

Invasive Plants and Best Practices for Forest Management

Michigan Society of American Foresters
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Outline

- Overview of potential impacts
- Highest risk species
 - Identification
 - impacts
 - Control options
- Best practices for forest management
 - Prevention
 - Detection/ Identification
 - Control
 - Considerations During Mgt Activities
 - Restoration
 - Monitoring
- Information sources



What makes a plant invasive?

- Excellent reproductive capacity
 - By seed
 - By vegetative means (rhizomes, fragments...)
- Rapid growth rates
- Ability to disperse rapidly and over long distances
 - Vectors include wind, water, animals, vehicles...
- Favorable conditions:
 - Climate, soils similar to home range
 - Lack of natural enemies/herbivores



Why do we care?

- Forest pests and pathogens typically impact mature trees and can immediately effect forest health and wood production
- Invasive forest plants primarily impact regeneration, soils, and future health and productivity of the forest



Economic Impacts

- Loss of commercial revenue (agriculture, forestry)
- Cost of control
- Other negative impacts (hunting, fishing, bird watching)
- Estimated annual cost to USA of **over \$100 Billion** for all invasive species (Pimental et al. 2004)
- Cost of invasive plants estimated at **over \$35 Billion** (Pimental 1999)



Ecological Impacts:

- Can significantly impact tree regeneration
 - Many invasive plants will not immediately impact mature trees, but future regen and tree production can be greatly effected
- Some invasive plants can injure or kill mature trees
- Alter species composition
- Directly outcompetes native plants
- Creates thick thatch that inhibits germination and establishment of native plants
- Provides very little habitat value for native wildlife
- Can increase or decrease flammability (ex. cheatgrass, woody shrubs)
- Change in successional pathways

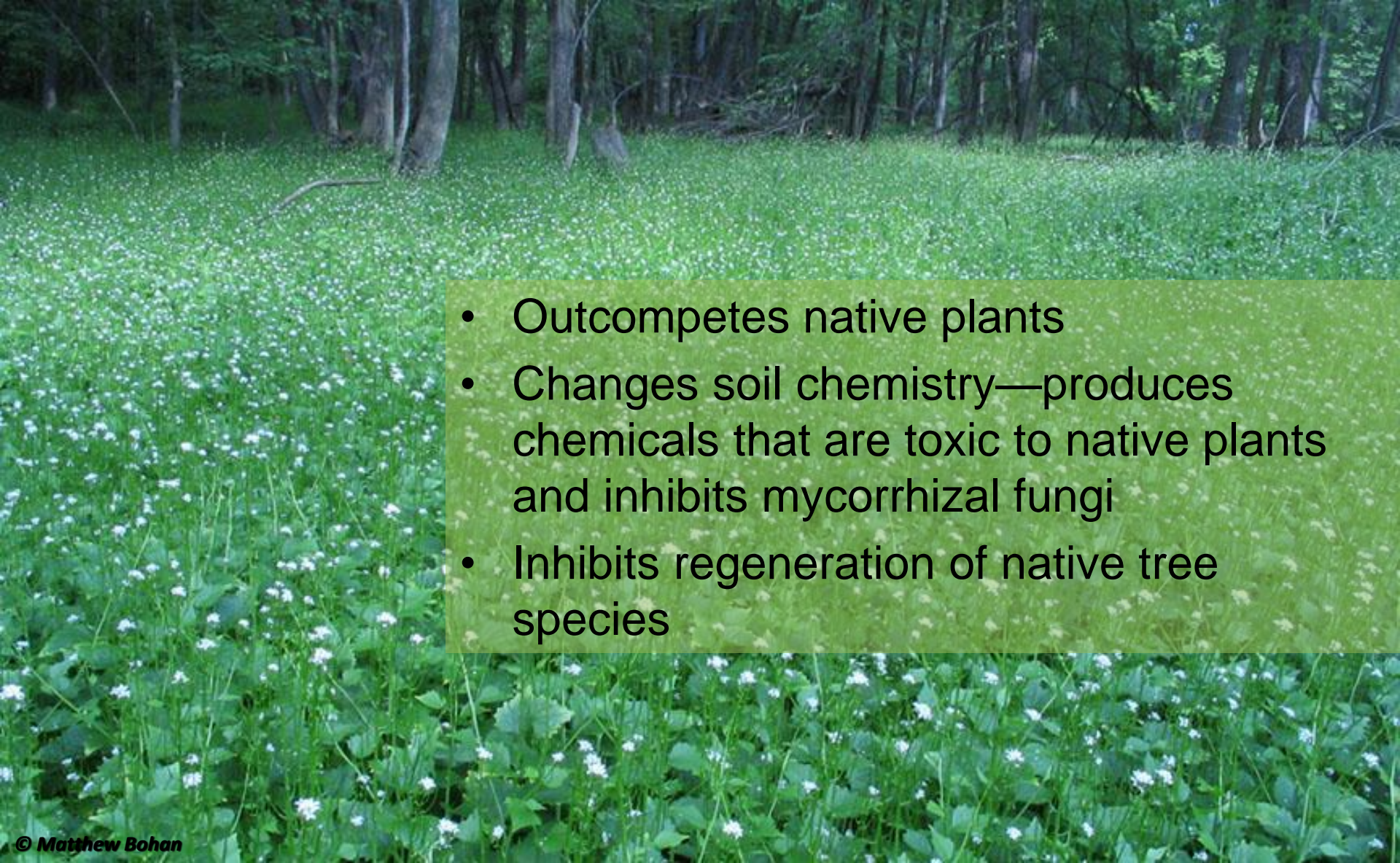
The background of the slide is a close-up photograph of Garlic Mustard plants. The leaves are large, green, and have a distinctively toothed or serrated edge. In the center, there is a cluster of small, green, rounded flower buds. The overall appearance is lush and green.

