

# COASTAL PLAIN MARL OUTCROPS

## Contents

- COASTAL PLAIN MARL OUTCROPS** ..... 1
- COASTAL PLAIN MARL OUTCROPS THEME ..... 2
- COASTAL PLAIN MARL OUTCROP (BLUFF SUBTYPE) ..... 5
- COASTAL PLAIN MARL OUTCROP (LAKE SHORE SUBTYPE)..... 7

## COASTAL PLAIN MARL OUTCROPS THEME

**Concept:** Coastal Plain Marl Outcrops are communities occurring on outcrops of limestone in the Coastal Plain. Outcrops are very small and may be shaded by trees in the adjacent forest, but vegetation on the rocks themselves is typical of other rock outcrop communities in being a heterogeneous mix of sparse vegetation, herb cover, and patchy woody stems. The flora strongly reflects the high calcium levels yielded by the limestone.

**Distinguishing Features:** Coastal Plain Marl Outcrops are distinguished by having substantial cover of bare limestone or an area of many meters in extent. Small outcrops and lone boulders with almost no plants, occasionally present in Basic Mesic Forest (Coastal Plain Subtype) or exposed on riverbanks, are not treated as this community. Bases of outcrops flooded enough of the time to lack terrestrial plants are excluded.

The two subtypes are distinguished by physical setting, along streams or on a lake shore.

**Sites:** The limestone outcrops that support Coastal Plain Marl Outcrops generally occur on bluffs or banks of creeks or rivers or, in one unique situation, on the shore of Lake Waccamaw. Undercutting by stream flow or waves likely is important in keeping the outcrops open. Outcrops are rarer but possible on lower or mid slopes away from the creek bank, embedded in forest. Though the rock is locally called “marl” and that name is retained as the community name, most or all is coquina limestone, a porous mass of cemented shells and shell fragments. A few may be calcareous-cemented sandstone. The rocks include the Castle Hayne and Waccamaw Formations, and possibly some of the Cretaceous formations. No true marl is known.

**Soils:** Soil on the outcrops themselves consists of small pockets of accumulated organic matter, deposited clay and sand, and the limited insoluble material released from the limestone. All are smaller than the minimum map unit for soil mapping.

**Hydrology:** Communities are probably generally mesic but are heterogeneous. Limited size of soil pockets makes them prone to drying quickly, while the open rock is very dry, but their position at the base of slopes and usually next to water may provide an ongoing or periodic source of water input by flooding, runoff, or seepage.

**Vegetation:** Vascular plants on the rock outcrops tends to be sparse, with larger plants limited to solution pockets and crevices. Outcrops are small enough that they often are shaded by trees rooted in adjacent communities, but their occurrence along streams or, in one case, a lake, leads to sunny conditions in some examples. Plants include a mix of species of various high-calcium sites, such as *Aquilegia canadensis*, rare specialist species such as *Asplenium heteroresiliens*, *Cystopteris tennesseeensis*, and *Adiantum capillus-veneris*, and more widespread species such as *Asplenium platyneuron* and *Polystichum acrostichoides*. Vines are often prominent, especially *Toxicodendron radicans*, *Hydrangea barbara*, and the exotic *Lonicera japonica*. Bryophytes often have higher cover. *Conocephalum salebrosum* is abundant in one subtype, while *Anomodon attenuatus*, *Anomodon rostratus*, and *Dumortiera hirsuta* are abundant in the other subtype.

**Dynamics:** Coastal Plain Marl Outcrops are stable over periods of years, but given the porous limestone's extreme susceptibility to weathering, they presumably are maintained in the long run only by periodic slumping resulting from undercutting by water. Occasional stream or lake flooding may affect the lower portions of outcrops, but they are unlikely to be exposed to fire. The occurrence of highly local populations of plants that are not in the surrounding landscape suggest that the outcrops have persisted for long periods.

