

STREAMHEAD POCOSINS

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STREAMHEAD POCOSINS

Concept: Streamhead Pocosins are saturated wetlands of seepage-fed drainages in sandhill terrain, with mucky soils and with distinctive vegetation characterized by *Pinus serotina* or *Chamaecyparis thyoides* and a suite of mostly evergreen shrub species. The dominant shrub species are also characteristic of Peatland Pocosins, but some additional species are present. Most examples are in the Sandhills Region, but examples may occur in sandy areas elsewhere.

Distinguishing Features: Streamhead Pocosins are distinguished by the occurrence of pocosin, canebroke, or Atlantic white cedar vegetation in seepage-fed sandhill drainages in dissected topography. The suite of characteristic pocosin species consists of *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, and *Cyrilla racemiflora*, along with the vine *Smilax laurifolia*, and the trees *Pinus serotina*, *Liriodendron tulipifera*, *Magnolia virginiana*, and *Persea palustris*. Alternatively, *Arundinaria tecta* may dominate the shrub layer. Peatland Pocosin communities have somewhat similar vegetation but occur in other environments: peatlands on broad flats, Carolina bays, and shallow swales in relict dune fields. *Liriodendron tulipifera*, *Oxydendrum arboreum*, and *Toxicodendron vernix* are common in Streamhead Pocosins but generally absent in Peatland Pocosins, as are rare species such as *Lindera subcoriacea*. *Chamaecyparis thyoides* may dominate the canopy, in association with these species.

Sandhill Streamhead Swamps also occur in seepage-fed sandhill drainages and share many of the characteristic pocosin shrubs. However, its canopy is dominated by different trees — *Nyssa biflora*, sometimes with *Pinus taeda* and *Acer rubrum* var. *trilobum*. Sandhill Seeps often occur adjacent to the various Streamhead Pocosin communities, and the transition between them can be gradual. Sandhills Seeps are distinguished by a diverse herbaceous flora and a broader range of shrubs, though potentially sharing the pocosin shrubs. In the absence of fire, pocosin shrubs can spread and proliferate in them and obscure the natural boundary.

Synonyms: Tall pocosin, evergreen shrub bog.

Sites: Streamhead Pocosins occur in the bottoms of narrow valleys in dissected sandhill terrain.

Soils: Soils are muck-rich mineral soils. The most frequently mapped soil series is Johnston (Cumulic Humaquept). Many are mapped as a complex of Bibb (Typic Fluvaquent) with Johnston, while many examples are mapped as upland soil units but represent inclusions. The few outer and middle Coastal Plain examples are generally mapped as Lynn Haven (Typic Alaquod), Murville (Umbric Endoaquod), or Torhunta (Typic Humaquept).

Hydrology: Soils are saturated most or all of the year but do not have standing water more than briefly. Though occurring in small floodplains, flood inundation is rare and short-lived. A distinct stream channel with a sandy bed generally is present, but other floodplain features are little developed. The surrounding sandy soils have rapid infiltration, and rainfall reaches the valleys gradually as shallow ground water. The streams show much less fluctuation in flow than other streams in North Carolina. The water is acidic and low in nutrients, because of the low mineral content of the sands through which it moves.

Vegetation: Vegetation is characterized by a dense shrub layer consisting of *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, *Cyrilla racemiflora*, *Toxicodendron vernix*, *Persea palustris*, and *Magnolia virginiana*, rarely *Arundinaria tecta*, along the vine *Smilax laurifolia*. It can be nearly impenetrable. Less common shrubs include *Vaccinium fuscatum*, *Vaccinium formosum*, *Morella caroliniana*, *Kalmia cuneata*, and *Lindera subcoriacea*. The canopy varies among communities, with *Pinus serotina* dominant in most, *Chamaecyparis thyoides* in the rarer Streamhead Atlantic White Cedar Forest, and with almost no canopy in Streamhead Canebrake communities. In all, *Liriodendron tulipifera*, *Persea palustris*, *Magnolia virginiana*, and occasionally *Oxydendrum arboreum* may be present and even abundant *Acer rubrum* var. *trilobum* may invade in the long absence of fire, and *Nyssa biflora* may be present in examples transitional to Sandhill Streamhead Swamp. Herbs typically are sparse, with the most frequent species *Anchistea virginica*, *Steinchisma areolata*, and clumps of *Sphagnum* spp., less commonly with *Sarracenia flava*, *Sarracenia purpurea*, *Lycopus cokeri*, *Carex collinsii*, *Carex austrodeflexa*, and other species. When intense fires repeatedly penetrate Streamhead Pocosins, herbs may become abundant, with *Osmundastrum cinnamomeum* and *Andropogon glomeratus* becoming prominent. The ecotone at the edge of Streamhead Pocosin communities, if regularly subject to fire from the adjacent uplands, has a diverse herbaceous flora. Many species shared with Sandhill Seep and Pine Savanna communities may be present in a narrow band, sometimes including *Ctenium aromaticum*, *Muhlenbergia expansa*, *Sporobolus brevipilis*, as well as most of the above herbs. Rare species such as *Lysimachia asperulifolia* and *Dionaea muscipula* may be present.

