

August 3, 2005

Assessment of Norway Maple (*Acer platanoides*) in Indiana's Natural Areas

May 25, 2007 assessment meeting – Hilary Cox, Kate Howe, Ellen Jacquart

Answers are underlined; *comments in italics*

Contents of the Assessment:

Section I – Invasion Status. Pages 1 - 2. Determines whether the species being evaluated is invasive in Indiana.

Section II – Ecological Impacts of Invasion. Pages 2 - 3. Evaluates the significance of impacts of the species.

Section III – Potential for Expansion. Pages 3 - 4. Evaluates the actual and/or potential expansion of the species.

Section IV – Difficulty of Management. Pages 4 - 5. Evaluates how hard it is to control the invasive species.

Section V – Commercial Value. Page 5. Evaluates how valuable the species is economically in Indiana.

Questions in Sections I – V may direct you to one or more of the following sections for particular invasive species:

Section A. Page 7. For species which have impacts limited to a few sites, assesses the potential for further spread.

Section B. Page 7. For species which have medium impacts but high value, assesses whether species could be used in specific circumstances that would prevent escape and invasion.

A worksheet for use with the assessment is found on page 7.

Automatic Exemption From the Assessment

Is this species listed on any federal or on an Indiana state noxious, or prohibited plant lists?

If **YES** then do not proceed with assessment but indicate a conclusion of

Do not use this plant on the front of the response form.

If **NO** then go to Section I.

Section I

Invasion Status

1-a Current Invasion in Indiana

1. Does this species occur in any natural areas in Indiana?

If **NO** then go to Section III-c (page 4).

If **YES** then go to 1-a 2.

2. Does it **ONLY** occur in natural areas of Indiana because it has persisted from its previous cultivation (e.g., in abandoned farmland or homesteads)?

If **YES** then go to Section III-c (page 4).

If **NO** then go to Section 1-b (below).

1-b Invasion Status in Indiana

Evidence of invasion (forming self-sustaining and expanding populations within a plant community with which it had not previously been associated) must be provided. If not available in a published, quantitative form, this evidence must include written observations from at least three appropriate biologists.

1. Is species invasive **ONLY** when natural disturbance regime and scale have been altered? (e.g. where frequency, extent, or severity of fires have been reduced by human activity).

If **YES** then go to questions 1-b 2.

If **NO** – the species is invasive, go to Section II (below).

2. Has this species ever been known to persist, following colonization, when the natural regime is

II-b Range of Habitats in Which Species is Invasive

- Forest: 1)Dry upland, 2)Dry-mesic upland, 3)Mesic upland, 4)Mesic floodplain, **5)Wet-mesic floodplain, 6)Wet floodplain**, 7)Bluegrass till plain flatwoods*, 8)Boreal flatwoods*, 9)Central till plain flatwoods, 10)Dry flatwoods*, 11)Sand flatwoods*, 12)Southwestern lowland mesic flatwoods*
- Savanna: 13)Mesic savanna*, 14)Dry sand savanna*, 15)Dry-mesic sand savanna*
- Barrens: 16)Limestone bedrock*, 17)Sandstone bedrock*, 18)Siltstone bedrock*, 19)Chert*, 20)Gravel*, 21)Sand*, 22) Clay*
- Prairie: 23)Dry-mesic prairie*, 24)Mesic prairie*, **25)Wet prairie***, 26)Dry sand prairie*, 27)Dry-mesic sand prairie*, 28)Wet-mesic sand prairie*, **29)Wet sand prairie***
- Wetland: **30)Marl beach***, **31)Acid bog***, **32)Circumneutral bog***, **33)Fen***, **34)Forested fen***, **35)Muck and Sand flats***, **36)Marsh**, **37)Sedge meadow***, **38)Panne***, **39)Acid seep***, **40)Calcareous seep***, **41)Circumneutral seep***, **42)Forest swamp**, **43)Shrub swamp**
- Lake: **44)Lake**, **45)Pond**
- Stream: **46)Low-gradient creek**, **47)Medium-gradient creek**, **48)High-gradient creek**, **49)Low-gradient river**, **50)Medium-gradient river**, **51)Major river**
- Primary: **52)Aquatic cave***, 53)Terrestrial cave*, 54)Eroding cliff*, 55)Limestone cliff*, 56)Overhang cliff*, 57)Sandstone cliff*, 58)Lake dune*, 59)Gravel wash*