Garlic Mustard (*Alliaria petiolata*)

- Herbaceous biennial, 2-3 ft tall
- Triangular, toothed leaves
- Crushed leaves smell like garlic
- Produces 1000's of seeds per square meter

**Very well adapted to northeast,
midwest**

Ecological Effects

- 
- Outcompetes native plants
 - Changes soil chemistry—produces chemicals that are toxic to native plants and inhibits mycorrhizal fungi
 - Inhibits regeneration of native tree species

Control Methods

- Seeds can be viable up to 7+ yrs- control programs must be long term for established infestations.
- Must prevent seed production for total control
- Hand pull small patches- March to May
 - Bag and burn plants
- Fire- repeated fire (Rx or spot burning)



Control Methods

- Chemical- use in dense patches
 - Roundup (glyphosate) 1.5-2% Will kill any actively growing plants (grasses and broadleaf)
 - Garlon 3a- will kill any actively growing broadleaf plants
 - Ideally use when native plants are dormant- Dec-March
 - use caution in areas with abundant native vegetation
 - Avoid spraying after flowers are present

Black swallow-wort (*Vincetoxicum nigrum*)

- Perennial vine
- Opposite leaves
- 5 petaled, star shaped flowers
- Produces abundant, wind-dispersed seeds



Ecological Effects

- Climbs over trees and plants, forms very dense patches
- Inhibits germination and regeneration



