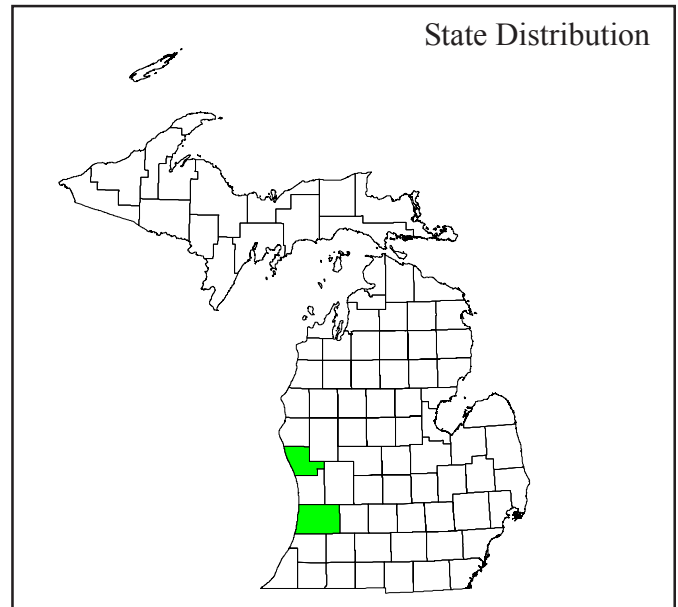
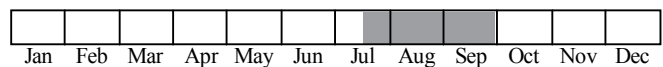




Photo by Gary A. Reese



Best Survey Period



Status: State threatened. Currently under consideration for nomination as a Federal Candidate species, based on a recent status assessment by the U.S. Fish and Wildlife Service (McKenzie 1998).

Global and state rank: G2/S2

Other common names: Hall's club-rush.

Family: Cyperaceae (sedge family)

Synonyms: *Scirpus hallii* A. Gray, *Scirpus supinus* L. var. *hallii* (Gray) Gray, *Scirpus uninodis* (Delile) Boissier var. *hallii* A. Beetle.

Taxonomy: The taxonomy of the genus *Scirpus*, to which this species was formerly referred, is complex and thus understandably confusing to most non-specialists and undoubtedly many botanists as well. However, based in part on recent studies, Cyperaceae taxonomists now appear to be in general agreement on a modern treatment for *Scirpus*. This has resulted in the delineation of several new genera (see Smith 1995 and Schuyler 1969), including the genus to which Hall's bulrush has now been assigned, *Schoenoplectus*. An excellent overview of Hall's bulrush taxonomy is provided in the status assessment by McKenzie (1998).

Total range: Based to some extent on the taxonomic disagreement within the literature, in addition to incorrect determinations and misinterpretations (McKenzie 1998), the specific range of this species has been somewhat unclear. Hall's bulrush is generally quite rare and rather local throughout its range, ranging very sporadically from the U.S. Atlantic Coastal Plain to the central United States, occurring in Georgia, Illinois, Indiana, Kansas, Kentucky, Michigan, Missouri, Nebraska, and Wisconsin. The species has also been documented from Massachusetts and Iowa, but is now considered extirpated from those states (McKenzie 1998). Although it is difficult to determine the precise number of sites for Hall's bulrush globally, due in part to the vagueness of historical collection records, it appears that there are perhaps fewer than 50 occurrences (P. McKenzie, pers. comm.). Considering that the vast majority of sites have been documented in Illinois (40% or more, P. McKenzie, pers. comm.), and that many populations consist of rather small, localized, or fragmented colonies, this species is highly vulnerable to further decline and range contraction.

State distribution: This species is known from only five occurrences in southwest Lower Michigan, consisting of three in Muskegon County and two in Allegan County. In Muskegon County, Hall's bulrush was last observed as scarce at two sites in 1986, and was found



to be very local at a third county location where it has not been observed since its discovery in 1988. In Allegan County, Hall's bulrush is known from two high quality intermittent wetlands where it was first observed in 1989, including one site where the species was locally dominant over several acres. After several years of monitoring in the exemplary Allegan site, which has experienced extended drought and drawdown, the species was not observed again until 2002, when it emerged in modest numbers. This small sedge, which germinates rather sporadically and is easily overlooked, has a high potential for being discovered in several additional sites in southwest Michigan and perhaps elsewhere in the state.

Recognition: *Schoenoplectus hallii* is a **diminutive, annual bulrush** that grows in **small tufts or clumps, producing soft, roundish (terete) stems, the longest of which may range from 1-4 dm in height, and also sometimes forming shorter stems at the base that may be only 1 cm in length** (Fernald 1950). Michigan plants appear to be within the low end of the size range for the species, and are often considerably smaller than 10 cm. Several short leaf blades, some only up to 1 cm long, arise from the base of the clumps, with longer stem (cauline) leaves occasionally produced upward. At the tip of each stem, two to six small (ca. 5-10 mm long) ovoid spikelets (inflorescences) are borne without stalks in a crowded cluster. The spikelets, which appear to be laterally produced, are actually much surpassed by a leaf-like involucral bract that appears to be a continuation of the stem, as is typical in several bulrush species. The most distinctive identifying feature of Hall's bulrush is the fruit, which consists of tiny, flattened, 1.5 mm long **black achenes that are round to somewhat top-shaped and covered with conspicuous, somewhat wavy horizontal (transverse) ridges**. These jet black, highly ornamented achenes enable Hall's bulrush to be distinguished from all other species. As noted above, short basal culms may be produced, these usually found in plants observed or collected later in the season and tending to be somewhat enclosed within the encircling leaf sheath. Achenes produced these basal culms are somewhat larger than those from aerial stems and also unequally 3-angled (McKenzie 1998).