Dynamics: All communities in the Streamhead Pocosins theme are naturally shaped by fire, but the details of their natural dynamics are not well known. As narrow bands of vegetation bordering sandhill communities that burn very frequently, they would not lack for ignition under natural conditions. However, occurring downhill from them and having wet soils, flammability is limited, and ignition must depend on particular weather conditions. The conditions chosen for contemporary prescribed burns may be different enough from times of natural fire that the fire regime is quite altered even in landscapes where the adjacent longleaf pine vegetation is well maintained by fire. The three communities within this theme vary substantially in the fire regime that would sustain them, and variation in fire dynamics may be the only thing determining which occurs in a given place. Their relationship to Sandhill Streamhead Swamp may be similarly determined by fire dynamics.

Different streamhead communities can give way to each other along the length of a single drainage, and do not necessarily occur in a consistent order. It is unclear if streamhead communities represent a shifting mosaic or a stable landscape pattern. The vegetation could represent the recent fire history, with any community capable of changing into any other if subjected to a different kind of fire. Alternatively, predominant natural fire behavior may be substantially controlled by topography and wetness, leading to stable mosaics of different communities. Feedback of vegetation on fire behavior might also stabilize the patterns. *Arundinaria tecta* tends to promote the frequent fire that it needs to maintain dominance, while pocosin shrubs are flammable but under a narrow range of conditions. Atlantic White Cedar Forest is less flammable, while swamp vegetation reduces flammability even further.

Many streamheads are also subject to impoundment by beavers. Thus, Coastal Plain

Semipermanent Impoundment communities are also part of a potential shifting mosaic. However, as with fire, site characteristics may make some locations subject to impoundment while others are not. Ponds modify the site conditions for a long time even after the pond is drained, and these changes along with vegetation will affect fire regimes. Beavers, rather than fire, may be the primary cause of the mosaics in streamhead sites.

Comments:

References:

KEY TO STREAMHEAD POCOSINS

1. Tree canopy absent or total cover of trees and broadleaf shrubs less than 25% under natural conditions, and *Arundinaria tecta* dominant **Streamhead Canebrake**
1. Tree canopy present, or total cover of trees and broadleaf shrubs >25%; *Arundinaria tecta*, if present, not dominant in the shrub layer.
 2. Tree canopy dominated by *Pinus serotina*, with or without *Liriodendron tulipifera*
.....**Streamhead Pocosin**
 2. Tree canopy not dominated by *Pinus serotina*.
 3. Tree canopy dominated by *Chamaecyparis thyoides*..... **Streamhead Atlantic White Cedar Forest**
 3. Tree canopy dominated by *Nyssa biflora* or *Acer rubrum*, sometimes with *Pinus taeda*. (*Chamaecyparis* or *Pinus serotina* may be present in small numbers).
.....**Sandhill Streamhead Swamp in Coastal Plain Floodplains theme**

STREAMHEAD POCOSIN

Concept: Streamhead Pocosins are pocosin woodlands or shrublands occurring in mucky, seepage-fed drainages in the Sandhills Region and rarely in similar dissected uplands with sandy soils and seepage-fed streams.