Black swallow-wort

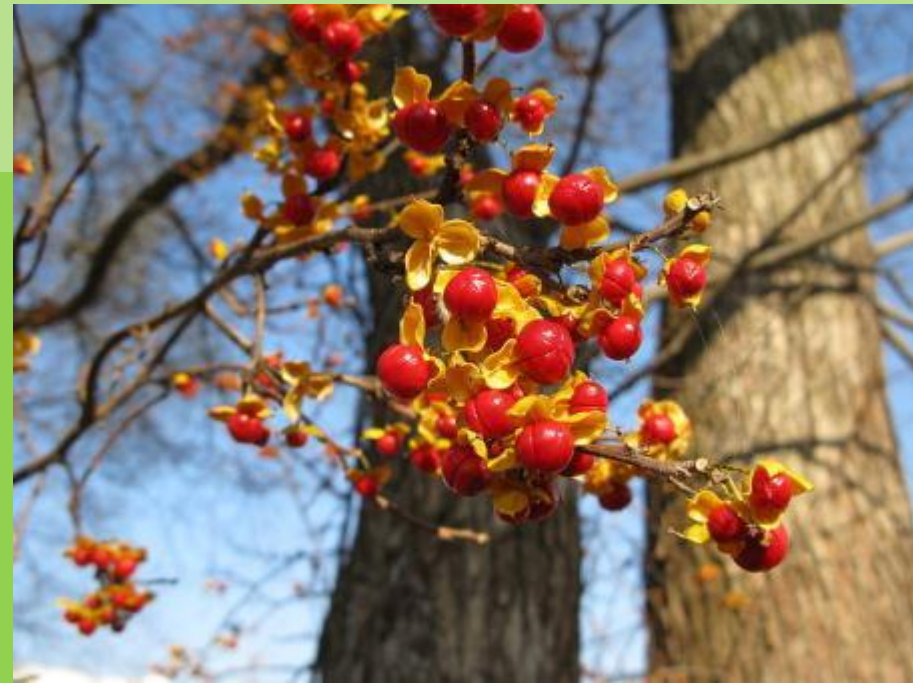
Control Methods

- Very difficult to pull-roots break very easily and can propagate
- Chemical- Roundup or Garlon
 - Foliar spray before seed pods form
 - If pods are forming, plants can be cut or mowed. Foliar spray once plants resprout

Oriental Bittersweet

(*Celastrus orbiculatus*)

- Perennial, woody vine
- ID- fruit clusters where leaves attach (native- fruit at end of vine)
- Alternate leaves
- Stems up to 4" diameter



Oriental Bittersweet

Ecological Effects:

- Climbing vine, strangles and smothers trees
- Can weigh down crowns resulting in poor growth form and breakage
- Outcompetes native trees and vegetation



Nancy Loewenstein, Auburn University, Bugwood.org

Oriental Bittersweet Control Methods

- Small infestations can be hand pulled
- Chemical
 - cut, stump treat with Roundup-(3:1 mix, Sept-March).
 - Basal bark treatment with Garlon 4
 - Foliar spray- spray small plants with 2% mix Garlon
 - Cut, let resprout, foliar spray with Garlon



Common and Glossy Buckthorn



- Full sun to full shade
- Leaves mostly alternate
- Can reach 10-25ft tall
- Produces abundant fruit, bird dispersed



Autumn Olive

(Eleagnus umbellata)



- Produces abundant, bird-dispersed fruit
- Silver under leaves

Photos © John M. Randall/The Nat

Asian Shrub Honeysuckles (*Lonicera* spp.)



- Full sun to full shade
- Hollow branches
- Leaves opposite
- Produces abundant bird-dispersed fruit

Privet

(*Ligustrum vulgare*)

