forested communities. Although onged growth period is beneficial ant, it is also beneficial in control- plant. Vegetative runners are most in the open sun and will resprout ney touch the soil, forming mats of nts. But Japanese honeysuckle dis- tle growth under moderate shade, deep shade, runners develop but e back. Flowering and seed devel- are heaviest in sunny areas. Seed- blishment and growth is slow in the o years of development of a new ickle colony.

o control Japanese honeysuckle in- ns in areas of heavy and light infes- ave included the following methods: , grazing, prescribed burning, and les. Although grazing and mowing he spread of vegetative stems, nei- thod provides completely effective Mowing limits the length of Japa- neysuckle vines, but will increase of stems produced. Grazing e same effects as mowing, but is dictable because of the uneven treat- ven by browsing animals. Prescribed r a combination of prescribed burns bicide spraying appears to be the y to eradicate this vine.

adapted communities, spring pre- burns can greatly reduce Japanese ickle coverage and crown volume. ed fires have reduced honeysuckle uch as 50% over a single burn. A sly burned population of honey- will recover after several years if excluded during this time. After ickle coverage is reduced with fire, herbicide treatments may be ap- f considered necessary, using less al.

e Japanese honeysuckle is semi- en, it will continue to photosynthe- er surrounding deciduous vegeta- ormant. This condition allows man- o detect the amount of infestation, ows for treatment of the infestation rbicides while minimizing damage nt vegetation.

sate herbicide (trade name Round- a recommended treatment for this honeysuckle. A 1.5–2% solution (2–2.6 oz Roundup/gal water) applied as a spray to the foliage will effectively eradicate Japanese honeysuckle. The herbicide should be applied after surrounding vegetation has become dormant in autumn and before a hard freeze (25°F). Roundup should be applied carefully by hand sprayer, and spray coverage should be uniform and complete. Do not spray so heavily that herbicide drips off the target species. Retreatment may be necessary for plants that are missed because of dense growth. Although glyphosate is effective when used during the growing season, use at this time is not recommended in natural areas because of the potential harm to nontarget plants. Glyphosate is nonselective, so care should be taken to avoid contacting nontarget species. Nontarget plants will be important in recolonizing the site after Japanese honeysuckle is controlled.

Crossbow, a formulation of triclopyr and 2,4-D, is also a very effective herbicide that controls Japanese honeysuckle. Crossbow should be mixed according to label instructions for foliar application and applied as a foliar spray. It may be applied at dormant periods, like glyphosate, and precautions given above for glyphosate should be followed when using Crossbow. Either herbicide should be applied while backing away from the treated area to avoid walking through the wet herbicide. By law, herbicides may be applied on public properties only according to label instructions and by licensed herbicide applicators or operators.

Herbicides that have given poor control results or that are more persistent in the environment than the above mentioned are picloram, annitrole, aminotriazole, atrazine, dicamba, dicamba & 2,4-D, 2,4-D, DPX 5648, fenac, fenuron, simazine and triclopyr.

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VEGETATION MANAGEMENT GUIDELINE: Bush Honeysuckles — Tatarian, Morrow's, Belle, and Amur Honeysuckle (*Lonicera tatarica* L., *L. morrowii* Gray, *L.* x *bella* Zabel, and *L. maackii* [Rupr.] Maxim.)

Randy Nyboer
Division of Natural Heritage
Illinois Department of Conservation
2612 Locust Street
Sterling, Illinois 61081
(815) 625-2968

Bush honeysuckles can invade a wide variety of native habitats and have a broad tolerance to a variety of moisture regimes and habitats. Although individual species may have certain environmental tolerances (e.g., Tartarian in drier habitats, Morrow's in moister areas), most natural communities are susceptible to invasion by one or more of the species. Often the source of the invasion comes from a planting or from a highly disturbed successional community in which the honeysuckle has flourished. Wetland, prairie, and forested communities are all affected. Habitat disturbance appears to be a key to introduction of these species.

The spread of bush honeysuckle is generally accomplished by birds. Fruits are consumed readily upon ripening during summer. Bush honeysuckle plants commonly are found growing under tall shrubs or trees that act as perch areas for birds. Seeds appear to need a cold stratification period to break dormancy. Seedlings establish in areas of sparse herbaceous vegetation and can tolerate moderate shade. It is suspected that bush honeysuckle may produce allelopathic chemicals that enter the soil and inhibit the growth of other plants, preventing native plants from competing with the shrub. Shading by bush honeysuckle may also limit the growth of native species. Bush honeysuckles leaf out before many native species and hold their foliage until November.