Distinguishing Features: Streamhead Pocosins are distinguished from other pocosin communities by their occurrence in drainages in dissected sandhill terrain, with flowing or seepage water, rather than on peat domes or in depressions fed mainly by rain water. *Liriodendron tulipifera* is often, but not always, a component of this type and is never present in other pocosin types. *Clethra alnifolia*, *Toxicodendron vernix*, and *Oxydendrum arboreum* are often present in this type and seldom present in other types of pocosins. *Gordonia lasianthus*, common in various Peatland Pocosins, is absent in Streamhead Pocosins. Streamhead Pocosins are distinguished from Streamhead Atlantic White Cedar Forest and Sandhill Streamhead Swamp by canopy predominance of *Pinus serotina*. Streamhead Pocosins that have repeatedly burned through have boggy herbaceous vegetation. In places with long absence of fire, vegetation resembling Streamhead Pocosin spreads uphill into Sandhill Seep sites and even into less wet areas.

Synonyms: *Pinus serotina* - (*Liriodendron tulipifera*) / *Lyonia lucida* - *Clethra alnifolia* - *Ilex glabra* Woodland (CEGL004435).

Ecological Systems: Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin and Baygall (CES203.252).

Sites: Streamhead Pocosins occur along mucky headwater and small stream bottoms in dissected sandhill areas, where soils are kept saturated by seepage.

Soils: Soils are mucky mineral soils, most often mapped as Johnston (Cumulic Humaquept).

Hydrology: Hydrology is typical of the theme as a whole, with long-term saturation by nutrient-poor water but with little or no stream flooding or standing water.

Vegetation: Vegetation structure is generally a shrubby woodland or savanna. The tree canopy can range from sparse to dense, depending on recent fire history. Understory trees generally are sparse. The shrub layer is generally dense and tall, and herbs are sparse. The canopy is dominated by *Pinus serotina*. *Liriodendron tulipifera* is often present and sometimes abundant. *Nyssa biflora* or *Acer rubrum* var. *trilobum* may be present in small numbers, larger where fire has long been suppressed. Other trees, usually in the understory but occasionally in the canopy, include *Persea palustris*, *Magnolia virginiana*, and *Oxydendrum arboreum*. The dense shrub layer generally is dominated by *Lyonia lucida*, *Ilex coriacea*, *Cyrilla racemiflora*, *Ilex glabra*, and *Clethra alnifolia*. Other shrubs include *Toxicodendron vernix*, *Vaccinium fuscatum*, *Vaccinium formosum*, *Aronia arbutifolia*, and the rare shrub *Lindera subcoriacea*. *Arundinaria tecta* may be present in small to moderate amounts. *Smilax laurifolia* is often dense. Other vines are few and limited to acidic wetland species such as *Smilax rotundifolia* and *Muscadinia rotundifolia*. The most frequent herbs are *Anchistea virginica* and *Osmundastrum cinnamomeum*. Other herbs may include *Steinchisma areolata*, *Carex lonchocarpa*, *Carex collinsii*, *Carex austrodeflexa*, *Carex* species, *Hexastylis sorrei*, *Sarracenia flava*, and *Sarracenia purpurea*. Clumps of *Sphagnum* spp. are usually present.

Streamhead Pocosins that have repeatedly burned through may have areas of boggy herbaceous vegetation dominated by species such as *Osmundastrum cinnamomeum*, *Andropogon glomeratus*, and *Erianthus* spp. CVS plot data show a high frequency for *Gaylussacia frondosa* and show presence of a large number of other species that clearly are associated with the edges and are not characteristic of the community as a whole.

Where Streamhead Pocosin borders upland communities, a distinct ecotonal zone often occurs, where the more frequent fire of the uplands interacts with the wetter soils of the pocosin. This ecotonal zone, while too small to be classified as a separate community, often resembles a Pine Savanna or Sandhill Seep, with a high diversity of herbaceous plants and some shrubs absent from both of the adjoining communities. This ecotone is the primary habitat for a number of rare plant species in the Sandhills Region, including *Lysimachia asperulifolia*, *Dionaea muscipula*, and *Lilium pyrophilum*, as well as uncommon species such as *Kalmia cuneata*, *Fothergilla gardenii*, and *Sporobolus brevipilus*.

Range and Abundance: Ranked G4. Streamhead Pocosins are abundant through the Sandhills region of North Carolina and South Carolina. They rarely are recognized in dissected sandhill-like terrain in the outer Coastal Plain. They range into South Carolina.

