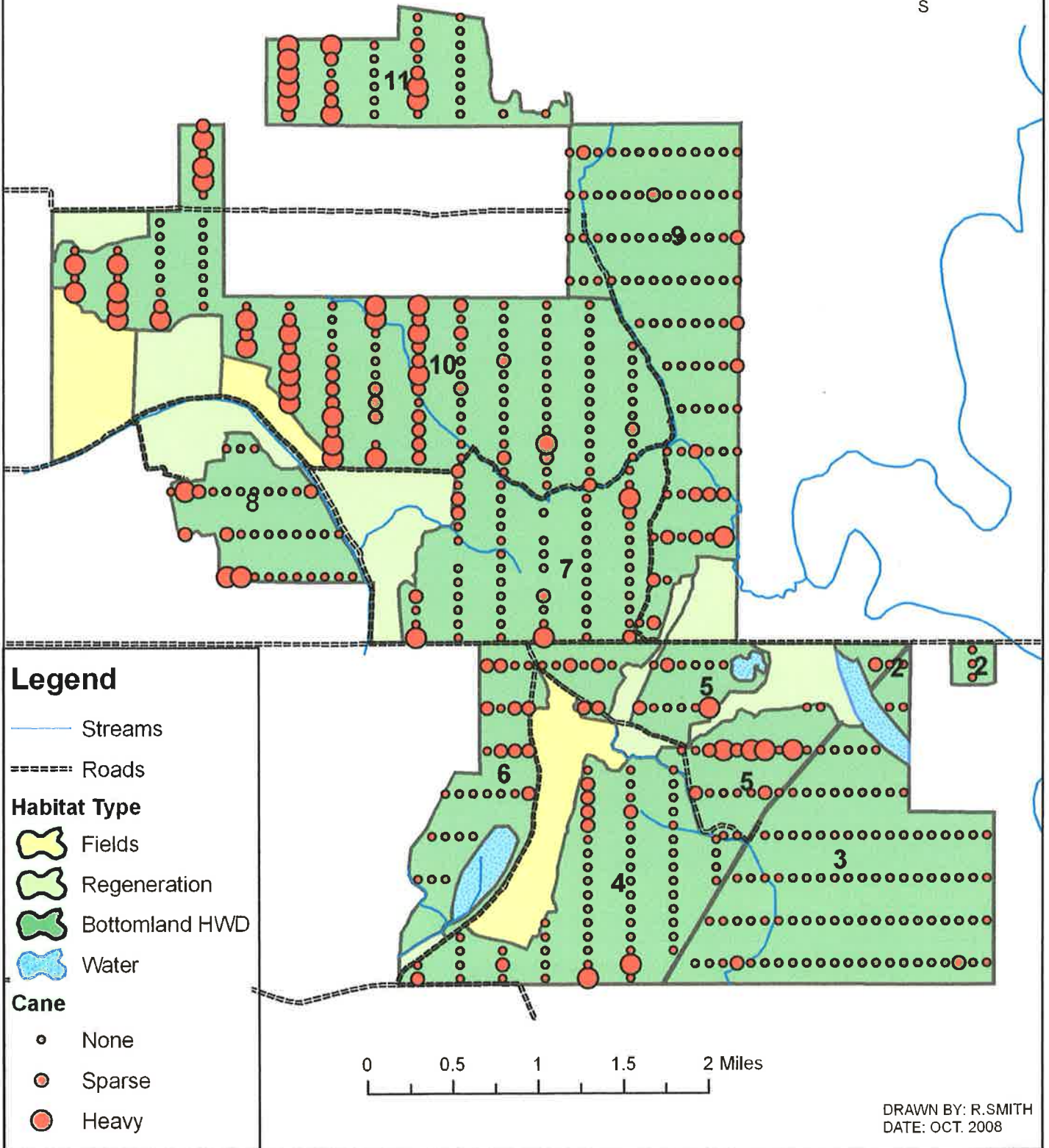
# Dahomey NWR

## Understory Cover



# Dahomey NWR

Habitat Type  
&  
Stand Locations



Areas w/ heavy cane = ↓ canopy closure or presence of edge



# Dahomey NWR

Vine Abundance

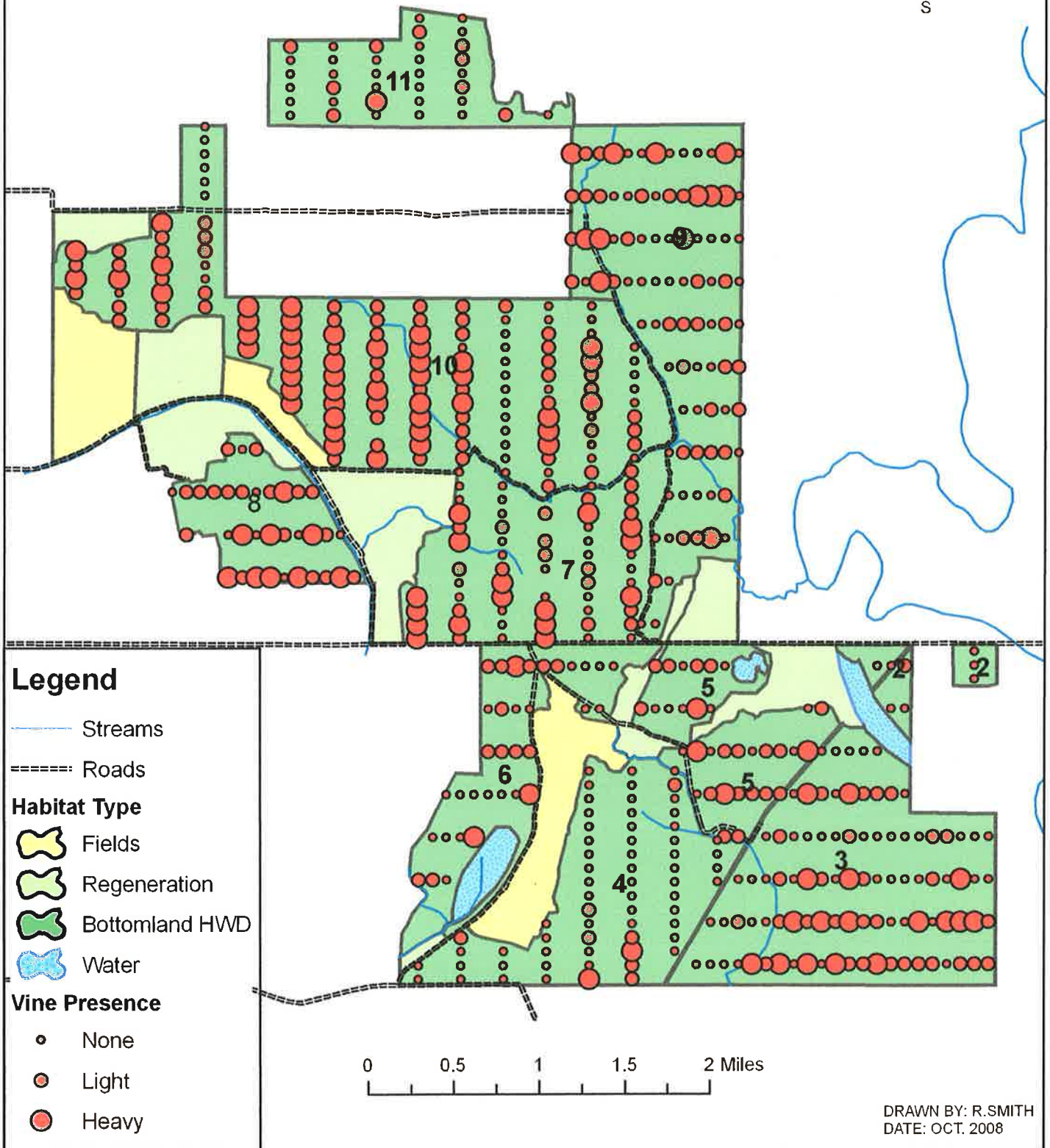




Table 1: DAHOMEY NWR – Stand Data

Stand #	Acres	# Trees/ Acre	Small Trees/ Acre*	Large Trees/ Acre*	Total BA/ Acre	Small Trees BA*/Ac	Large Trees BA*/Ac	Pulp- Wood/ Acre	Bd ft/ Acre Doyle	Treatment
<b>2</b>	<b>116</b>	<b>119</b>	<b>70</b>	<b>49</b>	<b>101</b>	<b>25</b>	76	9.4	<b>4,034</b>	
3	1,232	124	82	42	90	29	61	6.7	3,445	
<b>4</b>	<b>813</b>	<b>105</b>	<b>63</b>	<b>42</b>	<b>81</b>	<b>22</b>	<b>59</b>	<b>7.1</b>	<b>2,710</b>	
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<b>6</b>	<b>542</b>	<b>151</b>	<b>90</b>	<b>61</b>	<b>121</b>	<b>30</b>	<b>91</b>	<b>9.4</b>	<b>6,299</b>	<b>Thin</b>
7	840	121	70	51	94	23	71	7.2	3,768	
<b>8</b>	<b>379</b>	<b>99</b>	<b>49</b>	<b>50</b>	<b>102</b>	<b>16</b>	<b>86</b>	<b>8.0</b>	<b>5,363</b>	<b>Thin</b>
9	1,182	126	86	40	89	29	60	6.5	2,863	
<b>10</b>	<b>1,873</b>	<b>133</b>	<b>86</b>	<b>47</b>	<b>97</b>	<b>28</b>	<b>69</b>	<b>9.9</b>	<b>3,037</b>	
11	<b>512</b>	94	50	44	86	17	69	7.2	2,972	
DFC					60 - 70					

\* Small trees = 6" to 10" DBH, Large trees = 12" and larger DBH

