



Natural Heritage & Endangered Species Program

Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
tel: (508) 389-6360, fax: (508) 389-7891
www.nhesp.org

Description: Calcareous Forest Seeps are a very small patch (< 1 acre) community, characterized by northern hardwoods in the canopy and a diverse assemblage on the surface adapted to wet conditions. In particular, the herbaceous layer includes several species more typical of calcareous fen communities. There may be substantial downed logs due to wet soils and rooting zones promoting periodic windthrow. These seeps may occur in disjunct patches along a slope or along forested river banks or wetland edges. They may also occur in wide or narrow draws along a slope where topography favors groundwater discharge.

Environment: Calcareous Forest Seeps occur in areas of limestone or dolostone and near headwaters of streams, on slopes, or at the base of a slope where groundwater discharges to the surface. Groundwater typically flows year round and at a relatively constant temperature of between 40 and 50 degrees F. This may result in early snow melt or even snow free areas in the forest. While generally discharging water, these seeps may recharge groundwater in some conditions. Soils are generally mineral and may be deep and contain organic material, or may be shallow and have primarily alluvial material from periodic high flows. Stones of various sizes may be evident on the surface or in the soil, and there may be areas of bare soil. Nutrient availability and pH are high due to water moving through high pH bedrock and associated soils. The boundaries between seeps and dryer areas may not be distinct, and seeps may occur in scattered patches.

Characteristic Indicator Species: Canopy and subcanopy species are typical surrounding forests, generally northern hardwoods, and include sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), American elm (*Ulmus americana*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), green ash (*F. pennsylvanicum*), black birch (*Betula lenta*), various species of hickory (*Carya* spp.), white pine (*Pinus strobus*), and red oak (*Quercus rubra*) depending on the composition of the surrounding forest. In some instance, black ash (*Fraxinus nigra*) may occur.

Calcareous Forest Seep (S2)

State Status: None

Federal Status: None



Two different Calcareous Forest Seeps showing the variation in shrub density. Above: Patricia Swain, NHESP. Below: Henry Barbour, NHESP.

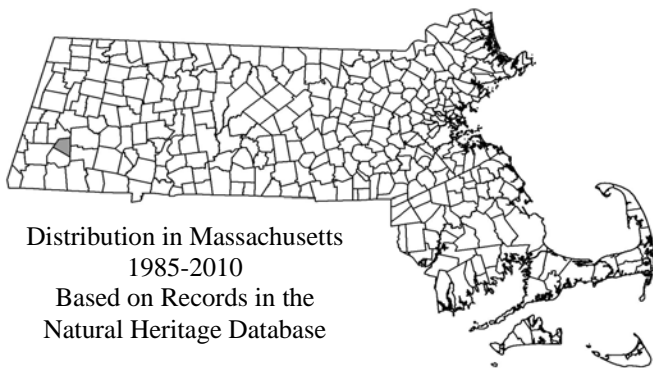
The shrub and sapling layer generally includes canopy dominants, along with hornbeam (*Carpinus caroliniana*), witch-hazel (*Hamamelis virginiana*), speckled alder (*Alnus incana*), alternate-leaved dogwood (*Cornus alternifolia*), silky dogwood (*Cornus amomum*), and striped maple (*Acer pensylvanicum*). Shrub species that are good indicators of calcareous seeps include hoary willow (*Salix candida*), autumn willow (*S. serissima*), and shrubby cinquefoil (*Dasiphora floribunda*). Some occurrences may appear to be a shrub swamp with limited tree cover. Herbaceous indicators include yellow sedge (*Carex flava*), porcupine sedge (*Carex hystericina*), sensitive fern (*Onoclea sensibilis*), rough-leaved

goldenrod (*Solidago patula*), water avens (*Geum rivale*), and grass-of-Parnassus (*Parnassia glauca*). Other more common species may include sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), horsetail (*Equisetum arvense*), jack-in-the-pulpit (*Arisaema triphyllum*), skunk cabbage (*Symplocarpus foetidus*), purple-stem aster (*Symphotrichum puniceum*), stinging nettle (*Urtica dioica*), swamp loosestrife (*Lysimachia ciliata*), white avens (*Geum canadense*), jewelweed (*Impatiens capensis*), violets (*Viola* spp.), and awned sedge (*Carex crinita*). Hummocks may have species more typical of dryer calcareous habitats or cliffs including hog peanut (*Amphicarpaea bracteata*), white snakeroot (*Ageratina altissima*), and bulblet-fern (*Cystopteris bulbifera*).