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Control measures may enlist one or more of the following techniques: prescribed burning, hand-pulling of seedlings, cutting, and herbicide treatments. A recently introduced pest, the European honeysuckle aphid, somewhat controls flower and fruit production in some of the bush honeysuckles. Heavy infestations cause tips of branches to form "witches brooms" or deformed twigs. This often greatly reduces fruit production. Native ladybug beetles, however, have been noted to control this aphid.

In high-quality natural communities that are fire-adapted, spring prescribed burning will kill seedlings and the tops of mature plants. Bush honeysuckles readily resprout, and repeated fires are necessary for adequate control. It may be necessary to burn annually or biennially for five years or more for effective control.

Seedlings may be hand pulled when soils are moist. All of the root should be removed or resprouting will occur. Physical removal by hand pulling smaller plants or grubbing out large plants should not be used in sensitive habitats. Open soil and remaining root stocks will result in rapid reinvasion or resprouting of honeysuckles and other exotics.

Bush honeysuckle stems can be cut at the base with brushcutters, chainsaws, or hand tools. To prevent resprouting, a 20% solution of glyphosate (available under the trade names Roundup and Rodeo) should be applied to the cut stump, either by spraying the stump with a low-pressure hand-held sprayer or by wiping the herbicide on the stump with a sponge applicator. While the Roundup and Rodeo labels recommend a 50–100% concentration of herbicide for stump treatment, a 20% concentration of Roundup has proven effective. It is not known if this lesser concentration is effective for Rodeo also. Rodeo can be used in wetlands and over open water, but Roundup is only labeled for use in nonwetlands. Herbicide should be applied to the cut stump immediately after cutting for best results. Application in late summer, early fall, or the dormant season has proven effective. Some resprouting may occur, making a follow-up treatment necessary. The wood of bush honeysuckles is very tough and easily dulls power-tool blades.

Methods given above for high-quality natural communities are also effective and preferred on buffer and disturbed sites. However, when a disturbed area with bush honeysuckles lacks sufficient fuel to carry a fire, herbicides may be necessary to obtain control. In dry upland areas, a foliar spray of 1% Roundup (glyphosate) will control seedlings. A 1.5% foliar spray of Roundup just after blooming in June will control mature shrubs. Application should occur from late June to just prior to leaf color changes in fall. The herbicide should be applied while backing away from treated areas so as not to walk through the wet herbicide.

In moist areas, a foliar spray of 1% Rodeo (glyphosate) with Ortho-X27 spreader will control seedlings. Application should occur from late June to just prior to changes in leaf color in the fall. Foliar application of a 1.5% solution of Rodeo (2 oz Rodeo/gal clean water) will kill mature plants if all foliage is sprayed. This control method usually requires less labor but more herbicide than mechanical control.

Krenite also controls bush honeysuckle when applied according to label instructions. The herbicide Garlon, however, does not control bush honeysuckles.

Treated areas should be checked in following years for reinvasion. Glyphosate is a nonselective herbicide and care should be taken to avoid contacting nontarget plants with herbicide. Do not spray so heavily that herbicide drips off the target species. By law, herbicides may be applied on public properties only according to label instructions and by licensed herbicide applicators or operators.

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VEGETATION MANAGEMENT GUIDELINE: Johnson grass (*Sorghum halepense* [L.] Pers.)

Max Hutchison
Natural Land Institute
R.R. 1
Belknap, Illinois 62908

current address:
The Nature Conservancy
R.R. 1, Box 53E
Ullin, Illinois 62992
(618) 634-2524

Johnson grass invades riverbank communities and disturbed sites, particularly fallow fields and forest edges, where it crowds out native species and slows succession. It quickly dominates the herbaceous flora and reduces plant diversity.

Johnson grass is a very aggressive, perennial grass. It occurs in dense clumps that spread by seed and rhizomes to form nearly pure stands. The grass emerges late in spring and forms seed by late July, reaching a height of 2.4 m or more. Stems and leaves die back after the first frost, but the dead litter often covers the ground all winter. Rhizome cuttings commonly form new plants, making it very difficult to eradicate. It spreads rapidly and is not affected by many of the agricultural herbicides.

In areas with light infestations of Johnson grass, clumps and individual plants may be hand pulled during June, just after a rain when the ground is soft. All plant parts should be removed from the area. Broken stems and roots left in the ground should be dug up if only a small area is involved. It is more effective to spot-treat the individual plants with herbicide than to pull them, and large clumps can be sprayed with 2% Roundup (a formulation of glyphosate) using a hand sprayer or backpack sprayer. Herbicide treatment may need to be repeated for several years to ensure good control.

To control Johnson grass in heavily infested areas, seed panicles should be cut and removed from the area where practical. Dense patches can be controlled by spraying the foliage with 2% Roundup during