Common Name: WINTER QUILLWORT

Scientific Name: *Isoetes hyemalis* D.F. Brunton

Other Commonly Used Names: wintergreen quillwort, evergreen quillwort

Previously Used Scientific Names: none

Family: Isoetaceae (quillwort)

Rarity Ranks: G2G3/S1

State Legal Status: Special Concern

Federal Legal Status: none

Federal Wetland Status: none

Description: Perennial **herb**, forming robust tufts of leaves on creek banks. **Rootstock (corm)**, with two lobes, one or more attached to a knotty, horizontal, underground stem (**rhizome**); new plants may develop from these corms. **Leaves** 9 - 10½ inches (23 - 27 cm) long, evergreen, bright green when young, dark brownish-green when older, flared at the base and tapering to a sharply pointed tip; when growing in flowing water, the leaves are long, wavy, and slightly curled. **Spores** are produced in the **sporangium**, a brown-streaked or brown-spotted chamber,

about ¼ inch (5.3 mm) long, in the leaf base, with a transparent membrane (**velum**) covering 10 - 20% of the chamber opening. Dozens of tin, grayish-white **female spores (megaspores)**, approximately 0.05 mm across and covered with a dense pattern of bumps (low spines) and very short, loosely connecting ridges, may be seen with 20 - 30x magnification. Olive-gray to tan, dust-sized **male spores (microspores)** are produced on separate leaves but are indistinguishable without much higher magnification.

Similar Species: Quillworts are distinguished from flowering, wetland plants by their spongy leaves with conspicuous cross-walls **and** by the presence of sporangia in the flared base of the leaves. Engelmann's quillwort (*Isoetes engelmannii*) has long leaves (10 - 24 inches, 25 - 60 cm) like winter quillwort, and the velum covers less than 30% of the sporangia, but it has lighter green leaves and smaller megaspores with regularly reticulate ornamentation patterns; Engelmann's quillwort is the most common quillwort in Georgia but is found mostly in the Piedmont. Appalachian quillwort (*I. appalachiana*), found across the state, has the same size megaspores as winter quillwort but these have an irregularly reticulate ornamentation pattern. Southern quillwort (*I. flaccida*) also occurs in the southwest portion of Georgia's Coastal Plain in habitats similar to winter quillworts; it also has long leaves (4 - 24 inches, 10 - 60 cm) but its velum completely covers the spore chamber, which is colorless (not streaked with brown), and contains smaller, more plainly ornamented megaspores. Boom's quillwort (*I. boomii*) and Georgia quillwort (*I. georgiana*) both have larger, more coarsely ornamented megaspores and more extensive velum coverage (see full species accounts elsewhere on this website).

Related Rare Species: Nine quillwort species are listed or considered of Special Concern in Georgia. Six are included on this website: Boom's quillwort (*Isoetes boomii*), Georgia quillwort (*I. georgiana*), winter quillwort (*I. hyemalis*), rush quillwort (*I. junciformis*), black-spored quillwort (*I. melanospora*), and mat-forming quillwort (*I. tegetiformans*).

Habitat: Densely shaded blackwater creeks with circumneutral to basic water pH, sandy banks along seasonally flowing streams, and flowing water in swamps. Outside of Georgia, forms pure stands of several hundred plants in blackwater streams, but also may occur with rushes (*Juncus*), pondweeds (*Potamogeton*), and burweed (*Sparganium americanum*).

Life History: Quillworts are seedless, non-flowering plants that reproduce by spores. Winter quillwort also may rarely reproduce vegetatively by producing plantlets along a horizontal, underground rhizome. Quillwort leaves have hollow chambers at the base where two types of spores are produced: tiny microspores develop sperm-producing structures, and larger (though still minute) megaspores produce eggs. Sperm swim to the eggs in available water and unite to form new plants. Quillworts compete poorly with other aquatic plants and are typically found in relatively sterile sand or silt or in frequently water-worn sites that support few or no other vascular plants.

Survey Recommendations: Surveys in Georgia are best conducted in late spring – early summer when plants are most conspicuous and their leaves have not withered; mature megaspores are best developed in mid – late summer but may be found (from previous year's growth) in the soil at the base of plants during the following spring.

Range: Coastal Plain and lower Piedmont of Georgia, Florida, Alabama, South Carolina, North Carolina, and Virginia.