Invasive species can include Morrow's honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), moneywort (*Lysimachia nummularia*), common buckthorn (*Rhamnus cathartica*), and Japanese barberry (*Berberis thunbergii*).

Several rare species are found in Calcareous Forest Seeps including leafy white orchis (*Platanthera dilatata*, T) and dwarf scouring-rush (*Equisetum scirpoides*, SC).

Range: Calcareous Forest Seeps are found primarily in western Massachusetts where limestone and dolostone are predominant. Forest seep communities have been described in Rhode Island, New Hampshire and Vermont, but are calcareous types are not distinguished.



Related Communities: The Calcareous Forest Seep Community is associated with the types of forests within which they are found. There may be certain types of communities, such as Rich Mesic Forests that contain more seeps embedded within them than dryer forest types, such as an Oak-Hickory Forest. Calcareous Forest Seep Communities are found in conditions similar to those of Forest Seep Communities, headwaters, springs and breaks in slope, but have calcium rich water. The pooling of the seepage waters of the forest seeps creates condition conducive to use by amphibians typical of Vernal Pools.

Riverside Seeps form along riverbanks and are primarily herbaceous. Red maple swamps may form at the base of slopes and have a similar herbaceous flora.

Threats and Management Recommendations: Since these seep communities are within larger forests, they may be affected by logging and other types of management. Protection of sufficient forested buffer is essential to maintaining their integrity.

In some seepage areas, invasive species, such as those listed above, that are tolerant of wet conditions may become established. If it is determined invasives species need to be controlled, a plan should be developed, in consultation with the Massachusetts Natural Heritage and Endangered Species Program, to remove the invaders. All active management of any rare plant populations associated with this community is subject to review under the Massachusetts Endangered Species Act, and should be planned in close consultation with the Massachusetts Natural Heritage and Endangered Species Program.

High white-tailed deer densities may have an impact on the abundance of native species, particularly woody seedlings and herbaceous plants.

Walking through these seeps can create significant disturbance as plants on wet, shallow soils or growing with mosses on rocks or logs may be dislodged. Hiking trails should be rerouted or designed with appropriate crossings.

These seepage communities are likely wetlands, but may be too small to be discerned by typical methods of delineation using aerial photographs. Some may be isolated except for intermittent streams flowing from them, and not covered by the current regulations. They may also not be readily located in the field. Therefore, they may not be protected under wetlands protection regulations.

Activities upstream may result in erosion into these seeps. Activities, such as increased development and other land use actions involving groundwater withdrawal may result in reduced groundwater discharge to the surface. Discharges from roads or culverts should have aprons to dissipate energy of storm water flowing into these seeps.

Calcareous Forest Seeps as headwaters may be important to species using headwater streams with the latter containing a greater abundance of species associated with limestone or dolostone. Forested seeps may be associated with Vernal Pools in cases where groundwater discharges.

Status in Massachusetts: This community is ranked as S2 (Imperiled), indicating there are 6-20 occurrences in the state.

For More Information See:

Enser, R.W. and J.A. Lundgren. 2006. Natural Communities of Rhode Island. A joint project of the Rhode Island Dept. of Environmental Management Natural Heritage Program and The Nature Conservancy of Rhode Island. Web published by R.I. Natural History Survey, Kingston, RI. www.rinhs.org.

Manomet Center for Conservation Sciences. 2006. A guide to the natural communities of Massachusetts. Manomet Center for Conservation Sciences. Manomet, MA. URL:
http://www.communitymapper.org/natcom_resources.htm

NHDFL (New Hampshire Division of Forests and Lands). undated. Forest seep/seepage forest system. Available via <http://www.nhdfl.org/about-forests-and-lands/bureaus/natural-heritage-bureau/photo-index/SystemPhotos/forestseepseepageforest.aspx>.

Sperduto, D.D. and W.F. Nichols. 2004. Natural communities of New Hampshire. The New Hampshire Heritage Bureau and The Nature Conservancy. URL:
http://www.nhdfl.org/library/pdf/Natural_Communities2ndweb.pdf

Swain, P.C. and J.B. Kearsley. 2011. Classification of the Natural Communities of Massachusetts. Version 1.4. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, MA.
<http://www.mass.gov/dfwele/dfw/nhsp/nhclass.htm>

Thompson, E.H. and E.R. Sorenson. 2000. Wetland, Woodland, Wildland: a guide to the natural communities of Vermont. University Press of New England, Hanover, NH.

USEPA (U.S. Environmental Protection Agency). 2009. Characteristic mid-Atlantic wetland type-spring seep. Available via:
http://www.epa.gov/reg3esd1/wetlands/spring_seep.htm. Accessed February 2, 2010.