- Full sun to partial shade
- Leaves opposite
- Blue-ish berries

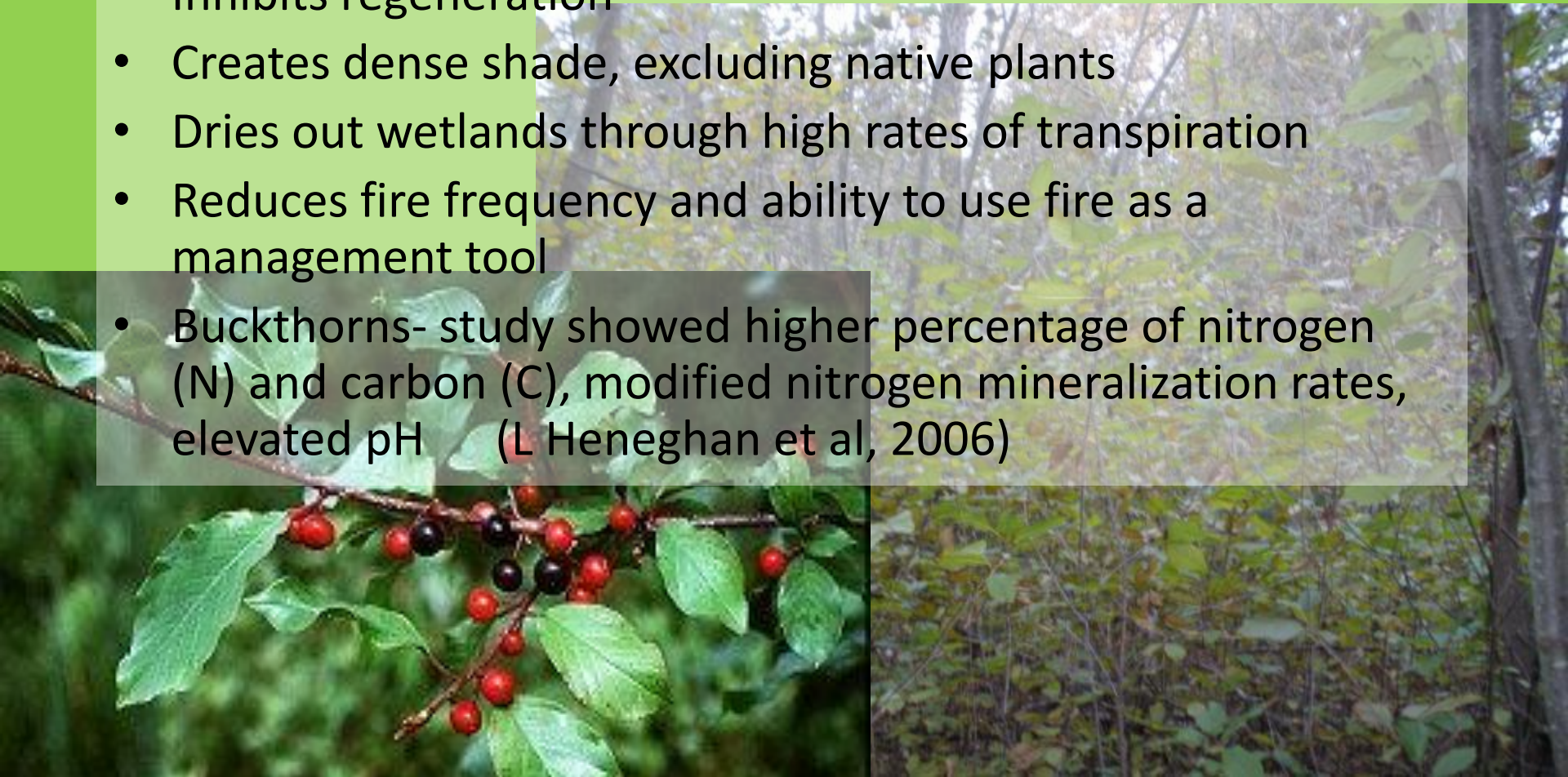


Photo: Steven J. Baskauf, Bioimages



Ecological Effects

- Leaves emerge early and hang on late
- Seedlings, saplings and mid-canopy trees can be replaced or restricted from establishing
- Inhibits regeneration
- Creates dense shade, excluding native plants
- Dries out wetlands through high rates of transpiration
- Reduces fire frequency and ability to use fire as a management tool
- Buckthorns- study showed higher percentage of nitrogen (N) and carbon (C), modified nitrogen mineralization rates, elevated pH (L Heneghan et al, 2006)



Control of Woody Shrubs

- Large shrubs/trees- cut, stump treat with Garlon or Roundup-(3:1 mix, Sept-March)
- Dense infestations can be mechanically treated, re-sprouts sprayed the following growing season
- Must follow up on seedlings
 - Seedlings susceptible to fire