Threats: Ditching and draining wetlands, impounding streams, clearcutting in swamps and floodplains.

Georgia Conservation Status: Two populations are known, neither on conservation land.

Conservation and Management Recommendations: Protect floodplains and swamps and adjacent areas of local watersheds from damming, clearing, draining, and filling.

Selected References:

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Date Compiled or Updated:
L. Chafin and D. Brunton, Dec. 2008: original account
K. Owers, Feb. 2010: added pictures

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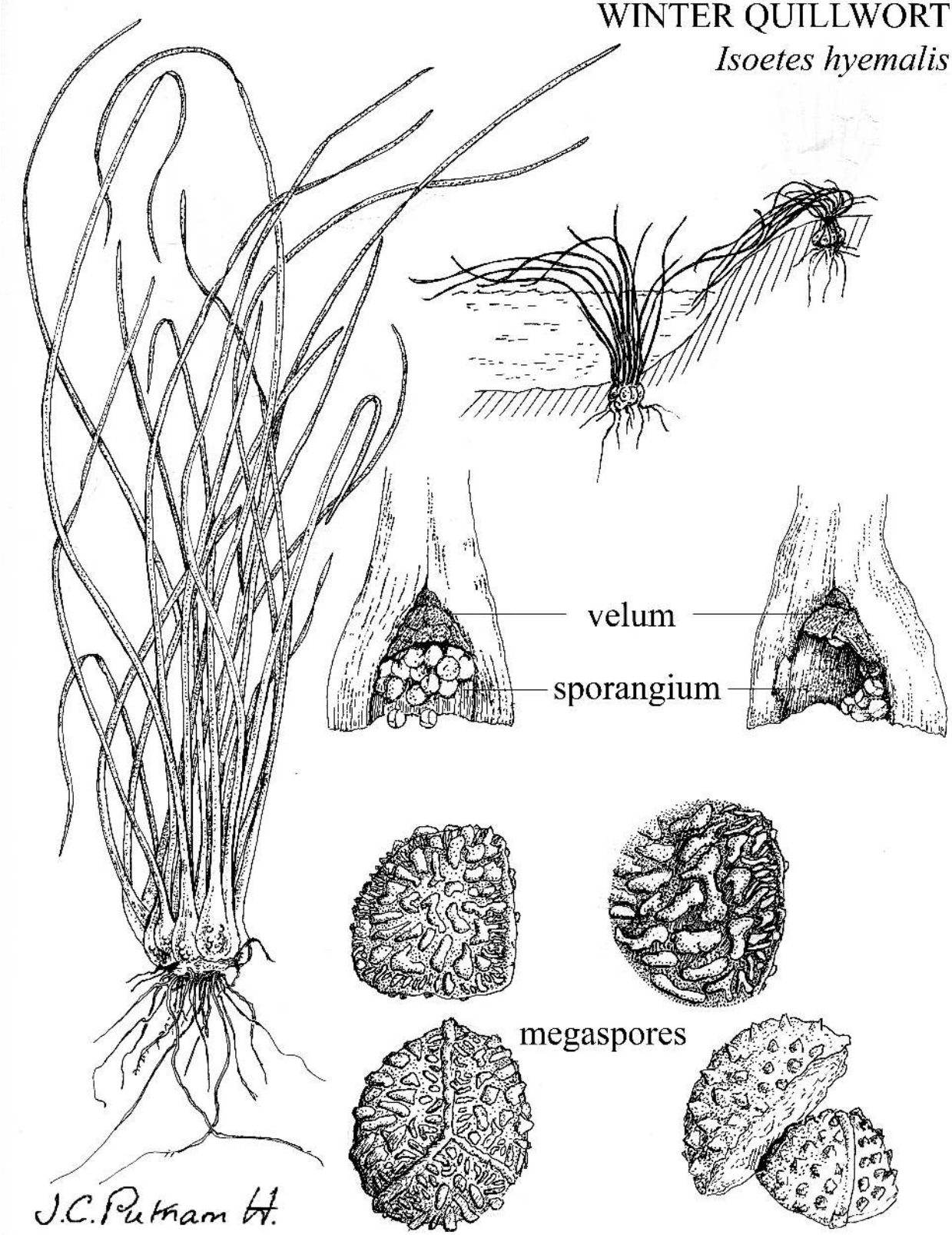


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