Is this species known to be invasive in at least four habitat-types (note – rare habitat-types are marked with a * and count as 2 when adding) OR does it occur in at least one habitat-type of each of the terrestrial and palustrine/aquatic lists (palustrine/aquatic habitats are shown in **bold**)

If YES then multiply total score from II-a by 1.5
then go to Section II-c (Below)

If NO then multiply total score from II-a by 1
then go to Section II-c (Below) (3 habitat-types impacted)

Place point total in worksheet, page 7.

II-c Proportion of Invaded Sites with Significant Impacts

Of the invaded sites, might any of the worst impacts [items i-v in section II-a] only occur under a few, identifiable, environmental conditions (i.e., edaphic or other biological conditions occurring in 1-10% of the sites)?

Documentation of evidence must be provided for a **YES** answer.

If NO or NO SCORE on items i to v in section II-a
then go to Section III

If **YES** then go to Section A (page 7)

Section III**Potential for Expansion.****Potential Index**

This section evaluates a species' actual and/or potential for expansion in Indiana.

III-a Potential for Becoming Invasive in Indiana

1. Is information available on the occurrence of new populations of this species in Indiana over the last 5 years?

If **YES** then go to section III-b

If NO go to Section III-c to estimate potential for expansion based on the biology of the species.

III-b. Known Rate of Invasion.

1. Was this species reported in more than two new discrete sites (e.g., lakes, parks, fragments of habitats at least 5 miles apart) in any 12 month period within the last 5 years?

If **NO** then P = Low; then go to Section IV

If **YES** then P = High; then go to Section IV

III-c. Estimated Rate of Invasion. This section is used to predict the risk of invasion for species that are 1) not currently invasive in the state, and 2) invasive in the state but for which no data on current rate of spread exists. These questions are based on Hiebert et al. 1995.

1. Does this species hybridize with any State-listed plants or commercially-important species? (E.g., exhibit pollen / genetic invasion.)

If **YES** then go to Section B (page 7)

If NO then go to question III-c 2.

2. Add up all points from statements that are true for this species. Points

- | | | | |
|---|--|----------|----------|
| i. Ability to complete reproductive cycle in area of concern | | | |
| a. not observed to complete reproductive cycle | | 0 | |
| b. observed to complete reproductive cycle | | <u>5</u> | |
| ii. Mode of reproduction | | | |
| a. reproduces almost entirely by vegetative means | | 1 | |
| b. reproduces only by seeds | | | <u>3</u> |
| c. reproduces vegetatively and by seed | | 5 | |
| iii. Vegetative reproduction | | | |
| a. no vegetative reproduction | | <u>0</u> | |
| b. vegetative reproduction rate maintains population | | 1 | |
| c. vegetative reproduction rate results in moderate increase in population size | | 3 | |
| d. vegetative reproduction rate results in rapid increase in population size | | 5 | |
| iv. Frequency of sexual reproduction for mature plant | | | |
| a. almost never reproduces sexually in area | | 0 | |
| b. once every five or more years | | 1 | |
| c. every other year | | | 3 |
| d. one or more times a year | | | <u>5</u> |
| v. Number of seeds per plant | | | |
| a. few (0-10) | | 1 | |
| b. moderate (11-1,000) | | 3 | |
| c. many-seeded (> 1,000) | | <u>5</u> | |
| vi. Dispersal ability | | | |
| a. little potential for long-distance dispersal | | <u>0</u> | |
| b. great potential for long-distance dispersal | | 5 | |

Per Matlack 1987 (Amer. J. Bot. 74(8):1150-1160), mean lateral movement of Norway maple propagules in still air = .14 m. In a 10 km/hr breeze, = 50 m. For a wind-dispersed tree, this is a fairly large distance but still not what we would characterize as long-distance.

