Atlantic White Cedar Forest

Guild Description:

Lepidoptera
Mitoura hesseli
Semiothisa multilineata
Glena plumosaria
Hypagyrtis brendae
Patalene olyzonaria puber

No vertebrates are exclusively associated with stands of white cedar, although the black-throated green warbler (*Dendroica virens waynei*) nests in mature stands of this habitat, as well as in other types of nonriverine forested wetlands (see discussion for the Nonriverine Forested Wetlands Guild)

The lepidoptera composing this guild are believed to feed on white cedar as larvae. Two of these species, in fact, appear to be monophagous on this plant: Hessel s hairstreak (*Mitoura hesseli*), whose association with white cedar has been well documented (see Opler and Krizec, 1984), and Brenda s hypagyrtis (*Hypagyrtis brendae*), whose association is more circumstantial -- in North Carolina, at least, this species has been found abundantly in white cedar stands but virtually nowhere else[1].

The other three species are associated with both Atlantic white cedar and red cedar (*Juniperus virginianus*). Within the project area, however, red cedar naturally occurs only along the immediate coast in association with tidal marsh communities; inland, it exists only as sparsely planted ornamental specimens. Given the ecological and geographical separation between sites where the two species of cedars are found, we treated all records for these species away from the coast as representing this guild, and all records from tidewater areas as representing tidal marsh and salt shrub habitats.

Vulnerability to Habitat Fragmentation: Among this group, life history data are available only for Hessel s hairstreak and even for that species little is known concerning movements and demographic patterns. Like other habitat-specific Lycaenids, Hessel s hairstreak is believed to be strongly colonial, with colonies persisting over long periods of time. Given the transient nature of white cedar stands, however, at least some movement must take place between stands, and the species probably survives only where sufficient habitat patches exist to support a

[1]This species was originally only known from the Midwest, where its host plant has not been identified but must be a species other than Atlantic white cedar. Along the Atlantic Slope, *Hypagyrtis brendae*, was first discovered by S. Hall during an NHP inventory of the Dare County Bombing Range (Fussell, et al., 1995). Since then, it has been found at a number of other sites in North Carolina containing stands of white cedar.

metapopulation. The harvesting of vast tracts of white cedar in the Coastal Plain of North Carolina -- usually with no regeneration -- places this species and Brenda s hypagyrtis at high risk of extirpation. The other species may also disappear from inland portions of the Coastal Plain, although they are likely to survive wherever stands of red cedar occur.

Habitat Description and Distribution: Atlantic white cedar is the dominant tree species in two types of natural communities: Peatland Atlantic White Cedar Forest, which is associated with large peat domes and peat-filled Carolina bays, and Streamhead Atlantic White Cedar Forest, which is restricted to small headwater streams in sandhill areas, primarily north and west of the project area. Additionally, white cedar is often a component in other types of forested peatlands, including Nonriverine Swamp Forest, Bay Forest, and Pond Pine Woodland.

White cedar is a valuable commercial timber tree and most large tracts dominated by this species have long been cleared, without any attempt at stand regeneration until recently. Since even natural regeneration requires fires hot enough to kill competing tree species, fire suppression throughout the Coastal Plain, and particularly in peatland habitats, has further reduced the acreage dominated by this species; although individual trees can reach great age, stands of white cedar eventually succeed to other types of forested peatlands if left unburned.

Due to these factors, an estimated 90% reduction of white cedar coverage has taken place in North Carolina since the Colonial period. Most occurrences of white cedar, particularly in the southeastern portion of the North Carolina Coastal Plain, are small, widely separated, and composed of thickets of young specimens or scattered older individuals within stands dominated by other peatland trees.

The largest remaining concentrations of white cedar in North Carolina occur in mainland Dare County and in the Great Dismal Swamp outside the study area. Remnant stands in the Green Swamp, particularly along the Juniper/Driving Creek drainage, comprise the third most important area, and stands within several of the Carolina bays in Bladen County form another major concentration (Davis, 1997). A recently surveyed site in the Northeast Cape Fear River floodplain contains an excellent quality occurrence.

The NCGAP cover map includes one class, #41, representing white cedar forest. Although other peatland forests may contain scattered individuals of white cedar, we did not include them in the habitat analysis for this guild, since the majority of these stands probably contain too few white cedars to be suitable.