Control of Woody Shrubs

- Small seedlings can be hand pulled
- Must follow up on seedlings
 - Seedlings susceptible to fire (Rx or spot burn)



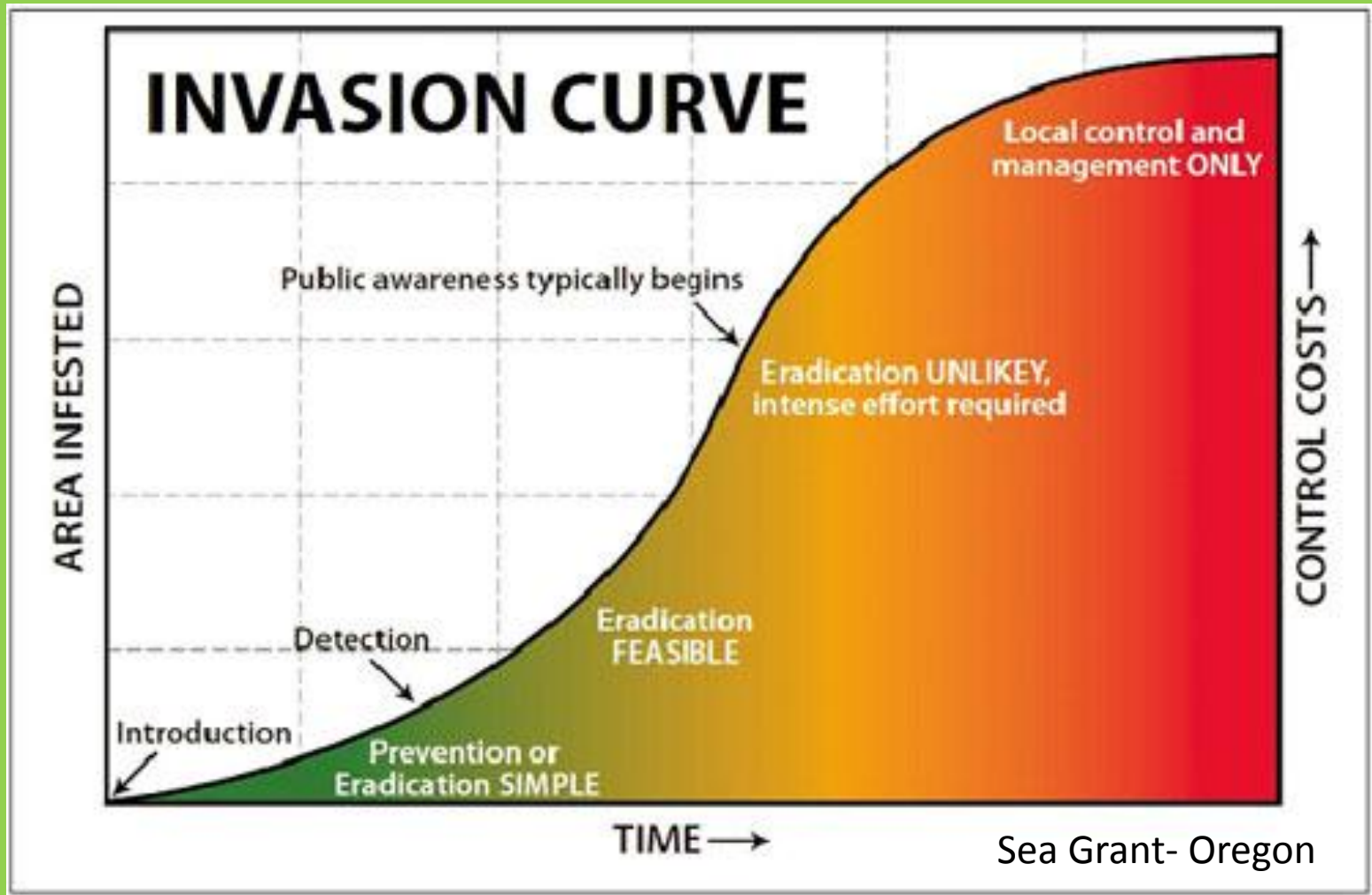
Invasive Plants- Best Practices for Forest Management



