COASTAL PLAIN SEMIPERMANENT IMPOUNDMENT (CYPRESS–GUM SUBTYPE)

Concept: Coastal Plain Semipermanent Impoundment communities are ponded wetlands produced by beaver dams or by long-established man-made dams that produce similar ponds. They include drained impoundments whose vegetation remains distinct from other floodplain communities. The Cypress–Gum Subtype covers portions or examples supporting a substantial canopy of *Taxodium* or *Nyssa*. These are generally remnant trees that established in a Cypress–Gum Swap, but under the right circumstances, a similar canopy can become established once a pond has formed.

Distinguishing Features: Coastal Plain Semipermanent Impoundment communities are distinguished by occurrence in the Coastal Plain in active or recently drained beaver ponds or in artificial ponds that have a similar environment and vegetation. It is not entirely clear what allows artificial ponds to resemble natural beaver ponds. Good mimics are usually old mill ponds that have long been unused. Larger reservoirs and smaller farm ponds do not seem to develop similar communities and have no natural community analogue.

The Cypress–Gum Subtype is distinguished from all other communities (except the Sandhills Mire Subtype) by a well-developed open or closed tree canopy, mostly of *Taxodium* or *Nyssa* in an active or recently drained impoundment. The conceptual boundary with other subtypes is placed at 50% canopy tree cover, since sparser trees may survive in any subtype. The Sandhills Mire Subtype, if it has a canopy, is distinguished by its distinctive well-developed herb layer of *Sphagnum* and herbs of highly acidic, organic soils.

Synonyms: *Taxodium distichum / Lemna minor* Forest (CEGL002420).
Ecological Systems: Atlantic Coastal Plain Small Brownwater River Floodplain Forest (CES203.250). Atlantic Coastal Plain Small Blackwater River Floodplain Forest (CES203.249). Atlantic Coastal Plain Brownwater Stream Floodplain Forest (CES203.248). Atlantic Coastal Plain Blackwater Stream Floodplain Forest (CES203.247).

Sites: Coastal Plain Semipermanent Impoundments occur on the floodplains of blackwater or brownwater streams or rivers, rarely on tidal creeks. Beavers prefer second order streams (Snodgrass 1997), but they can use smaller or larger streams. On large river floodplains, beavers dam sloughs, tributary streams, or drainages from backswamps. Old mill ponds that mimic beaver ponds tend to be on relatively small streams. While beavers strongly prefer low gradient streams, very few streams in the Coastal Plain have high enough gradients to deter them. The Cypress–Gum Subtype occurs in both active and abandoned ponds.

Soils: Coastal Plain Semipermanent Impoundments can occur on any floodplain soil, though impoundment presumably modifies the preexisting soil if the pond lasts very long. The still water allows deposition of clay or muck. This layer may persist even after the pond drains and is revegetated. Kroes and Bason (2015) noted that ponds could be significant repositories for carbon storage, and that, though sediments in channels tend to wash out quickly if the dam was breached, sediment stored in floodplains might remain in place for centuries.

Hydrology: The Cypress–Gum Subtype may be permanently flooded or may be unflooded but permanently saturated. The water may be shallow or deep.

Vegetation: The Cypress–Gum Subtype is a closed forest or open woodland dominated by water-tolerant trees: *Taxodium distichum*, *Nyssa aquatica*, *Nyssa biflora*, or *Taxodium ascendens*. In most examples, in deep water, there is only a sparse understory and shrub layer, consisting of individuals rooted on stumps and tree bases. Examples in shallow water, and on edges, have more cover of other trees and shrubs. *Acer rubrum* var. *trilobum* is the most common tree, but *Fraxinus caroliniana*, *Ilex opaca*, *Magnolia virginiana*, and occasionally other species may occur. Shrubs include *Cephalanthus occidentalis*, *Alnus serrulata*, *Rosa palustris*, *Cyrilla racemiflora*, *Morella cerifera*, *Itea virginica*, *Ilex laevigata*, and a variety of other species. Herbs vary widely. Deep water areas often have high cover of *Lemna* and other tiny floating plants, or of *Utricularia* spp. Any of the floating-leaf or submersed plant species of the Open Water Subtype, such as *Nymphaea odorata* or *Brasenia schreberi*, may occur, though at lower density. *Limnobium spongia* is extensive in several examples. Characteristic herbs of tree bases and stumps, such as *Boehmeria cylindrica* or *Hypericum walteri*, are often present in low numbers. In shallow water examples and on edges, a great range of herbs may occur. Any of the species of the Typic Marsh Subtype may be present, but more shade-tolerant species such as *Saururus cernuus* and *Carex* spp. are most likely.

Range and Abundance: Ranked G4G5. This subtype occurs throughout the Coastal Plain, including, though less commonly, in the Sandhills region. It presumably occurs in South Carolina, and probably occurs with little difference in character over much of the Southeast.