Associations and Patterns: The ecological relationship among the different communities of Sandhills streamheads is not entirely clear. While there is a general trend from Streamhead Pocosin upstream to Sandhills Streamhead Swamp downstream, these communities, along with Streamhead Atlantic White Cedar Forest, Streamhead Canebrake, and Coastal Plain Semipermanent Impoundment, may alternate along the length of a given drainage.

Streamhead Pocosins are sometimes bordered by Sandhill Seeps. Their boundary can be gradual and can be blurred by the effects of fire exclusion. Otherwise, Streamhead Pocosins generally are bordered by Pine/Scrub Oak Sandhill communities, less commonly by Xeric Sandhill Scrub.

Variation: No variants have been defined. Examples vary in structure and composition over a wide range, apparently in response to fire history.

Dynamics: Dynamics are similar to the theme as a whole, with fire playing an important role, but with appropriate fire regimes not known. As in other pocosin communities, fire is needed to allow regeneration of *Pinus serotina*. It is unclear how often fire in adjacent sandhill communities would penetrate into Streamhead Pocosins under natural conditions. Prescribed fires are often done under mild conditions where it does not penetrate at all, sometimes deliberately using the pocosins as firebreaks. When fires occur in this community, they tend to be patchy, leaving unburned shrub patches, top-killed or consumed shrubs, and patches with dead or scorched trees. Repeated fires in the same area can create more persistent herbaceous dominance. This variation in fire causes variable vegetation structure in some examples. Trees may also blow down in wind storms, but fire is likely the predominant cause of tree mortality where it occurs.

Even when Streamhead Pocosins do not burn with the adjacent uplands, they are affected by scorching along the ecotone, and by input of nutrients released in the ash. The combination of

more frequent disturbance and somewhat more nutrients may account for the higher shrub and tree diversity in these communities than in other pocosin types.

Comments: Many general writings on pocosins mention streamheads as a site for pocosin vegetation, without describing them specifically in detail (e.g., Otte 1981; Sharitz and Gibbons 1982). It is not clear how much of the general information on pocosins applies to them. The smaller size, different hydrology, nutrient availability, and fire dynamics make them distinct from the peatland pocosins.

Rare species: *Lindera subcoriacea*, *Carex austrodeflexa*, and *Hyla andersonii*.
Ecotones only: *Lilium pyrophilum*, *Lysimachia asperulifolia*, and *Dionaea muscipula*.

References:

Otte, L.J. 1981. Origin, development, and maintenance of pocosin wetlands of North Carolina. Rept. to N.C. Natural Heritage Program.

Sharitz, R.R., and J.W. Gibbons. 1982. The ecology of Southeastern shrub bogs: pocosins and Carolina bays, a community profile. U.S. Fish and Wildlife Service. FWS-OBS-82/04

STREAMHEAD ATLANTIC WHITE CEDAR FOREST

Concept: Streamhead Atlantic White Cedar Forests are forests dominated by *Chamaecyparis thyoides* in mucky, seepage-fed drainages in the Sandhills Region and rarely in similar terrain with sandy uplands and seepage-fed streams.

Distinguishing Features: Streamhead Atlantic White Cedar Forests are distinguished from Streamhead Pocosin and Sandhill Streamhead Swamp by having canopies with over 50 percent *Chamaecyparis thyoides* cover. They are distinguished from Peatland Atlantic White Cedar Forests by occurring in mucky, seepage-fed drainages in sandhill terrain. *Liriodendron tulipifera* is often, but not always, present, and additional species characteristic of streamheads and not peatlands, such as *Toxicodendron vernix* or *Oxydendrum arboreum*, may be present.

Synonyms: *Chamaecyparis thyoides* - (*Liriodendron tulipifera*) / *Lyonia lucida* Forest (CEGL007563).

Ecological Systems: Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin and Baygall (CES203.252).

Sites: Streamhead Atlantic White Cedar Forests occur along mucky headwater and small stream bottoms in dissected sandhill areas, where soils are kept saturated by seepage.

Soils: Soils are wet and acidic, with an organic layer overlying or interbedded with clay or sand. They are usually mapped as Johnston (Cumulic Humaquept), occasionally as Torhunata (Typic Humaquept) or other series.

Hydrology: Hydrology is typical of the theme as a whole, with long-term saturation by nutrient-poor water but with little or no stream flooding or standing water.

