Purple loosestrife (*Lythrum salicaria* L.) occurs widely in wet habitats, such as marshes, bogs, pannes, fens, sedge meadows, wet prairies, roadside ditches, river banks, and at the edge of reservoirs. This species quickly crowds out most native wetland vegetation, creating a monoculture that provides little food or shelter for native wildlife. The natural character of many preserves throughout the Northeast is threatened by this exotic species.

The reproductive capacity of purple loosestrife is one of the most significant and relevant life history characteristics of this herbaceous perennial plant. A single stalk can produce 300,000 seeds, and densities as high as 80,000 stalks/acre have been recorded, resulting in the potential for production of as many as 24 billion seeds/acre. The seeds can remain viable even after 20 months of submergence in water. Seed set begins in mid- to late-July and continues through late summer. Seeds may be dispersed by water, wind, and in mud attached to animals. Purple loosestrife also spreads vegetatively; root or stem segments can form new flowering stems. Muskrat cuttings and mechanical clipping can contribute to rapid spread by floating in riverine and lacustrine systems. Purple loosestrife lacks natural enemies in the United States.

Research is currently being conducted on methods of biological control, and the U.S. Fish and Wildlife Service has begun a search for biological control agents that might be used against this species (see articles by Thompson, and Hight and Drea, this issue). Only mechanical and chemical control methods are currently available, and these have had limited success. The chances of success are best with the smallest infestations, and methods of control are determined by the size of the infestation. Early diagnosis is critical. Areas with suitable habitat should be searched annually. Decisions on control methods must be balanced against the chances of success and the potential damage caused by the treatment method.

In areas with individual plants and clusters of up to 100 plants, younger plants (one to two years old) can be hand-pulled. Do not

VEGETATION MANAGEMENT GUIDELINE: PURPLE LOOSESTRIFE (*Lythrum salicaria* L.)

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pull after flowering because this will scatter seed. Older plants, especially those in bogs or in deep organic soils, can be dug out. Roots of older plants can be "teased" loose with a hand cultivator. Bag the plant and remove from the site. Failure to bag removed plants could result in spreading the plant along the exit route when fragments are dropped. Dispose of the plant by burning. Follow-up treatments are recommended for three years after plants are removed. If seeds were present, clothing, equipment, and personnel should be cleaned.

If the above control method is not feasible in areas with relatively small infestations, spot application of glyphosate herbicide can be used as described below.

In areas with clusters in excess of 100 plants (up to 1.6 ha in size), spot application of a glyphosate herbicide to individual purple loosestrife plants is the recommended treatment where hand-pulling is not feasible. Glyphosate is available under the trade names Roundup and Rodeo, products manufactured by Monsanto. Only Rodeo is registered for use over open water. Herbicides only may be applied according to label directions and by licensed herbicide applicators or operators when working on public properties. Glyphosate is nonselective so care should be taken not to let it come in contact with nontarget species. Glyphosate application is most effective when plants have just begun flowering. Timing is crucial, because seed set can occur if plants are in mid- to late flower. Where feasible, the flower heads should be cut, bagged, and removed from the site before application to prevent seed set. Roundup should be applied by hand-sprayer as a 1.5% solution (2 oz. Roundup/gallon of clean water). Rodeo should also be applied as a 1.5% solution (2 oz. Rodeo/gallon clean water) with the addition of a wetting agent, as specified on the Rodeo label.

Another option is to apply glyphosate twice during the growing season. Foliage should be sprayed as described above when flowering has just started and a second time two to three weeks later. This procedure is more likely to succeed because plants are not allowed to set seed, and those missed because they were not flowering the first time are treated the second time.

Excessive application of herbicide (causing dripping from the plant) can kill desirable plants under the loosestrife. These plants, left unharmed, will be important in recolonizing the site after the loosestrife has been controlled. If the desirable plants are killed, purple loosestrife seeds present in the soil will germinate and quickly fill the "void." Since purple loosestrife is usually taller than the surrounding vegetation, application to the tops of plants alone can be very effective and limit exposure of nontarget species. Complete coverage is not required to effect control.

Herbicide should be applied while backing away from treated areas to avoid walking through the wet herbicide. Equipment, clothing, and personnel should be cleaned completely before entering other uninfested sensitive areas, if seeds were present in the treated area. It will be necessary to treat the same area again annually until missed plants and plants originating from the seed bank are eliminated.

Cutting purple loosestrife and subsequently flooding the area so that cut plant stalks are completely immersed has controlled purple loosestrife. However, flooding may encourage the spread of purple loosestrife seed present in the soil. Artificial flooding should not be used in high-quality natural communities with an intact natural flooding regime.

In areas with large monocultures (greater than 1.6 ha in size), an assessment should be made to determine if the loosestrife can be eradicated with available resources. If it cannot be controlled, then efforts should be focused on keeping the loosestrife out of the highest quality areas. Applying glyphosate from a vehicle-mounted sprayer is usually necessary in areas with extensive stands of purple loosestrife. The most effective control can be achieved by beginning treatment at the periphery of large patches and working toward the center in successive years. This allows peripheral native vegetation to reinvade the treated area as the loosestrife is eliminated.

Mowing, burning, and flooding have proven largely ineffective. A single known exception is cutting followed by flooding as described above. Mowing and flooding can further spread the species by disseminating seed and cut plant stems. Do not mow; cut parts may root. Biological control methods that are feasible in natural areas are being developed (see articles by Thompson, and Hight and Drea, this issue).

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