Associations and Patterns: The Cypress–Gum Subtype can be a site-specific subtype, a temporal phase, or a zone within a pond complex. Some impoundments in flat swamps may have only this subtype, while in others it is a zone grading to the Open Water Subtype in deeper portions. In other cases, especially where formed by damming sloughs or the edges of backswamps in large river floodplains, it may occupy the deeper part of a pond where Cypress–Gum Swamp was already established, while the Typic Marsh or Open Water Subtype occurs on the edges that were occupied by less flood-tolerant trees.

Variation: The Cypress–Gum Subtype, as currently defined, is one of the most variable in the state, especially in differences among sites. The variation is not well studied, but two variants are proposed to reflect what likely are the most important differences:
1. Brownwater Variant occurs on brownwater and intermediate river floodplains. It has clayey soil, a canopy that includes *Nyssa aquatica*, and associated flora characteristic of brownwater swamps.
2. Blackwater Variant occurs in blackwater river and stream floodplains. It lacks *Nyssa aquatica* and has flora characteristic of more acidic, nutrient poor wetlands. Sandhills ponds, and those associated with peatlands, may be different enough to warrant an additional variant, with a component of pocosin shrubs.

The differences between shallow water and deepwater examples are also substantial, with primarily aquatic and tree-base flora in the latter and substantial herbaceous or shrub cover in the former. It may be worth distinguishing variants based on this, but it is not clear that the differences can be sorted out in a useful way. Variation should also be observed and characterized between

examples where the canopy trees are relict from a preimpoundment community and those where they were established in a long-lasting pond. These may have different dynamics.

The physical typology of beaver ponds and pond clusters described by Krues and Bason (2015) and summarized under the Open Water Subtype may be useful.

Dynamics: See the more extensive discussion of general beaver pond dynamics under the Open Water Subtype.

The Cypress–Gum Subtype may form quickly, as a relict community, by impoundment of an existing Cypress–Gum Swamp. Once ponded water is present, the change in the character of the herb and shrub layers probably happens in a few years. The composition and structure may continue to change slowly after that, as additional pond species disperse into the pond, and as the most susceptible trees gradually die. As long as deep water remains, the trend generally will be toward a more open canopy over time, as all but the shallowest examples are unlikely to see new establishment even of *Taxodium* or *Nyssa* seedlings. However, short-term draining, followed by rebuilding of the dam, could allow a cohort of trees to become established. Without new tree establishment, the Cypress–Gum Subtype might gradually succeed to the Open Water Subtype, but it is unclear if most beaver ponds last long enough for this to happen. This may be more likely in the deeper water in the middle of the larger mill ponds, which would place more stress on the established trees. Townsend and Butler (1996) noted that beavers did not cut *Nyssa* and *Taxodium*, and that they were more likely to build ponds where more preferred food trees dominated.

The Cypress–Gum Subtype can also develop as a secondary community, through establishment in open areas of an existing pond. This requires a temporary drawdown of water level to allow seedling establishment and is likely to result in an even-aged stand. It is unclear how common this is, but it may not be uncommon to have temporary dam breaches or drainage in both beaver ponds and mill ponds.

When a pond drains permanently, the Cypress–Gum Subtype may quickly succeed to Cypress–Gum Swamp, but this is not well known. If the soil is changed in character by deposition of clay or muck in the pond, the area may not return to the previous community for quite some time. In the Sandhills, the Sandhills Mire Subtype might develop from the Cypress–Gum Subtype as well as from the Sandhills Marsh Subtype. For secondary communities, the trees may have established on pond edges that did not previously support Cypress–Gum Swamp, but they may remain dominant for the rest of their life span.

Comments: See the Typic Marsh Subtype and other subtypes for general comments and references on beaver ponds, landscape diversity, and ecosystem services.

The Cypress–Gum Subtype is distinctive in that the flood tolerance of *Taxodium* and *Nyssa* allow them to persist for many years, creating a shaded pond environment with much structural diversity. They likely are particularly important for birds and other vertebrates. They may be good sites for colony-nesting birds such as herons.

The NVC association corresponding to this subtype is very broadly defined, probably too broadly. *Taxodium distichum* Semipermanently Flooded Woodland (CEGL004442), another association overlapping this concept, has been merged in the NVC. A Successional Subtype, included in earlier drafts of the 4th approximation but never incorporated into NVC, has been dropped. Successional ponds may be partially or fully drained and may be affected by the vegetation established before drainage. Zonal communities can also succeed to each other even if a pond is not drained. Since the subtypes are broadly defined and overlap the kinds of successional vegetation, it seems best to treat most successional ponds as parts of the other subtypes, at least for the present.

References:

Kroes, D.E. and C.W. Bason. 2015. Sediment trapping by beaver ponds in streams of the Mid-Atlantic Piedmont and Coastal Plain, USA. Southeastern Naturalist 14: 577-595.

Snodgrass, J.W. 1997. Temporal and spatial dynamics of beaver-created patches as influenced by management practices in a southeastern North American Landscape. Journal of Applied Ecology 34: 1043-1056.

Townsend, P.A., and D.R. Butler. 1996. Patterns of landscape use by beaver on the lower Roanoke River Floodplain, North Carolina. Physical Geography 17: 353-269.