- Prevention
- Detection/ Identification
- Control
- Considerations During Mgt Activities
- Restoration
- Monitoring

Prevention

Most effective strategy is prevention



Prevention:

- Scout for and identify potential invasive species prior to developing forest management prescriptions (during inventory, monitoring, etc.)
- Powerwash equipment prior to moving to a new site, especially if equipment was operating around known invasives
- Site disturbance, equipment, fill material, etc. increase likelihood of introduction
- Post harvest monitoring to detect any new invasives that might have been introduced during harvest operations

Detection/ Identification

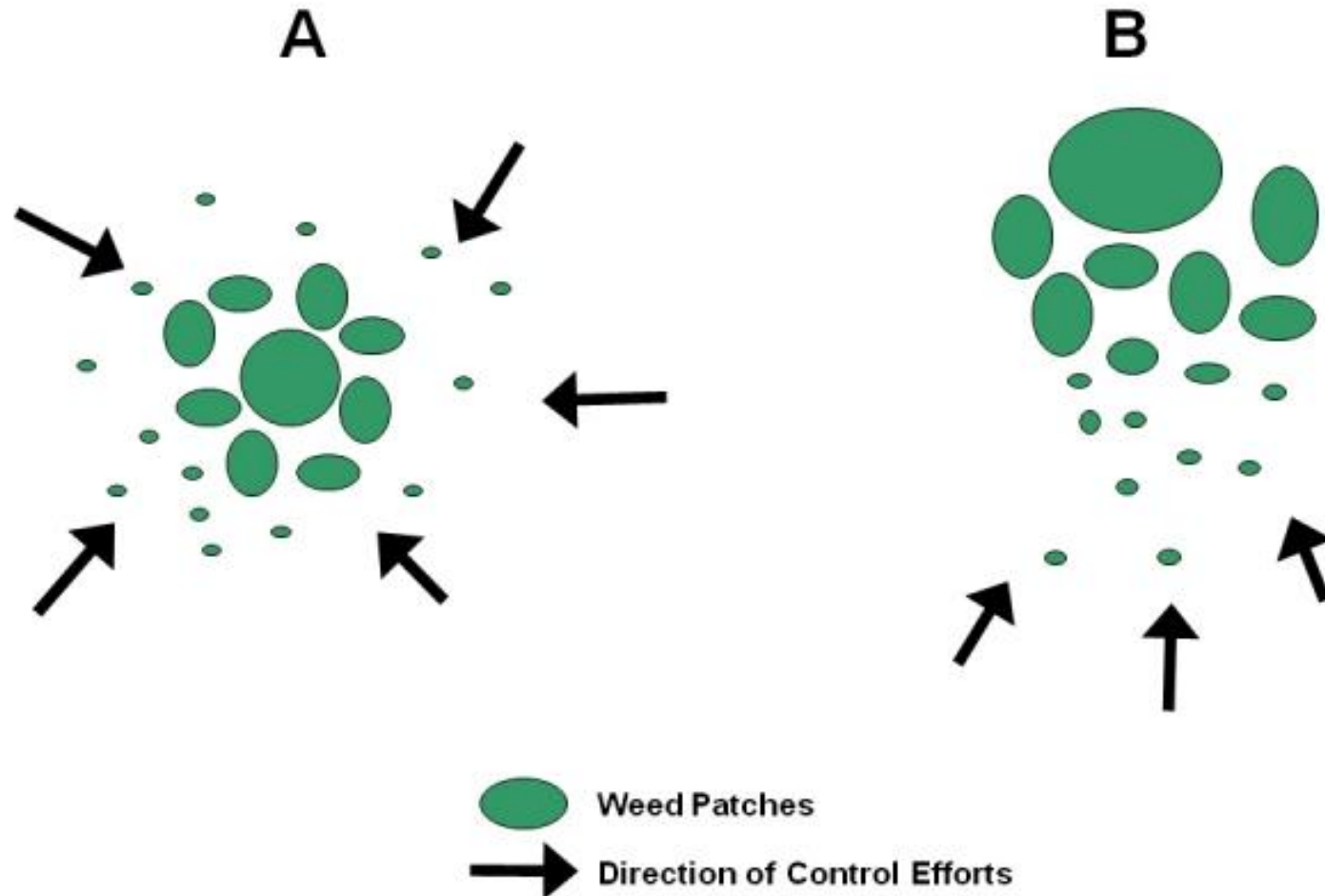
- Be familiar with identification of high risk species
- Watch for new infestations while in the field
- Watch for monocultures
- Focus on disturbed areas (rd sides, skid trails, landings, ORV/ horse trails, around campgrounds, etc.)
- Dump sites- yard waste, etc.



