Management information: *Microstegium vimineum*

Prescribed burns have not been successful in controlling this species so far, but fall burns may have the potential for partial control. If controlled during the early stages of invasion, the potential for successful management is high. The potential for large-scale restoration of wildlands where it has become established is probably moderate. Hand pulling is the preferred method of removal as it is highly specific and provides minimal impact (except trampling and soil disturbance) to the surrounding environment. Hand pulling is an effective method of control if it is thorough and timed correctly. It is, however, labor-intensive and time-consuming. Pulling late in the season (September to early November) before seed production reduces the unintentional spread of the current year's seeds. Pulling early in the season (before July), however, allows germination of new plants from the seed bank, which will mature during the remaining season and produce seeds. In the northeast, August and late September are good times to pull plants by hand (LaFleur, 1996, in Tu, 2000). Yearly weeding is necessary because new plants can appear as a result of seed banking or re-infestation from new seed being dispersed into the area (G. Edinger letter to J. Randall, in Tu, 2000). Mowing using a weed whacker (or a weed-eater) is an effective control method if carried out in late summer just before seeds are produced. Mowing at any other time is not useful as the plants have the ability to resprout and can produce seed heads in the axils of their lower leaves (Woods, 1989, Barden, 1991, in Tu, 2000). Mowing can also be useful in reducing the amount of litter and plant biomass prior to herbicide application, making the herbicide more effective. Grazing is not a control option for *M. vimineum* since cattle, deer, and even goats avoid feeding on it (A. Houston, pers. comm., Barden, 1991, in Tu, 2000).

Flooding for more than three months, or intermittent flooding during the growing season, may be an effective control method for mature plants. The

seeds, however, can survive periods of inundation of at least ten weeks (Barden, 1991, in Tu, 2000).

Spring burns are ineffective at controlling *M. vimineum* because a new cohort of seeds will germinate soon after the burn. Burns in the late fall, however, may be useful in controlling this species (Barden, 1991, in Tu, 2000). Burning is also useful in reducing the amount of litter and plant biomass prior to herbicide applications. For large infestations of *M. vimineum*, the use of herbicides may be the only viable option for good control. A series of control experiments using herbicides was carried out at the Ames Plantation (University of Tennessee), where the researchers reported that it is relatively easy to kill *M. vimineum* but that managing for a desirable plant community is difficult. They found that the herbicide imazameth (tradename Plateau) was the herbicide of choice for controlling *M. vimineum*. This is because imazameth kills *M. vimineum* but allows for development (i.e., does not kill) of the desirable native sedges, ragweeds, and legumes. The grass-specific herbicide fluazifop-p (tradename Fusilade) also controlled *M. vimineum*, but left a less desirable plant community. Glyphosate (tradename RoundUp) was also tested but resulted in a complete kill of all plants, which could potentially lead to possible re-invasion by *M. vimineum* or other undesirable species. Formulations of glyphosate registered for use in aquatic systems (Rodeo) have been effective for *M. vimineum* control in wetlands. The grass-specific herbicide sethoxydim (tradenames Poast, Vantage), when applied during late summer, also provided excellent control (more than 95%) and released dicots from competition without injuring them (Woods, 1989, in Tu, 2000) . Pre-emergent herbicides such as diphenamid (tradename Enide) and benefin (tradename Balan) have also demonstrated excellent control of seedlings under conditions of good herbicide-to-soil contact (Woods 1989, in Tu, 2000) but do not encourage the germination of native species. No biological controls are currently available for *M. vimineum*.

Derr and Tech found that the following preemergence herbicides controlled *M. vimineum*: Barricade, Ronstar, Bensumec, Snapshot, Dimension, Surflan,

Pendulum, and Treflan, when applied prior to germination. Repeat applications may be needed in wet years or to control late germination (Derr and Tech, 2004). The following post-emergence grass herbicides were effective: Acclaim, Extra, Envoy, Fusilade, Vantage, Plateau (semi-selective), Finale (non-selective) and Round-up Pro (non-selective) (Derr and Tech, 2004). Handweeding and close mowing late in the season were also effective means of control (Derr and Tech, 2004).