

### **Ecosystem Description**

Maritime wetland forests occur in wet sites on barrier islands and near the sounds on the mainland. There are three community types: maritime swamp forest, maritime shrub swamps, and estuarine fringe loblolly pine forest.

Maritime swamp forests and maritime shrub swamps occur on barrier islands in dune swales which are sheltered from the most extreme salt spray and from seawater overwash. The soils are saturated for much of the year and may be flooded for substantial periods. Maritime swamp forests have a canopy of tall wetland trees which varies from place to place. Dominants include swamp black gum, red maple, ash, water oak, sweetgum, loblolly pine, and bald cypress. Maritime shrub swamps have a canopy of tall shrubs or small trees, usually red bay or swamp dogwood, which may be tangled together with vines. They are apparently wetter than maritime swamp forests but also may be kept in shrub dominance by periodic disturbance. Maritime swamp forest examples can be found in in Buxton Woods and Nags Head Woods.

Estuarine fringe loblolly pine forests occur on wet flats adjacent to salt or brackish marshes along the sounds. There is often a fairly dense layer of shrubs and greenbriars. All of the dominant plants are species that occur in disturbed wet sites elsewhere in the Coastal Plain, but these communities appear to be of natural origin. It may be that periodic natural disturbances such as salt water intrusion prevent succession to hardwoods. It has been suggested that fire occurred naturally in these communities and that the natural aspect was open and grassy rather than shrubby. Examples of estuarine fringe loblolly pine forests can be found on marsh islands at Swanquarter National Wildlife Refuge and higher uplands at Goose Creek State Park.

The 2005 Wildlife Action Plan describes Mid-Atlantic Coastal Plain Maritime Forest/Shrub communities as a priority habitat (see Chapter 5A) (NCWRC 2005). Components in this ecosystem include maritime shrub, evergreen forest, and deciduous forest and coastal fringe evergreen forest and Sandhills communities.

Table 1 at the end of this report provides of summary of expected climate change impacts to these natural communities.

### **Predicted Effects to Wildlife Species**

Tables 2 through 5 at the end of this report identify the species of conservation concern and priority species that use habitats in this ecosystem.

No animals have been identified as specialists of the communities represented by this Ecosystem Group, although *Euphyes dukesi*, currently assigned to the Freshwater Marsh Guild,

appears to be restricted to habitats where marshes are closely bordered by coastal forests. All guilds linked to this group have their highest acreage of habitats in other Ecosystem Groups.

These habitats are important breeding and migration stopover points for many migratory birds, and key breeding areas for populations of the eastern painted bunting (Hunter *et al.* 2000, Johns 2004). These communities are also important for some snake species for which we have little status, distribution, or demographic information. The presence of dense canopies are a key habitat element in maritime forests; many maritime forest-associated herpetofauna, and their prey, are adapted to survive under particular sun and shade regimes (Bailey *et al.* 2004, NCWRC 2005).

There are feral animal impacts (horses, goats, cows, cats) on some of the barrier islands (*e.g.*, Shackleford Banks and Brown's Island). In addition, egg predators such as raccoons and foxes that typically did not inhabit most of the Outer Banks are now widespread because of the increased amount of food available now that people inhabit the area (NCWRC 2005)

**Climate Change Compared to Other Threats**

Climate change may be the biggest threat to remaining examples of this ecosystem group, especially in places where topography or development limits potential for elevational migration. Residential and commercial coastal development leading to fragmentation and overall reduction of habitat is the single most important factor leading to the existing loss of this habitat.

Table 6 compares climate change with other existing threats.

<b>Threat</b>	<b>Rank Order</b>	<b>Comments</b>
Climate Change	1	Sea level rise may be the biggest threat, outside of development.
Development	1	Almost all this habitat is found in areas close to the beach where human population growth is booming. The creation of numerous small clearings for houses will likely have far-reaching effects on the dynamics of these habitats (Schafale and Weakley 1990 in NCWRC 2005).
Impoundments	2	Construction of larger dunes can either prevent overwash saltwater from reaching these wetlands or trap water that might otherwise run off. Maritime wetland forests may be destroyed by impoundment, ditching, and by extensive well pumping that lowers the water table.
Groundwater Depletion	2	Control of ground water extraction is likely to be difficult, as coastal towns seek water sources from perched aquifers that are shrinking by erosion and salt water intrusion. Ground water pumping, ditching, and impoundment associated with development are threats which can be mitigated.

## **Summary and Recommendations**

Most of the maritime swamps on the barrier islands are under conservation, as are many of the estuarine fringe communities. Substantial opportunities to protect additional examples are limited. There is value in protecting additional examples in the broader, more stable parts of barrier islands such as Kitty Hawk Woods, where these communities have the best chance of surviving. There is value in protecting estuarine fringe examples where there is opportunity for them to migrate inland.

