Landscape Prioritization and Treatment of Invasive Plants

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Landscape-level Management

Managing infestations of invasive plants requires diligence and effective planning, as well as an understanding of the plants-both where they currently occur and how they are spreading across a landscape. Each invasive plant species recognized by the Bureau of Forestry has different modes of spread and preferred habitat, and as such, each infestation and situation can be unique and require an individualized treatment strategy. The Bureau of Forestry is committed to managing invasive plant species across all state forest lands, which requires adaptive management and landscape-level prioritization based on efficiency, availability of resources, and perceived threat to ecosystem health. At the landscape level, rarely is it as simple as adopting a strategy of eradicating all known invasive plant populations. There are many different methods available to land managers to prioritize invasive species management across their state forest district. Many of these methods require an understanding of the current levels of infestations across a given landscape. It is recommended that prior to developing a prioritization strategy, thorough invasive plant surveys are conducted and the data is compiled spatially. The goals of the Bureau of Forestry's invasive plant management program are to: 1) control and eradicate novel and high threat invasive plant species populations, and 2) limit the spread of additional invasive species that threaten forest and wetland ecosystems or forest management activities.

The Bureau of Forestry is committed to a standard approach when coordinating invasive plant species surveys and treatments with operators and lessees. While managing invasive plants requires varying strategies across different landscapes, the basics of the decision-making process are similar in all forest districts. These strategies aid land managers in effectively eradicating novel invasive plant species and populations and containing the spread of existing invasive plant populations in each state forest district.

Most landscape level strategies used by the Bureau for establishing invasive plant treatment priorities consider (but are not limited to) the following factors:

1. **Threats to forest ecosystems –** As forest managers, the Bureau's primary role is to promote the health of forest ecosystems and native plant species. Some invasive species pose a greater threat than others to forest health by easily out-competing native herbaceous plant species for nutrients and growing space, as well as inhibiting desired tree regeneration in forest stands. Threats to state-listed species populations or Wild Plant Sanctuaries are also considered.
2. **Density and scale of infestation –** Small or newly established populations of any invasive are easier to treat than dense, large-scale infestations. Treating these small populations provides a higher probability of success and limits the spread of species across a landscape, confining species to "core" areas of infestation.
3. **Novelty of species on the landscape –** Species that are new to a particular landscape are often given a higher priority than established invasive species. As with small populations, the probability of eradicating a particular species on a given landscape is higher with novel, populations. This is often accomplished on state forest lands using Early Detection and Rapid Response strategies.
4. **Areas targeted for forest management –** Forest managers treat well-established invasives in areas that are targeted for forest management activities such as timber harvesting and habitat restoration or

recreational activities like trails and parking lots. This helps control the spread of established populations into newly disturbed areas or areas with high visitation by the public.

5. Resources available for treatment – After ecological and management decisions are made using the points described above, forest managers consider the amount of time, manpower, and funds that are available for invasive species management and allocate their resources accordingly.

Treatment Strategy

The same decision-making process is used when considering how best to treat species found during a post-construction invasive plant report submitted by a lessee or agreement holder. After review of post-construction invasive species monitoring reports and internal discussions concerning prioritization based on the five factors listed above, populations that are selected by the Bureau for treatment by the lessee or agreement holder often can be categorized in one of three ways: (1) high priority species that are new or novel to a particular region or species that the Bureau of Forestry recognizes as posing the highest threat to all native species and ecosystems (i.e, Japanese angelica tree, Common reed), (2) additional invasive species that are known to specifically threaten forest or wetland ecosystems (i.e. Japanese barberry, honeysuckle species), and (3) species or populations that threaten existing or proposed forest management activities in the immediate vicinity of the occurrence.

Highest-threat Invasive Species

The Bureau of Forestry has established the following eleven invasive plant species listed below as the highest priority targets for immediate treatment and control. These were chosen due to their ability to severely threaten all ecosystems in Pennsylvania and because they are currently found in mostly low levels in northern Pennsylvania, raising the probability of successful control and eradication. **When found, these species are to be subject to required treatment regardless of size of the population.** Please note that this list may change as new invasive species are discovered in Pennsylvania. These species are also subject to the Bureau's Early Detection and Rapid Response Protocols, ensuring timely and aggressive treatment of any new populations identified during monitoring activities. As of 2017, the highest threat species are:

Tree-of-heaven (*Ailanthus alitissima*)
Japanese angelica tree (*Aralia elata*)
Poison hemlock (*Conium maculatum*)
Glossy buckthorn (*Frangula alnus*)
Goatsrue (*Galega officinalis*)
Mile-a-minute (*Persicaria perfoliata*)
Common reed (*Phragmites australis* ssp. *australis*)
Japanese & Giant knotweed (*Polygonum cuspidatum* & *P. sachalinensis)*
Black swallow-wort (*Cynanchum louiseae*)
Pale swallow-wort (*Cynanchum rossicum*)
Wavyleaf basketgrass (*Oplismenus hirtellus spp. undulatifolius*)

**And any other invasive plants classified as PA Noxious Weeds by the PA Department of Agriculture

Species Threatening Forest and Wetland Ecosystems

While the Bureau of Forestry does maintain a list of the invasive plant species with the highest priority for treatment and eradication, they are not the only invasive plant species that threaten forest or wetland

ecosystems. Additional invasive plant species, such as multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), Japanese barberry *(Berberis thunbergii)*, garlic mustard (*Allaria petiolata*), and reed canary grass (*Phalaris arundicatum*) can easily out-compete native herbaceous plant species for nutrients and growing space, as well as inhibit desired tree regeneration in forest stands. Many known invasive plant species fit into this category and are actively managed by foresters across the state forest districts. When found in small populations, many of these species can be easily eradicated.

Species Threatening Forest Management Activities

Well-established invasive plants in areas that are targeted for forest management activities such as timber harvesting or habitat improvement are often priorities for treatment. This limits opportunities for existing invasive species populations to encroach upon newly altered or enhanced forest habitat. Similarly, areas with high visitation by the public, such as trails or parking lots, are also priority treatment areas regardless of species. This limits the chance of high forest use to be an effective vector for the spread of established invasive plant species. Each state forest district also has unique ecological features including wetlands, spring seeps, or old growth forests that are given high priority for protection on the landscape planning level regardless of the invasive plant species that threaten these areas.