Areas mapped by this cover class are generally located at sites known to contain peatland habitats, although not necessarily stands of white cedar. No high quality remnant is known where the large patch is mapped in the Juniper Creek floodplain, and the large patch in the northeast corner of Holly Shelter Game Land can only represent young, regenerating stands, if any at all, since this area was consumed in the large fire that swept over the Game Land in 1986. Several areas known to contain stands dominated by white cedar do not show up on the cover map. The

most significant of these false negatives is the large stand located on a floodplain terrace along the lower Northeast Cape Fear River. A 15 acre tract located in the southern part of Holly Shelter Game Land is also not shown.

Guild Distribution: Only a few sites containing white cedar have been sampled for lepidoptera within the project area. Where such surveys have been conducted, virtually all guild members have been documented; these include the fairly large stand of white cedar located on the northern boundary of the Green Swamp TNC Preserve and the small stand in southern Holly Shelter Game Land. Natural Heritage element records also exist for Hessel s hairstreak from white cedar stands in the state park units in Bladen County.

Several outlier records for this guild exist at locations where no white cedar is known to occur. Most of these records represent single specimens of the juniper geometer (*Patalene olyznonaria puber*), which may be more dispersive than other members of this guild[2]. One other outlier is more interesting. Both *Glena plumosaria* and *Semiothisa multilineata* were recorded in a back swamp along the Northeast Cape Fear River at the northwest corner Holly Shelter Game Land. The vegetation map includes a single pixel of white cedar forest close to this site, indicating that a remnant patch of white cedar may indeed be present in this vicinity.

Core Areas:

(1) One clear core area for this guild is the Juniper/Driving Creek area (Fig. 19b), which runs from the northern part of the Green Swamp TNC Preserve westward towards the Waccamaw River. This is the same core area that was previously identified for the Nonriverine Forested Wetland Guild, one member of which, the black-throated green warbler, makes frequent use of white cedars for nesting.

(1) One or more core areas also exist at Holly Shelter Game Land (Fig. 19c). In addition to the small, apparently isolated stand where all five guild members were recorded, the vegetation map shows one of the largest concentrations of white cedar forest within the region located at the northeast corner of Holly Shelter. This area was known to have possessed a large stand prior to the large fire that swept the Game Land in 1986 (David Allen, pers. comm. to Harry LeGrand). Although this site is surrounded by high pocosin and is virtually inaccessible from the ground (LeGrand and Sorrie, 1997), the cover map suggests that substantial regeneration has taken place. If this is the case, and if recolonization by the guild members can occur from either the Trumpeter Swamp area or from populations located near the wildlife depot, then this area would become one of the most important examples of the white cedar ecosystem in the entire southern part of the state.

[2]This species has also been questionably reported to use pine as a larval host (Covell, 1984), although its extreme sparsity in pine habitats argues against that hypothesis.

(1) Four of the guild members have been recorded in a stand of white cedar located in the Great Sandy Run Pocosin portion of Camp Lejeune (Fig. 19c). Prior to the acquisition of this area by the Marine Corps, most of the accessible areas of Great Sandy Run were logged. Regenerating stands of young white cedar are evident in some areas, however.

Connectors: No connections are identifiable between the three core areas. Stands of this habitat type appear to be among the most isolated of any included in this analysis.

Survey Needs: Several areas indicated by the vegetation map as supporting large stands of white cedar forest should be a high priority for verification. These include the large tract in the Juniper/Driving Creek floodplain west of the Green Swamp; the large concentration southeast of Lake Waccamaw; and the very large cluster at the northeast corner of Holly Shelter Game Land.

Other areas known to contain important concentrations of white cedar also need to be surveyed for this guild. These include the large stand in the floodplain of the Northeast Cape Fear River, several significant stands in the Bladen Lakes area, and white cedar-containing bottomland stands along the Waccamaw River.

Protection Coverage/Needs: All stands on private lands should be considered at great risk from timbering. Priorities for protection should include all of the larger stands within the Juniper/Driving Creek Floodplain and the stands along the lower Northeast Cape Fear River.

Forestry practices that encourage regeneration of white cedar should be actively promoted; development of prescribed burn techniques for peatland habitats should be a high priority.