**Comments:** This is the most narrowly defined theme in the 4<sup>th</sup> Approximation, containing only a single type with two subtypes. This reflects the unique distinctness of these communities, as the only terrestrial rock outcrop communities in the Coastal Plain. Presumably the closest affinity of this theme would be with Low Elevation Cliffs and Rock Outcrops. An alternative treatment, only marginally rejected, would be to create a slightly broader Coastal Plain cliffs and rock outcrops theme, which would include Coastal Plain Cliff communities.

**References:**

Key to Coastal Plain Marl Outcrops

1. Community occurring on the shore of a natural lake. Sparse vegetation dominated by *Adiantum capillus-veneris* and liverworts. Known only at Lake Waccamaw. **Coastal Plain Marl Outcrop (Lake Shore Subtype)**

1. Community not occurring on the shore of a lake. Occurring on banks or bluffs along a stream or river, or on upland slopes. Vegetation various, but *Adiantum capillus-veneris* absent. ....  
.....**Coastal Plain Marl Outcrop (Bluff Subtype)**

## COASTAL PLAIN MARL OUTCROP (BLUFF SUBTYPE)

**Concept:** Coastal Plain Marl Outcrops are terrestrial communities occurring on outcrops of limestone in the Coastal Plain. The Bluff Subtype covers the handful of examples on bluffs or nonflooded stream banks in the Coastal Plain. These outcrops are small and generally are substantially shaded by trees rooted in adjacent forests but have very distinctive flora on the rocks. The rock is usually a mix of dry and wet microhabitats.

**Distinguishing Features:** Coastal Plain Marl Outcrops are distinguished by the presence of bare or vegetated limestone that is not regularly flooded. Calciphilic vascular plants such as *Asplenium heteroresiliens*, *Cystopteris tennesseensis*, and *Aquilegia canadensis* are usually present. Distinctive calciphilic bryophytes are believed to be present but are not well studied. The Bluff Subtype is distinguished by its environment, occurring on bluffs or stream banks, with substantial forest shading.

**Synonyms:** *Aquilegia canadensis* - *Asplenium X heteroresiliens* Herbaceous Vegetation (CEGL004269).

Ecological Systems: Southern Atlantic Coastal Plain Mesic Hardwood Forest (CES203.242).

**Sites:** The limestone outcrops that support the Bluff Subtype occur on bluffs or banks of creeks or rivers in the outer Coastal Plain. They are generally of coquina limestone but may include calcareous-cemented sandstone.

**Soils:** Soil on the outcrops themselves consists of small pockets of accumulated organic matter, deposited clay and sand, and the limited insoluble material released from the limestone. All are smaller than the minimum map unit for soil mapping.

**Hydrology:** Communities are probably generally mesic but are heterogeneous. Limited size of soil pockets makes them prone to drying quickly, while the open rock is very dry, but their position at the base of slopes and usually next to water may provide an ongoing or periodic source of water input by flooding, runoff, or seepage.

**Vegetation:** Vegetation on the rock outcrop itself is sparse or patchy. *Aquilegia canadensis* is the most constant species, but some of the rare plants, especially *Asplenium heteroresiliens*, are also among the most frequent in site descriptions. Other herbs that have moderate frequency include *Cystopteris tennesseensis*, *Asplenium platyneuron*, and *Polystichum acrostichoides*. Other herbs noted occasionally include *Melica mutica*, *Sanicula odorata*, *Carex digitalis*, and *Solidago caesia*. Vines, especially *Hydrangea (Decumaria) barbara*, *Lonicera japonica*, and *Toxicodendron radicans*, may be abundant. The rocks often have abundant bryophyte cover. These are not well documented, but likely usually include *Anomodon rostratus* and *Anomodon attenuatus* and may include *Dumortiera hirsuta* and the rare *Lejeunea bermudiana*. The outcrops generally are shaded by trees from the adjacent forest.

**Range and Abundance:** Ranked G1? The uncertainty in global rank presumably is related to uncertainty in the range of the NVC association, which is definitively attributed to North and South Carolina but questionably attributed to Georgia and Florida. This in turn probably reflects

uncertainty in classification or interpretation, as to whether the more extensive limestone outcrops in Florida represent this association or a different one. Given the large range and biogeographic differences, this community is probably best regarded as being endemic to the Carolinas and being a true G1 element. In North Carolina, the Bluff Subtype is widely scattered through the southern half of the outer Coastal Plain, from Craven and Jones to Brunswick County. Overall, fewer than ten occurrences are known.

