

BAYHEAD DRAIN HABITAT

Community Characterization

Bayhead drains occur in response to slow drainage through the flat topography of the coastal pine savannah and pine flatwoods landscape and generally occur along small, relatively narrow, well-defined drainageways high up in the watershed. Generally these habitats are seepage depressions that are concentration areas for water on the landscape. It is common for them to contain active, narrow, shallow, braided, and meandering stream channels.

Bayheads are dominated by obligate and facultative wet plant species. The overstory is characterized by tall, densely packed evergreen hardwoods dominated by sweet bay and other bays, which are the indicator species for this wetland type (Table 1). The plant community type generally has more sweetbay in the overstory and midstory sapling / shrub layers than the typical depression / drain community. The dense midstory layer is also comprised of broadleaved evergreen and deciduous shrub species in conjunction with the additional sweetbay (Table 2). The sparse to moderate forb and sedge ground cover generally consists of shrubs and ferns, which are particularly prominent components of the ground cover (Table 3).

Within the landscape, bayheads are normally found at the bottom of slopes. Bayheads have long hydroperiods, high water tables and mucky, organic soils. Most of the soils are organic with 2 to 5 feet of muck over sands, or 6 to 18 inches of mucky sands over sands, silts and/or clays. Moisture is provided from ground water and runoff from surrounding savannah and flatwoods habitats. Within the ecotone between the flatwoods and the deeper portions of the bayhead is a zone where the seepage of water from the uplands emerges from the mineral soil and maintains a saturated peat layer.

Rarely do bayheads dry out completely, prohibiting fire from entering the community but once every 50 to 100 years. When fire does get into a bayhead, those bay trees on the edge of the community that are killed usually resprout from the roots and replace themselves. Fire may burn and kill the top most portions of the hardwoods at the edge of the bayhead and the typical domed appearance is typical for this community. When more severe fires occur, bayheads may change into different communities. If fire gets into a bayhead too often, the community may eventually change to a shrub bog.

General Maintenance and Management Strategies

1. Remove landscape alterations affecting natural hydrological regime. Avoid any soil disturbing activities or treatments that rut or remove organic muck soils and cause damaging hydrological alterations that lower the groundwater table.
2. Restore ecosystem structure and composition by removing exotic/invasive plant species (Exotic Species List) and non-target species, manipulating existing populations of native species, augmenting populations of native species, and reintroducing extirpated plants and animals.
3. Restore natural fire regime. Select moisture conditions for prescribed fire that allows fire spread from the surrounding savannah / flatwoods habitat to barely

penetrate and scorch system periphery vegetation. The normal burn interval in these communities is 50-100 years or more.

Success criteria for bayhead communities are based upon soils, species composition and community structure. Success criteria have ranges, and it is recommended that a reference forest ecosystem (RFE) be used to determine and justify site-specific success criteria that might be different or less than the proposed maximum requirements for each criterion listed below. It is the applicant's responsibility to characterize the reference forest ecosystem to the satisfaction of the MBRT.

Reference Forest Ecosystem (RFE) –

“The kind of forest selected for creation or restoration, as it is represented locally (same or nearby watershed) in terms of species composition and physiognomy”.
- *MiST Mitigation Site Type Classification (1990)*

The RFE includes the selection of an actual reference site, but recognizes that bayhead hydrology and species composition, even among sites within the same watershed, may differ due to micro-topographical variations on-site. Therefore, species selection should not necessarily be limited to species that occur on the reference site, but should be open to all appropriate species. Thus, the RFE is an amalgum of reference site conditions and suitable species for the particular bayhead being restored, created, or enhanced. A major goal of all mitigation projects is to achieve long-term success. By adding site-specific speciation to the established hydrology and general vegetative structure of the chosen reference site, success should be much easier to achieve.

1. Target Habitat Success Criteria.

A. Canopy

1. 80-100% canopy coverage.
2. 70% target species composition from Table 1.
3. 100% obligate and facultative wet plant species
4. 80-120 square feet/acre basal area
5. <1% cover of exotic species (no seed bearing plants at any time)

B. Subcanopy

1. 40-100% coverage
2. 70% target species composition from Table 2.
3. 100% obligate and facultative wet plant species
4. <1% cover of exotic species (no seed bearing plants at any time)

C. Groundcover

1. 20-60% Coverage
2. 70% Target Species Composition from Table 3.
3. 100% obligate and facultative wet plant species
4. <1% cover of exotic species (no seed bearing plants at any time)