- vii. Germination requirements

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- a. requires open soil and disturbance to germinate 0
- b. can germinate in vegetated areas but in a narrow range or in special conditions 3
- c. can germinate in existing vegetation in a wide range of conditions 5

Reports and literature citations indicate it is able to establish in full shade with no soil disturbance.

viii. Competitive ability

- a. poor competitor for limiting factors 0
- b. moderately competitive for limiting factors 3
- c. highly competitive for limiting factors 5

Total points for questions i – viii (place in worksheet page 7): 28

Norway maple is significantly more shade tolerant than sugar maple, allowing it to out compete the native maple for light. It has also been suggested that Norway maple is allelopathic based on almost complete absence flora under it in the forest. Specifically, Epifagus appears unable to exist under Norway maple (Wyckoff and Webb J. of Torrey Botanical Club, 2007, pg 203). Also, it has been suggested herbivory is less on this species due to milky latex sap (same reference). This combines to give Norway maple a strong competitive advantage in forest understories.

Section IV

Difficulty of Management

Management Index

IV Factors That Increase the Difficulty of Management

Add up all points from statements that are true for this species then go to Section V (page 5). Assign 0.5 point for each statement for which a true/false response is not known.

- | | <u>Points</u> |
|--|---------------|
| i) Control techniques that would eliminate the worst-case effects (as listed in Section II) have been investigated but none has been found. | 15 |
| ii) This species is difficult to control without significant damage to native species because: it is widely dispersed throughout the sites (i.e., does not occur within discrete clumps nor monocultures); it is attached to native species (e.g., vine, epiphytes or parasite); or there is a native plant which is easily mistaken for this invader in: (choose one) | |
| ≥ 50% of discrete sites in which this species grows; | 10 |
| 25% to 50% of discrete sites in which this species grows. | <u>7</u> |
| <i>Individual stems are relatively easy to treat and mature stems are easily identifiable. However, it can be difficult to distinguish Norway maple from sugar maple at the seedling stage, requiring treatment of all small maples to eradicate the invader.</i> | |
| iii) Total contractual costs of known control method per acre in first year, including access, personnel, equipment, and materials (any needed re-vegetation is not included) > \$2,000/acre (estimated control costs are for acres with a 50% infestation) | <u>5</u> |
| <i>Control costs would vary greatly by the age of the Norway maples to be treated. The Indiana reports are of approx. 5-15 year old invasions and therefore estimates on control costs used this age invasion as an example. At that age, trees are 10-20 feet tall, and a 50% infestation of such trees would result in large amounts of downed wood to dispose of. This would greatly increase the cost/acre of treatment.</i> | |
| iv) Further site restoration is usually necessary following plant control to reverse ecosystem impacts and to restore the original habitat-type or to prevent immediate re-colonization of the invader. | 5 |
| <i>The reports we've gotten are primarily of scattered individuals in natural areas; no further site restoration is necessary after control in such cases. In denser infestations, further site restoration would probably be necessary due to lack of seed sources nearby.</i> | |
| v) The total area over which management would have to be conducted is: (choose one) | |

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- ≥ 100 acres; 5
- < 100 but > 50 acres. 2
- ≤ 50 but > 10 acres. 1
- ≤10 acres 1/2

Based on 7 infestation sites reported.

- vi) Following the first year of control of this species, it would be expected that individual sites would require re-survey or re-treatment, due to recruitment from persistent seeds, spores, or vegetative structures, or by dispersal from outside the site: (choose one)
 - at least once a year for the next 5 years; 10
 - one to 4 times over the next 5 years; 6
 - regrowth not known 2

- vii) Occurs in more than 20 discrete sites (e.g., water-basins, parks, fragments of habitats at least 5 miles apart). 3

Per Overlease et al 2002 it is reproducing outside of cultivation in 62 counties in Indiana.