## **Scope of Work**

### **Dahomey Forest Cruise**

**Purpose:** Conduct a forest cruise of Dahomey National Wildlife Refuge to evaluate the current condition of the forest stands in terms of providing habitat for neotropical migrants.

**Protocol:** Conduct a 1% cruise of 13 forest compartments (approximately 8,400 acres) using the techniques developed by the Bottomland Hardwood Forest Working Group. Measure the following parameters:

- Plot-level Data (visible area): Presence and extent of vines, cane, overstory, mid-story, and understory.
- Regeneration Data ( $> 3'$  tall,  $< 3.5''$  dbh:  $1/100^{\text{th}}$  acre plot): Species and count.
- Tree Data ( $4-9''$  dbh:  $1/10^{\text{th}}$  acre plot): Species, DBH, and count.
- Tree Data ( $\geq 9.5''$  dbh:  $1/5^{\text{th}}$  acre plot): Species, DBH, Length/Height, Crown Class, Tree Condition, Epicormic Branching, Bark Disfiguration

**Summary:** Data should be tallied by compartment and provide such information as:

- Basal area
- Percent cover of canopy, mid-story, and understory
- Number of snags/acre
- Prevalence of vines and cane
- Amount of regeneration
- Amount of down, woody debris

**Timeline:** Cruise should be conducted over a 2-week period June 1 – August 31, 2007