

Occurrence of *Schoenoplectus mucronatus* at the U.S. Department of Energy Fernald Preserve

John Homer, john.homer@lm.doe.gov, Ashlee Decker, ashlee.decker@lm.doe.gov, and
Stephanie Bien, stephanie.bien@lm.doe.gov.
Fernald Preserve, 7400 Wiley Road, Hamilton, OH 45013

Abstract: Bog bulrush (*Schoenoplectus mucronatus*) is a perennial wetland species native to Africa, Asia, and Europe. Its documented occurrence in the United States includes California, Hawaii, Iowa, Kentucky, Missouri, New Jersey, New York, Pennsylvania, Washington, and Tennessee. This species spreads through seed, rhizomes, and stolons, and has shown resistance to certain herbicides. Online plant databases do not show the distribution of the species reaching into Ohio or Indiana; however, local experts have indicated that specimens are in both states. Various reports indicate that *S. mucronatus* is locally abundant but not yet widespread regionally. In recent years, *S. mucronatus* has become increasingly abundant at the Fernald Preserve, a U.S. Department of Energy site in northwest Hamilton County, Ohio. The 425-hectare (1,050-acre) site has undergone extensive remediation and subsequent ecological restoration, and various wetlands have been constructed across the site. *S. mucronatus* was first observed at the Fernald Preserve in 2008, in one constructed basin. During monitoring in 2009, *S. mucronatus* was seen in 8 of 23 basins surveyed. This increase has raised concern that the species may become a regional problem. This poster aims to alert botanists and ecological restoration personnel of the species' regional occurrence, and prompt discussion of its potential impacts and how it can be controlled.

Bog bulrush (*Schoenoplectus mucronatus*), also known as rice field bulrush, is a perennial obligate wetland species native to Africa, tropical and temperate Asia, and Europe (USDA 2005). Because of its invasive nature in rice fields, *S. mucronatus* is considered one of the world's worst weed species. This species affects the rice fields of Bangladesh, France, India, Malaysia, the Philippines, Portugal, Spain, and the United States (Bryson & Carter 2008). While the species' economic risk to agriculture proves its significance as a weed, this project investigates whether the species threatens regional ecosystems by destroying wildlife habitat, limiting biodiversity, or changing the natural composition of the native area. Reports of *S. mucronatus* claim local abundance; however, it does not appear to be widespread in the region.

The Fernald Preserve is situated on a 425-hectare (1,050-acre) tract of land, approximately 29 kilometers (18 miles) northwest of Cincinnati, Ohio. The site is near the unincorporated communities of Ross, Fernald, Shandon, and New Haven in Hamilton County. It is a former uranium-processing facility that was shut down in 1991. Since then, the site has undergone extensive remediation pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act. Remedial activities

and subsequent ecological restoration have converted the site from an industrial production facility to an undeveloped park, encompassing wetlands, prairies, and forest. When the large-scale soil remediation and waste disposition were completed in the fall of 2006, the site was successfully transferred from the U.S. Department of Energy (DOE) Office of Environmental Management to the DOE Office of Legacy Management. The Fernald Closure Project was then renamed the Fernald Preserve.

Wetland creation is a central component of ecological restoration at the Fernald Preserve. Approximately 57 hectares (140 acres) of wetland and open-water communities have been established at the site. The control of invasive species has been and will continue to be a part of the long-term ecological restoration and maintenance plan. *S. mucronatus* recently emerged in several of the created wetlands. It first appeared in 2008 in one wetland, but by the monitoring efforts in the summer of 2009, the species was seen in 8 of the 23 wetlands monitored, as well as in two additional locations on site.

This increase in observed patches of *S. mucronatus* raised concern about its potentially invasive nature. In response, we conducted both a literature review of the history, impacts, and control

of *S. mucronatus*, and a local review of *S. mucronatus* distribution.

This sedge fruits during the summer to fall months and at maturity reaches 2 to 3 feet. This plant is characterized by sharply triangular culms—its leaves consist of 1 or 2 bladeless sheaths per culm. *S. mucronatus* reproduces through seeds, rhizomes, and stolons. The stolons end with result in round, dark tubers, which will grow into new plants when constantly submerged. However, the tubers will become dormant in unfavorable conditions with potential to sprout when conditions improve. (Washington State 2007). Plants typically sprout 60 to 70 days after a flood event (Regents of the University of California 2008). Studies have shown this weed to be resistant to some herbicides, primarily ALS-inhibitors such as bensulfuron (e.g., Londax) and bispyribac (e.g., Regiment) (Busi et al. 2006; Fischer & Hill 2006). However, manually removing this weed has been reported as an effective means of eradication (Washington State 2007).

S. mucronatus was first sited in the United States in New England in the early 1900s but did not persist. The species has been seen in California rice fields since 1942. Regional presence in the Midwest began in 1971 (*Flora of North America* 2003). Currently online databases show distribution in California, Hawaii, Iowa, Illinois, Kentucky, Missouri, New Jersey, New York, Pennsylvania, and Tennessee (*Flora of North America* 2003; USDA 2009). Although *S. mucronatus* is not yet listed in online databases for the state of Washington, Washington State Noxious Weed Control Board has listed it as a class A noxious weed due to its presence on the Ridgefield National Wildlife Refuge in Clark County (Washington State 2007).

To learn more about the regional distribution of *S. mucronatus*, we asked 13 local herbariums about any *S. mucronatus* vouchers. The herbariums, contact persons, and positive responses are listed in figure 1. There is only one vouchered location in Indiana, one in Kentucky, and four in Ohio. Counties include Butler, Fairfield, Pickaway, and Hamilton, in Ohio; Perry in Indiana; and Pulaski in Kentucky. The Pulaski County voucher notes that this species may have been introduced into the area by contaminated ornamental water lilies planted in a local pond.

Wetland monitoring activities at the Fernald Preserve will continue to document the frequency and distribution of *S. mucronatus*. In addition, control alternatives will be evaluated and implemented as part of ongoing maintenance activities. The apparent spread of this species across created wetlands raises concern. Botanists and land managers should be on the lookout for *S. mucronatus* in created and preserved wetland communities across Ohio.

Figure 1.

Contact	Affiliated University	Response and Voucher Locations
Dr. Michael Vincent	Miami University, Oxford	Butler, Pickaway, Fairfield, and Hamilton counties, Ohio
Dr. Maggie Whitson	Northern Kentucky University	Pulaski County, Kentucky
Dr. Ron Jones	Eastern Kentucky University	Pulaski County, Kentucky
Alice Lawrence and Robert Neidlinger	Western Kentucky University	No known vouchers
Dr. Rebecca W. Dolan	Butler University	Perry County, Indiana; Portugal
Dr. Nick Harby	Purdue University	Taiwan
Dr. David Winship Taylor	Indiana University Southeast	No known vouchers
Eric Knox/Sarah Rosenberg (assistant)	Indiana University	No known vouchers

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