Vegetation: Streamhead Atlantic White Cedar Forests have *Chamaecyparis thyoides* dominant or codominant, unless recently disturbed. *Acer rubrum*, *Pinus serotina*, *Pinus taeda*, and *Liriodendron tulipifera* are frequently present and may codominate. *Nyssa biflora* may also occur. The understory is usually open. In CVS plot data and in site descriptions, *Persea palustris* and *Magnolia virginiana* occur with high constancy, and canopy species, especially *Acer rubrum*, may also be present. Other understory species may include *Oxydendrum arboreum*, *Ilex opaca*, and occasional trees from adjacent upland communities. The shrub layer is generally moderate to dense. *Lyonia lucida* is the most constant dominant in CVS plot data, but *Clethra alnifolia*, *Ilex coriacea*, *Arundinaria tecta*, and *Leucothoe axillaris* are frequent and sometimes dominant. Though less frequent in plot data, *Ilex glabra* and *Cyrilla racemiflora* are often observed to be abundant. Less dominant shrubs with high or moderate frequency in plot data and observations include *Viburnum nudum*, *Vaccinium formosum*, *Vaccinium fuscatum*, *Toxicodendron vernix*, *Vaccinium virgatum*, *Aronia arbutifolia*, *Morella caroliniensis*, *Rhododendron viscosum*, *Symplocos tinctoria*, and, in parts of Fort Bragg, *Kalmia latifolia*. Vines, particularly *Smilax laurifolia*, may be abundant. *Smilax rotundifolia*, *Smilax glauca*, *Muscadinia rotundifolia* and *Gelsemium sempervirens* are also at least moderately frequent. Herbs are generally low in cover, but *Osmundastrum cinnamomeum* is highly constant and sometimes abundant. Sphagnum spp. may have moderate cover in patches. Other herbs, at moderate to low frequency, include *Osmunda*

spectabilis, *Pteridium pseudocaudatum*, *Uvularia puberula*, *Dichantherium* sp, *Mitchella repens*, *Hexastylis sorriei*, and *Orontium aquaticum*.

Range and Abundance: Ranked G1 but probably more properly G2. More than 20 occurrences are known in North Carolina. They are under high threat from logging as well as from loss due to natural blowdown, fire, and, potentially, impoundment by beavers. The small size of stands and limited amount available in the region where they occur makes them less attractive for systematic logging than Peatland Atlantic White Cedar Forests, but stands are generally more accessible. In North Carolina, Streamhead Atlantic White Cedar Forests are primarily in the Sandhills region, but scattered examples occur elsewhere in the inner and middle Coastal Plain. This community ranges southward to Georgia.

Associations and Patterns: Sandhill Streamhead Swamps are large patch communities that occur along drainage systems that also support Streamhead Pocosin, Sandhills Streamhead Swamp, Streamhead Canebrake, or Coastal Plain Semipermanent Impoundment. These communities often are interspersed along the drainage in an unpredictable pattern. On the upland side, they may be bordered by any upland community, but Pine/Scrub Oak Sandhill (Blackjack Subtype) is the most common. The largest occurrences are up to 40 acres, and many occurrences are less than 10 acres.

Variation: No systematic variation has been identified, other than areas transitional to adjacent communities. Vegetation varies in the short term in response to fire.

Dynamics: The dynamics of Streamhead Atlantic White Cedar Forests are not well studied. It is unclear how much the distinctive dynamics of Peatland Atlantic White Cedar Forests apply to them. The shade intolerance, intolerance of fire, and ability to regenerate rapidly after fire in some circumstances likely lead to even-aged stands in streamheads as they do in peatlands. However, Moore and Carter (1987) observed both even-aged and uneven-aged stands of this type. They noted that as stands age, the cedar canopy becomes more open and the hardwoods listed above begin to invade. Although *Chamaecyparis thyooides* is generally regarded as being intolerant of fire, they also noted charred bases on some of the older trees. It is unlikely, however, that these communities burn more than rarely.