- viii) The number of viable, independent propagules per mature plant (e.g., seeds, spores, fragments, tubers, etc. detached from parent) is > 200 per year AND one or more of the following:
 - A. the propagules can survive for more than 1 year;
 - B. the propagules have structures (fleshy coverings, barbs, plumes, or bladders) that indicate they may spread widely by birds, mammals, wind or water;
 - C. the infestations at 3 or more sites exhibit signs of long distance dispersal. Some possible indicators of long distance dispersal include: the infestation has outlier individuals distant [>50 yards] from the core population; the infestation apparently lacks sources of propagules within ¼ mile. 3

- ix) Age at first reproduction is within first 10% of likely life-span and/or less than 3 months. 2

We estimate Norway maples can reach 200 years old. Bertin et al 2005 (J. Torrey Bot. Soc. 132(2), pp. 225-235) found that 30-40 year old Norway maples in forests were still pre-reproductive. Therefore we don't believe they reproduce within the first 10% of likely life span.

Total points (place in worksheet page 8): 25

Section V	Commercial Value	Value Index
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V-a Commercial Value

Does this species have any commercial value?

If response is **NO** then V = 0 and Go to Conversion of Index Scores to Index Categories

If response is **YES** then go to Section V-b

V-b Factors that Indicate a Significant Commercial Value

Add up all points from statements that are true for this species. Assign 0.5 point for each statement for which a true/false response is not known.

Points

- i) This species is sold in national or regional retail stores (e.g., WalMart,

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Home Depot, Publix).	<u>10</u>
ii) State-wide there are more than 20 commercial growers of this species.	7
iii) More than five growers in Indiana rely on this species as more than 10% of their production.	3
iv) This species has provided a crop, turf, or feed source (e.g., forage, nectar) that has been, or resulted in, a significant source of income for at least five farmers for over 20 years.	3
v) This species is utilized statewide	<u>3</u>
vi) There are more than 100 retail seed outlets statewide	3
Total points (place in worksheet page 8):	13

Section A (from Section II-c)

A1 Can the habitats in which the worst-case ecological impacts occur (items i to v in Section II-a) be clearly defined as different from invaded sites where there are no such impacts (e.g., defined by edaphic or biological factors)? (If ecological impacts include negative effects on a State-listed species, then the specific habitats in which that State-listed species occurs must be clearly distinguishable from habitats in which it does not occur.)

If **NO** then return to Section III (page 4)

If **YES** then Go to question A2 and prepare such a site definition

A2 Can an estimate be made of the maximum distance that propagules (or pollen if hybridization is a concern) might reasonably be expected to disperse?

If **NO** then return to Section III (page 4)

If **YES** then prepare instructions for Specified and Limited Use based on maximum dispersal distance (e.g., may be acceptable for use in specific areas but not near habitats where impacts are high.) Reassess if the incidence of worst-case impacts increases above 10% or within 10 years, whichever is earlier. THEN resume the assessment at Section III to provide scores for the other indices.

Section B (from Section III-c or if Value = High and Impact = Medium)

B1 Are there specific circumstances in which this species could be used that would not be expected to result in escape and invasion? (E.g., foliage plants that are only used indoors and which can be reasonably prevented, by conspicuous labeling, from use or disposal in the landscape.)

If **NO**, then retain the previously derived Conclusion.

If **YES**, then Acceptable for Specified and Limited Use where regulations and educational programs for penalties and enforcement of misuse exist. Reassess this species every 2 years.

Worksheet for Assessment

Section I:

Follow directions to different sections.

Section II:

Impacts Point Total: 24 X (1 or 1.5) = 24 **Impacts**

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native species intercepts the light that would otherwise be available for other species in or below that stratum. Estimated cover may be dispersed or continuous in a site. Cover is usually measured when foliage is fully expanded. In the case of species that form a dense, continuous mat of rhizomes or stolons, the percent of the soil surface or upper level occupied by that root mat can be estimated as soil, rather than canopy, cover.