### **Recommended Actions**

- |            |  |
|------------|--|
| Surveys    | <ul style="list-style-type: none"><li>● Conduct migration surveys to determine bird use, especially during the fall.</li><li>● Conduct small mammal surveys on barrier island systems to verify species status, distribution and community composition.</li><li>● Determine the status and distribution of amphibians and reptiles in maritime communities.</li></ul>  |
| Monitoring | <ul style="list-style-type: none"><li>● Conduct periodic surveys for painted buntings, or rely on citizen science to monitor painted bunting populations.</li><li>● Carefully monitor habitat loss of this habitat from sea level rise.</li><li>● Continue long-term monitoring and banding work (currently being done by the US Geological Survey) on eastern painted buntings and support the goals and objectives of the Painted Bunting Working Group that involves Florida, Georgia, South and North Carolina.</li><li>● Establish MAPS and migration banding stations in this habitat type.</li><li>● Establish long-term monitoring of amphibians and reptiles, once survey data has been established.</li></ul>  |
| Research   | <ul style="list-style-type: none"><li>● Conduct cooperative research with western states to determine the genetic relationships between eastern and western painted buntings.</li><li>● Conduct genetics research on all “kingsnake” species.</li><li>● Document the habitat selection and competition factors related to indigo bunting and painted bunting in these habitats (Kopachena and Crist 2000).</li><li>● Maritime forests in the far southeastern portion of the state historically supported eastern woodrats; consider those habitats as potential reintroduction sites.</li><li>● Examine demographics, population dynamics, and the specific habitat requirements of the white-footed mouse subspecies (listing is almost certain for the subspecies).</li><li>● Initiate productivity and habitat use research on priority species such as eastern painted bunting (Norris and Elder 1982, Lanyon and Thompson 1986 and Kopachena and Crist 2000), southern dusky salamander, eastern</li></ul> |

spadefoot, southern hog-nosed snake, eastern coachwhip, northern scarletsnake, kingsnakes and eastern coral snake.

Management Practices • Where possible, remove or exclude feral animals.

Land Protection • Remaining coastal maritime habitats must be a priority for land acquisition efforts. Though coastal uplands are essentially the most costly areas to acquire in the state, it is essential to acquire remaining undeveloped maritime forests, both on barrier islands and on the mainland (NCWRC 2005).  
• Re-establishment of maritime forest habitats should be pursued, including initiation of prescribed burning of appropriate maritime habitats, where possible (NCWRC 2005).

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**Table 1. Predicted Impacts of Climate Change**

<b>Climate Change Factor</b>	<b>Comments</b>
Sea Level Rise -- Salt Intrusion	Large expanses on the Currituck Banks are vulnerable to increased salinity in the sound if new inlets form anywhere on the Currituck Banks.
Sea Level Rise -- Inundation	Because low-lying sound-side s estuarine fringe loblolly pine forest sites are likely to remain common, the net change in acreage of this type will likely be drastic only if sea level rises faster than new examples can develop.
Storm Surge/ Wind Damage	Increased natural disturbance by wind, salt spray, and storm surge intrusion will be significant. Some of these communities consist of species that can recover from these disturbances, but increased frequency will result in death and regeneration, more time spent in recovery stages, and shifts toward the most tolerant species.
Coastal Erosion	With limited dune development in many parts, maritime swamp forests are vulnerable to erosion of the foredunes and increased overwash.
Structural Change	If erosion breaches swales and exposes them to sea water intrusion or overwash in storms, they likely will become Maritime Grasslands. If they are low enough have irregular tidal inundation, they will become brackish marshes. A lack of fire to maintain some variants of these habitats is also leading to successional changes in many of these sites. Burning is almost impossible to conduct in areas surrounded by homes.
Acreage Change	Any loss will be very significant for these already-rare communities. The acreage completely lost from this system by community shifts and destruction may be catastrophic. New sites for these communities may be generated as the coastal landscape changes, but only in places not already destroyed by development.
Fragmentation	Most barrier island examples occur in complexes that are distant from each other, but connections within the complexes can be threatened both naturally by rising sea level and by human actions such as hydrological alteration.

**Table 2. Bird Species Utilizing Maritime Wetland Forests**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>BIRDS</b>							
<i>Passerina ciris</i>	Eastern Painted Bunting					FSC/SC/P	

**Table 3. Mammal Species Utilizing Maritime Wetland Forests**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>MAMMALS</b>							
<i>Peromyscus leucopus easti</i>	White-footed Mouse					/SC/P	

**Table 4. Reptile Species Utilizing Maritime Wetland Forests**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>REPTILES</b>							
<i>Cemophora coccinea copei</i>	Northern Scarletsnake					/ /P	
<i>Heterodon simus</i>	Southern Hog-nosed Snake					/SC/P	
<i>Lampropeltis getula getula</i>	Eastern Kingsnake					/ /P	
<i>Lampropeltis getula sticticeps</i>	Outer Banks Kingsnake					/SC/P	
<i>Masticophis flagellum</i>	Eastern Coachwhip					/SR/P	
<i>Micrurus fulvius</i>	Eastern Coral Snake					/E/P	

**Table 5. Amphibian Species Utilizing Maritime Wetland Forests**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>AMPHIBIANS</b>							
<i>Bufo quercicus</i>	Oak Toad					/SR/P	
<i>Desmognathus auriculatus</i>	Southern Dusky Salamander					//P	
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot					//P	

**\* US/ NC/ WAP Abbreviations (species are subject to reclassification by USFWS, NHP, or WRC).**

E	Endangered	SC	Special Concern	P	WAP Priority Species
T	Threatened	SR	Significantly Rare		
FSC	Federal Species of Concern	W	Watch Category		
T(S/A)	Threatened due to Similarity of Appearance				

NatureServe Element Rank: <http://www.natureserve.org/explorer/ranking.htm>

USFWS Endangered Species Listing Status: [http://www.fws.gov/raleigh/es\\_tes.html](http://www.fws.gov/raleigh/es_tes.html)

NC Natural Heritage Program Status:  
<http://www.ncnhp.org/Images/2010%20Rare%20Animal%20List.pdf>

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