As with their peatland counterparts, it is possible that Streamhead Atlantic White Cedar Forests existed naturally as a shifting mosaic. Streamhead Pocosin might develop if fire was frequent in any area, Streamhead Canebrake if it was very frequent, and Sandhill Streamhead Swamp if too much time passed without a fire. Moore and Carter (1987) also noted that cedar was able to invade adjacent wet grassy areas when fire was suppressed. Coastal Plain Semipermanent Impoundment would appear in random places if beavers moved into an area. Possibly Sandhill Streamhead Swamp rather than the other communities would develop after beaver ponds were abandoned. Alternatively, the observed mosaics may be long-term patterns, created by the ease of fire spread into the drainage and the desirability of the area to beavers.

Comments: Streamhead Atlantic White Cedar Forests have had very little study in comparison with Peatland Atlantic White Cedar Forests. Many of the summaries and reviews address the two together, but streamheads are generally mentioned only in passing as an additional habitat for the species.

Streamhead Atlantic White Cedar Forest was included with the Peatland Atlantic White Cedar Forest type in the 2nd Approximation. The distinction between them is parallel to the distinction between Streamhead Pocosin and Pond Pine Woodland. The two types differ in hydrology, fire dynamics, and successional trajectories. Of particular note is the importance of *Liriodendron tulipifera* in the Streamhead Atlantic White Cedar Forest, though it is unclear what aspect of the environment or dynamics leads to its frequent presence.

Rare species:

Vascular plants: *Carex austrodeflexa*, *Eupatorium resinosum*, *Lindera subcoriacea*, *Sagittaria isoetiformis*, *Scirpus etuberculatus*, and *Xyris chapmanii*.

Invertebrate animals: *Callophrys hesseli*.

References:

Moore, J.H. and J.H. Carter III. 1987. Habitats of white cedar in North Carolina. In: A.D. Laderman (Ed.). Atlantic White Cedar Wetlands. Westview Press, Boulder, Colo.

STREAMHEAD CANEBRAKE

Concept: Streamhead Canebrakes are treeless or sparsely treed vegetation dominated by *Arundinaria tecta* in seepage-fed drainages. Tree plus broadleaf shrub cover is generally less than 25 percent in good examples but may be higher if fire frequency has been reduced. Most of this rare community type is in the Sandhills Region, but it might occur in sand dune areas elsewhere in the Coastal Plain.

Distinguishing Features: Streamhead Canebrakes are distinguished from other communities of seepage-fed streamheads by the dominance of *Arundinaria tecta* combined with low cover of trees and other shrubs (less than 25 percent). They are distinguished from Peatland Canebrakes by occurring in streamheads rather than in flat or domed peatlands, Carolina bays, or shallow outer Coastal Plain swales.

Synonyms: *Arundinaria gigantea ssp. tecta* Shrubland (CEGL003843) (not distinguished from Peatland Canebrake in NVC). Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin and Baygall (CES203.252).

Sites: Streamhead Canebrakes occur along mucky headwater and small stream bottoms in dissected sandhill areas, where soils are kept saturated by seepage.

Soils: Soils are mucky mineral soils, most often mapped as Johnston (Cumulic Humaquept).

Hydrology: Hydrology is typical of the theme as a whole, with long-term saturation by nutrient-poor water but with little or no stream flooding or standing water.

Vegetation: Vegetation consists of a dense thicket of *Arundinaria tecta* and limited cover of broadleaf shrubs. *Pinus serotina*, *Liriodendron tulipifera*, *Pinus taeda*, *Nyssa biflora*, and *Magnolia virginiana* may form a sparse canopy. Any of the species of Streamhead Pocosin may be present in moderate numbers. *Lyonia lucida* is the most abundant other shrub in CVS plot data. *Clethra alnifolia*, *Viburnum nudum*, and *Toxicodendron vernix* have high constancy, and *Ilex glabra* is abundant in some plots. *Smilax laurifolia* is universally present but not extensive, *Muscadinia rotundifolia* is usually present, and *Smilax rotundifolia* is sometimes abundant. Herbs may be sparse to moderate in density in the interior. *Osmundastrum cinnamomeum*, *Lorinseria areolata*, and *Steinchisma virginica* are fairly frequent and abundant. Gray et al. (2016), working with whole-site species lists for a larger number of sites (13), found *Osmundastrum cinnamomeum* and *Pinus serotina* to be the most constant species, along with *Arundinaria*. *Sphagnum* spp., *Acer rubrum*, *Magnolia virginiana*, *Liriodendron tulipifera*, *Nyssa biflora*, and *Toxicodendron vernix* are other species that were in more than half the sites. As in other streamhead communities, a narrow ecotone zone in the transition to adjacent sandhills is often diverse and contains species not otherwise present in either community. Any of the species many occur in the ecotone of any of the streamhead communities. Additional species in more than half of Gray et al.'s (2016) sites, and presumably ecotone species, are *Lysimachia asperulifolia*, *Eupatorium resinosum*, *Eupatorium rotundifolium*, and *Polygala lutea*. Other edge species in their study included *Ctenium aromaticum*, *Dionaea muscipula*, *Pogonia ophioglossoides*, *Carex glaucescens*, *Dichantheium*