D. Hydrology

1. Proper hydrological conditions as per RFE

E. Soils

1. Presence of 2-5 feet of organic muck over sand or
2. 6-18 inches of mucky sands over sands, silts and/or clay

**2. Monitoring and Difference between Restoration vs. Enhancement Standards:
See Bottomland Hardwood Description (Enhancement = vegetation only, restoration
= vegetation and hydrology).**

3. Bayhead Drain Proposed Credit Release Schedule

- 20% - Initial release for conservation easement and financial assurance.
- 10% - Completion of site preparation and hydrology work
- Removal of exotics, invasive or inappropriate species
 - All earthwork completed
 - Monitoring equipment installed
 - Must show that target hydrology and soils has been attained before trees are planted (minimum 1 year hydrologic monitoring)
- 15% - Post-planting of trees
- 10-15 target species planted, with no greater than 25% coverage of a single species, and a minimum of 400 trees per acre
- 10% - Post-planting of trees (after 1 year positive growth)
- Visual and photographic evidence and verification of proper species (and individual seedling) placement in relation to appropriate topographic/hydrologic habitat
 - Plantings show positive growth of root collar, diameter, and/or height
- 15% - Post-planting of shrubs and herbaceous layer
- A minimum of three years positive growth of tree species is required before shrubs and herbs are planted
 - Visual and photographic evidence of appropriate shrubs and herbs planted sparingly in small groupings across site
- 15% - Post Planting monitoring release
- Visual and monitored hydrology show positive correlation with the target hydrology for the site
 - Minimum of 6 years positive growth, minimum of 10 target tree species showing positive growth of root collar, diameter, and/or height
 - Average height of canopy a minimum 7'-10'
 - 50% of herbaceous species from Table 3, appropriate cover as related to RFE
 - 50% of shrub species from Table 2, 20-60% cover
 - <1% cover by exotics, extirpation of all seed producing plants
- 15% - Final credit release (approximately year 10)
- Visual and monitored hydrology and soils show positive correlation with the target hydrology and soils for the site
 - Stem density, percent cover and basal area of canopy demonstrating high likelihood of achieving final target habitat success criteria
 - Minimum 10 years of positive growth for planted trees, minimum of 10 target tree species in canopy, with a minimum of 10 trees per acre of each target species
 - Average height of canopy at least 25'
 - 70% of herbaceous species from Table 3, or appropriate cover as related to RFE
 - 70% of shrub species from Table 2, 20-60% cover or appropriate cover as related to RFE
 - 100% obligate and facultative wet plant species
 - <1% cover by exotics, complete extirpation of seed producing exotic plants

Table 1. Appropriate forested bayhead tree species (subcanopy and canopy) for restoration work in Mobile District (modified from Teaford et al. 1995).

<i>Acer rubrum</i>	<i>Nyssa aquatica</i>	<i>Pinus ellottii</i>
<i>Alnus serrulata</i>	<i>Nyssa biflora</i>	<i>Quercus laurifolia</i>
<i>Chamaecyparis thyoides</i>	<i>Persea borbonia</i>	<i>Quercus nigra</i>
<i>Cyrilla racemiflora</i>	<i>Persea palustris</i>	<i>Taxodium ascendens</i>
<i>Magnolia virginiana</i>		

Table 2. Appropriate forested bayhead shrub species for restoration work in Mobile District (modified from Teaford et al. 1995).

<i>Alnus serrulata</i>	<i>Hypericum fasciculatum</i>	<i>Leucothoe racemosa</i>
<i>Arundinaria gigantea</i>	<i>Hypericum hypericoides</i>	<i>Lindera benzoin</i>
<i>Carpinus caroliniana</i>	<i>Ilex amelanchier</i>	<i>Lyonia lucida</i>
<i>Clethra alnifolia</i>	<i>Ilex cassine</i>	<i>Myrica cerifera</i>
<i>Cornus foemina</i>	<i>Ilex coriacea</i>	<i>Myrica heterophylla</i>
<i>Fothergilla gardenii</i>	<i>Ilex glabra</i>	<i>Myrica inodora</i>
<i>Gaylussacia mosieri</i>	<i>Ilex myrtifolia</i>	<i>Rhodendron serrulatum</i>
<i>Halesia diptera</i>	<i>Illicium floridanum</i>	<i>Styrax americana</i>
<i>Hypericum brachyphyllum</i>	<i>Itea virginica</i>	<i>Toxicodendron vernix</i>
<i>Hypericum cistifolium</i>	<i>Leucothoe axillaris</i>	<i>Viburnum nudum</i>