**Associations and Patterns:** The Bluff Subtype occurs embedded in Basic Mesic Forest (Coastal Plain Subtype).

**Variation:** No patterns are known to the variation among the few examples. Those on larger river bluffs may be different in some way.

**Dynamics:** Dynamics are those discussed in the theme description. Many examples clearly have been present for a long time, since they support rare flora not found nearby. This subtype is potentially threatened by invasion by exotic plants, primarily *Lonicera japonica* but also including *Youngia japonica*, *Stellaria media*, and *Microstegium vimineum*.

**Comments:** Study of this community has been limited to a single floristic thesis (Sears 1966) and a study of the rare ferns (Jones-Roe 1982). They are difficult to represent in plots, because of the small size and irregular shape of the outcrop patches.

Although no rare animal species are known to be associated with this community, the potential exists for notable snails and other invertebrates.

**Rare species:**

Vascular plants: *Asplenium heteroresiliens* and *Cystopteris tennesseensis*.

Nonvascular plants: *Lejeunea bermudiana*.

**References:**

Jones-Roe, C.A. 1982. The status of two endangered ferns, *Asplenium heteroresiliens* Wagner and *Cystopteris tennesseensis* Shaver, in North Carolina. Report to N.C. Plant Conservation Board.

Sears, M.N. 1966. A floristic study of the limestone along Island Creek in Jones County, North Carolina. M.S. Thesis, University of North Carolina, Chapel Hill.

## COASTAL PLAIN MARL OUTCROP (LAKE SHORE SUBTYPE)

**Concept:** Coastal Plain Marl Outcrops are terrestrial communities occurring on outcrops of limestone in the Coastal Plain. The Lake Shore Subtype covers the unique limestone bluff on the north shore of Lake Waccamaw, exposed to spray and to storm waves and not shaded by trees.

**Distinguishing Features:** The Lake Shore Subtype is distinguished by the presence of bare or vegetated limestone that is not regularly flooded, on an open lake shore. It is unlikely to be found anywhere other than Lake Waccamaw.

**Synonyms:** *Adiantum capillus-veneris* / *Conocephalum conicum* Herbaceous Vegetation (CEGL004515).

Ecological Systems:

**Sites:** The Lake Shore Subtype occurs on an outcrop of coquina limestone on a bluff on the north shore of Lake Waccamaw.

**Soils:** The substrate is bare limestone with only small accumulations of organic and mineral material in pockets and crevices.

**Hydrology:** The community has highly variable moisture levels. Because Lake Waccamaw is subject to frequent south winds, the outcrop is often wetted by spray from waves. When not receiving spray, the lack of soil presumably makes for dry conditions. Seepage from the soils above may create more permanent moisture in minor portions.

**Vegetation:** The Lake Shore Subtype has sparse vascular vegetation, with *Adiantum capillus-veneris* the dominant species. Other species include *Aquilegia canadensis* and trailing vines of *Toxicodendron radicans* and *Hydrangea (Decumaria) barbara*. The liverwort *Conocephalum salebrosum* has high cover in wetter areas.

**Range and Abundance:** Ranked G1Q. The single example on Lake Waccamaw is the only example likely to exist, as it is the only lake with limestone occurring along it anywhere north of Florida and south of New England.

**Associations and Patterns:** The one example is bordered below by Natural Lake Shoreline (Lake Waccamaw Pond-Lily Subtype). The natural community bordering on the upland side is not known, as no natural vegetation remains there.

**Variation:** Only a single example exists.

**Dynamics:** Dynamics are similar to those described in the theme description. The presence of a long-distance disjunct plant population indicates great antiquity in the open outcrop.

**Comments:**

**Rare species:**

Vascular plants: *Adiantum capillus-veneris*.

**References:**