scabriusculum, *Sarracenia rubra*, *Zigadenus glaberrimus*, *Drosera capillaris*, *Erianthus giganteus*, and *Xyris platylepis*.

Range and Abundance: Ranked G1. Streamhead Canebrakes are not distinguished from Peatland Canebrakes in the NVC, but they clearly occur in South Carolina and Georgia as well as North Carolina (Gray et al. 2016). All known examples are in the Sandhills Region, but occasional examples could occur in other dissected sandy areas of the outer Coastal Plain. Given the number of examples reported, the G1 rank may warrant revisiting.

Associations and Patterns: Streamhead Canebrakes are associated with other streamhead communities, potentially including Streamhead Pocosin, Streamhead Atlantic White Cedar Forest, Sandhills Streamhead Swamp and Coastal Plain Semipermanent Impoundment. Often several streamhead communities can be found along the length of a stream valley, not always in the same order.

Along the upland edges, Streamhead Canebrakes are sometimes bordered by Sandhill Seeps. Otherwise, they generally are bordered by Pine/Scrub Oak Sandhill communities, less commonly by Xeric Sandhill Scrub.

Variation: No variants have been defined. Examples vary in structure and composition over a wide range, apparently in response to fire history.

Dynamics: Dynamics are generally similar to the theme as a whole, but Streamhead Canebrakes clearly burn more frequently than other streamhead communities and undoubtedly depend on frequent fire for their maintenance. *Arundinaria* recovers more rapidly from fire than broadleaf shrubs, and frequent fire gives it a competitive advantage. At the same time, *Arundinaria* is more flammable and likely promotes more frequent spread of fire from the frequently burned uplands. Gray et al. (2016) found that about 2 years was the optimal fire return interval for *Arundinaria* dominance and noted that mean fire return interval was more important than time since last fire. This is more frequent than has generally been suggested as optimal for cane. They also noted that Sandhills region cane is shorter than that elsewhere, and that this may make frequent fire more important in retaining its dominance.

Peatland Canebrakes occur only in landscapes that have had frequent fire for some decades, such as on Fort Bragg and the Sandhills Game Land. However, the increase in prescribed burning in recent years has led to apparent formation or revival of examples. Gray et al. (2016) found that canebrakes they studied on frequently burned military bases had increased in size since the 1940s and 1950s. Examples observed on the Sandhills Game Land clearly developed from Streamhead Pocosin vegetation in the last few decades, having remnant canopy trees and patches of broadleaf shrubs. However, even in frequently burned landscapes, canebrakes are a small part of streamhead systems; Streamhead Pocosin or Sandhill Streamhead Swamp communities are more extensive. It is not clear if this set of communities forms a shifting mosaic driven by fire history, or if each is tied to subtly distinct sites within the landscape.

Comments: The NVC does not distinguish between Streamhead and Peatland Canebrakes. However, given the substantial environmental differences, I believe they should be regarded as

different. The lists of associated species included in Gray et al. (2016) includes numerous species not found in Peatland Canebrakes, though most may be in ecotones. Streamhead Canebrake dynamics and conservation status are quite different. Streamhead Canebrakes appear to be increasing, and they appear to be readily recoverable in many sites if there is frequent fire.

Rare Species: Ecotones: *Lysimachia asperulifolia*, *Dionaea muscipula*, *Lilium pyrophilum*, *Eupatorium resinosum*, and *Parnassia caroliniana*.

References:

Gray, J.B., B.A. Sorrie, and W. Wall. 2016. Canebrakes of the Sandhills Region of the Carolinas and Georgia: Fire history, canebrake area, and species frequency. *Castanea* 81:280-291.