Table 3. Appropriate herb species for forested bayhead restoration work in Mobile District (modified from Teaford et al. 1995)

<i>Arundinaria gigantea</i>	Giant cane
<i>Bigelovia nudata</i>	Rayless goldenrod
<i>Bidens mitis</i>	Small-fruit beggartick
<i>Carex albolutescens</i>	Greenish-white sedge
<i>Carex glaucescens</i>	Southern waxy sedge
<i>Chasmanthium ornithorhynchium</i>	Birdbill spikegrass
<i>Cyperus haspan</i>	Sheathed flatsedge
<i>Dichantherium</i> spp.	Witchgrass/ Panic grasses
<i>Eleocharis microcarpa</i>	Small-fruit spikerush
<i>Helianthus heterophyllus</i>	Wetland sunflower
<i>Juncus polycephalus</i>	Many-head rush
<i>Lycopodium alopecuroides</i>	Foxtail clubmoss
<i>Lycopus</i> spp.	Bugleweed spp.
<i>Osmunda</i> spp.	Ferns
<i>Panicum virgatum</i>	Switchgrass
<i>Paspalum praecox</i>	Early paspalum
<i>Polygala</i> spp.	Milkwort spp.
<i>Rhexia</i> spp.	Meadowbeauty spp.
<i>Rhynchospora</i> spp.	Beakrush spp.
<i>Sagittaria graminea</i>	Grassleaf arrowhead
<i>Saururus cernuus</i>	Lizard's tail
<i>Viola lanceolata</i>	Lanceleaf violet
<i>Woodwardia</i> spp.	Ferns
<i>Xyris iridifloia</i>	Iris-leaf yellow-eyed grass

Invasive Species List

Federal Noxious Aquatic and Wetland Weeds (from 7 CFR 360.200):

- Azolla pinnata* R. Brown (mosquito fern, water velvet)
- Caulerpa taxifolia* (Mediterranean clone)
- Eichornia azurea* (Swartz) Kunth (anchored waterhyacinth, rooted waterhyacinth)
- Hydrilla verticillata* (Linnaeus f.) Royle (hydrilla)
- Hygrophila polysperma* T. Anderson (Miramar weed)
- Ipomoea aquatica* Forsskal (water-spinach, swamp morning-glory)
- Limnophila sessiliflora* (Vahl) Blume (ambulia)
- Melaleuca quinquinervia* (Cav.) Blake (broadleaf paper bark tree).
- Monochoria hastata* (Linnaeus) Solms-Laubach (arrowleaf false peickereelweed)
- Oryza longistaminata* A. Chevalier & Roehrich (red rice)

Oryza punctata Kotschy ex Steudel (red rice)
Oryza rufipogon Griffith (red rice)
Ottelia alismoides (L.) Pers.
Salvinia auriculata Aublet (giant salvinia)
Salvinia biloba Raddi (giant salvinia)
Salvinia herzogii de la Sota (giant salvinia)
Salvinia molesta D.S. Mitchell (giant salvinia)
Solanum tampicense Dunal (wetland nightshade)
Sparganium erectum Linnaeus (exotic bur-reed)

Alabama Noxious Aquatic and Wetland Weeds (from AL Department of Agriculture and Industries Plant Protection, Chapter 80-10-14):

Alternanthera philoxeroides (alligatorweed)
Dioscorea bulbifera (air potato)
Egria densa (Brazilian elodea)
Eichornia crassipes (floating waterhyacinth)
Lygopodium japonicum (Japanese climbing fern)
Myriophyllum aquaticum (parrotfeather, watermilfoil)
Myriophyllum spicatum (Eurasian watermilfoil)
Najas minor (spineyleaf naiad)
Phragmites australis (common reed)
Pistia stratiotes (water-lettuce)
Potamogeton crispus (curlyleaf pondweed)
Stratolotes aloides (water-aloe)
Trapa natans (water chestnut)

Other exotic or invasive aquatic plants of concern

Imperata cylindrica (cogon grass)
Ligustrum sinense (Chinese privet)
Lythrum salicaria (purple loosestrife)
Panicum repens (torpedo grass)
Paspalum urvillei (vasey grass)
Phalaris arundinacea (reed canary grass)
Sapium sebiferum (Chinese tallowtree)
Sesbania drummondii (Drummond's rattlebush)
Spirea spp. (meadowsweet)
Typha spp. (cattail)