Control

- Must prioritize- pick your battles
 - What species pose the highest risk based on region, forest type, management activities and objectives?
- If high risk species is found:
 - Assess overall risk of invasion and potential impact to forest resources
 - Assess need and feasibility of control

-High priority should be given to small outlying populations . Work back to large established infestations.





Control

- If control is warranted:
 - Should control activities be implemented before or after other management activities (harvest, planting, scarification, firebreak prep, etc.)?
 - If control should be implemented, should other mgt activities be postponed until control is complete?
 - Choose most effective control method with lowest risk for collateral damage
 - Plan for follow up



Considerations During Management Activities

- If it is not feasible to control before conducting other mgt.:
 - How will invasive respond to the silvicultural treatment (open canopy, scarification, roller chopping, Rx Burn, etc.)?
 - Can infested area be excluded from the management activity?
 - If not, enter infested area last to reduce risk of spreading seed throughout stand.



Considerations During Management Activities

- To minimize transporting seed, harvest during adequate snow cover.
- Minimize soil disturbance as much as possible.
- Locate landings, skid trails, haul rds, etc. to avoid activity near infestations.
- Clean soil and vegetation from equipment before leaving the site.
- Powerwash equipment before entering a new stand.



Considerations During Management Activities

- Avoid using fill material from infested sites
- Allow temporary rds to revegetate as soon as possible
- Include best practices in bid process and contracts



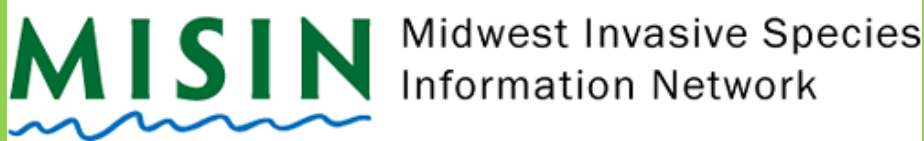
Restoration

- Encourage re-establishment of native veg as rapidly as possible
- If planting trees, consider controlling existing invasives to reduce competition with desirable trees
- Allow disturbed areas to revegetate with native vegetation
- If seeding is necessary use native seed or short lived cover crops

Monitoring

- Monitor sites post harvest to detect new infestations and assess response of existing infestations
- Focus on high risk areas:
 - Highly disturbed areas
 - Rds, skid trails, landings, etc.
 - Areas adjacent to known infestations

Sources for Additional Information



<http://www.misin.msu.edu/>



Michigan Invasive Plant Council:
<http://invasiveplantsmi.org>



USDA PLANTS database: <http://plants.usda.gov/>



Midwest Invasive Plant Network:
<http://mipn.org/>

Center for Invasive Species and
Ecosystem Health
<http://www.invasive.org/>



Fire Effects Information System
<http://www.fs.fed.us/database/feis/>

Questions???

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