The more widespread *Schoenoplectus smithii* (Smith's bulrush), which is commonly associated with *S. hallii* and the species most closely resembling it, is **usually a**

larger and more erect plant, bearing achenes that are black but **smooth to very slightly pitted**. In addition, perianth bristles, which are lacking in *S. hallii*, are **sometimes present in *S. smithii***.

Best survey time/phenology: Most of Michigan's occurrences have been observed from approximately the middle of August through early September, and plants may persist in identifiable condition into early October. However, observations in 2002 indicated that this species may grow much earlier than previously known, emerging in late July under the appropriate hydrological conditions following several successive years of drought.

Habitat: Throughout its range, *Scirpus hallii* inhabits moist sands to sandy-peaty substrates exposed by the receding shore of shallow seepage lakes, ponds, and similar types of intermittent to ephemeral wetlands. It is occasionally found in rocky or cobble habitat (McKenzie 1998). In Michigan this species occurs within southern Michigan intermittent wetlands known as coastal plain marshes, so named for a large set of Atlantic Coastal Plain disjunct species that occur in this natural community type (Kost 2000). These wetlands typically occur as shallow potholes within oak barrens landscapes formed on glacial lakeplain, such as in Allegan County. These communities may also occur along lakeshores or form the shallow portions of large lake complexes in other landscapes. Coastal plain marshes are characterized by their cyclical or fluctuating hydrological regime, during which species remain within the seedbank during high water years, followed by their often unpredictable emergence during drawdown periods. Drawdowns that are extended or otherwise result in very droughty conditions are not necessarily favorable to the emergence of seedbank species, which require moist – but not dry – substrates for germination and growth.

Typical associates includes such species as *Spartina pectinata* (prairie cordgrass), *Panicum virgatum* (switch grass), *Sorghastrum nutans* (Indian grass), *Fimbristylis autumnalis* (Autumn-grass), *Stachys hyssopifolia* (hyssop hedge nettle), *Rhynchospora capitellata* (beak-rush), *Aster dumosus* (bushy aster), *Panicum spretum* (panic grass), *Scirpus smithii* (Smith's bulrush), *Viola lanceolata* (lance-leaved violet), and *Hypericum canadense* (St. John's-wort). Many rare plants may be associated with Hall's bulrush,



including such species as *Psilocarya scirpoides* (bald-rush), *Fuirena squarrosa* (umbrella-grass), *Rotala ramosior* (tooth-cup), *Eleocharis melanocarpa* (spike-rush), *E. tricostrata* (spike-rush), *Eleocharis engelmannii* (spike-rush), *Rhexia virginica* and *R. mariana* (meadow-beauty), *Scleria pauciflora* (few-flowered nut-rush), *Rhynchospora macrostachya* (large beak-rush), among several other species. *Echinodorus tenellus* (dwarf burhead) is a very rare Coastal Plain disjunct species associated with Hall's bulrush at both Allegan County sites, and interestingly, is a frequent associate in several other states within the range.

Biology: This annual bulrush has been observed at the first Muskegon county collection locality only in certain drawdown years despite careful searching in other years. This species was similarly not observed for a number of years in Allegan County, and then appeared in 2002 with the advent of more suitable hydrological conditions following extended drought. Hall's bulrush likely requires a mid- to late-summer drawdown to expose moist substrate necessary to stimulate germination in the seedbank (Schuyler 1969). *Schoenoplectus hallii* has been found in different areas of the original Michigan locality (Muskegon County) over the past 25 years, suggesting that local colonies may be ephemeral or that only portions of the seed bank are germinating within a given year. Fruiting specimens of this species have been collected from mid-August to late September.

Hall's bulrush is known to produce two types of fruiting spikelets; those borne aerially on the stems, and those that are occasionally produced on very short stalks amongst the leaf sheaths at the base of the plant (the latter condition known as "amphicarp"). Basal achenes are reported to be slightly larger and unequally 3-angled, which contrast with the flattened (lenticular) achenes produced aerially.

Conservation/management: According to a recent report, off-road-vehicles (ORVs) have seriously damaged this plant's habitat at two of the Muskegon County localities, and continues to threaten populations in the Allegan County sites, both of which lie within the Allegan State Game Area. One Muskegon County station is partially protected within a Michigan Nature Association preserve, from which ORV's are now being successfully excluded. However, residential develop-

ment, accompanied by dredging and filling, continues on portions of the shore area, and local industry may be altering the hydrology of the site. Both Allegan County sites occur on state land, and land managers there remain diligent in protecting these fragile and diverse wetlands that contain an extraordinary number of rare and disjunct plant species. Conservation of Hall's bulrush habitats will require maximum protective ownership and the maintenance of natural hydrological regimes. The continuation of monitoring will help identify the most appropriate methods for management.

Research needs: McKenzie (1998) considered life history research to be of high priority, and such a study has been initiated in Illinois with support from the U.S. Fish and Wildlife Service (USFWS). Funding has also been allocated by USFWS for ongoing monitoring in Michigan for habitat characterization, population dynamics, and a statewide status assessment, the latter to take place in 2003. These investigations, in addition to studies being conducted elsewhere, such as germination research (McKenzie 1998), should provide significant guidance for conservation and management.

Related Abstracts: Coastal plain marsh, lakeplain wet prairie, lakeplain wet-mesic prairie, oak barrens, oak-pine barrens, paniced screw-stem, northern appressed clubmoss, meadow-beauty, prairie dropseed, zigzag bladderwort, Blanding's turtle, blazing star borer, culver's root borer, eastern box turtle, massasauga, red-legged spittlebug, silphium borer.

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