Disturbance. Mechanisms that limit biomass by causing its partial or total destruction.

Discrete sites. Disjunct habitat-types or fragments of habitats at least 1 mile apart that support invasive plant populations that likely arose by separate long-distance dispersal mechanisms.

Documentation of evidence. One publication including relevant, original research will suffice if data are specific to the taxon and zone(s) under evaluation. If such documentation is not available or needs to be up-dated, at least three individuals who have the expertise on the particular species and zone in question must be identified.

Federal- or Indiana -listed. Species that are listed by Federal laws or Indiana statutes or rules as threatened or endangered within the State of Indiana. This list with notes is available at <http://www.state.in.us/dnr/naturepr/endanger/plant.htm>

Formal Risk Benefit Analysis. Detailed economic studies of impact and management costs and commercial value for present and future infestations.

Invasive. A species that forms self-sustaining and expanding populations within a natural plant community with which it had not previously been associated (Vitousek *et al.* 1995).

Long-term alterations in ecosystem processes. Examples of ecosystem processes that could be altered: erosion and sedimentation rates; land elevation; water channels; water-holding capacity; water-table depth; surface flow patterns; rates of nutrient mineralization or immobilization; soil or water chemistry; and type, frequency, intensity, or duration of disturbance. For further explanation see Gordon (1998).

Native. Species within its natural range or natural zone of dispersal (i.e., within the range it could have, or would have, occupied without direct or indirect introduction and/or care by humans. Excludes species descended from domesticated ancestors) (Vitousek *et al.* 1995).

Natural areas. Natural areas: Areas with native plant communities supporting native plant and animal species, with long undisturbed soil systems, and hydrological regimes relatively intact or under restoration. Edges of historically or currently disturbed areas (roadsides, trails, adjacent to historically disturbed locations, etc.) should not be included in the assessment of invasion into natural areas. That invasion may have been facilitated by the edges, but has to have extended into the native communities for inclusion in this category.

Pollen or genetic invasion. When a native species is displaced by a non-native species through hybridization.

Stratum. A distinct layer in the architecture of vegetation (e.g., tree canopy or understory shrubs).

Summary of Norway maple (*Acer platanoides*) Reports and Comments

- 4 Survey Reports from natural areas in three counties (Elkhart, Porter, and St. Joseph Counties)
- 1-3 sites reported within each survey report for a total of 7 sites
- The table shows a summary of the number of sites of each size with each impact (1-7):

Size of Invasion Site (in acres)	Impact 1	Impact 2	Impact 3	Impact 4	Impact 5	Impact 6	Impact 7
≤ 0.25							
> 0.25 < 1		1					
> 1 < 5		1	2	1			
> 5 < 10	2						
> 10 < 20			1				
> 20							

Number Impact

- 1 Present in high quality community but ≤10% of invaded stratum
- 2 Covering ≥10% but ≤50% of invaded stratum
- 3 Displacing or precluding other vegetation by covering ≥50% of a stratum (groundlayer, shrub layer, canopy layer).
- 4 Growing with or in close proximity to Indiana State or Federal-listed plants or animals (**note which species is being impacted in Comments column**).
- 5 Changing community structure in ways other than vegetation displacement (e.g. alters wildlife abundance or adds a new stratum; **note specific change in Comments column**).
- 6 Hybridizing with native Indiana plants or commercially-available species (**note species with which it is hybridizing in Comments column**).
- 7 Causing long-term, broad alterations in ecosystem processes changing the community as a whole (e.g. invasion of cattails changes hydrology, drying the site and allowing open aquatic systems to become forested; **note specific alterations in Comments column**).

Impact 4 - One State and Federal listed species were listed as being impacted:

FE = Federally endangered
 SE = State endangered, 1-5 sites in state
 ST = State threatened, 6-10 sites in state
 SR = State rare, 11-20 sites in state

Valerianella chemopodofolia, SE

II-b Range of Habitats in Which Species is Invasive

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Communities underlined were reported as invaded:

Forest: 1)Dry upland, 2)Dry-mesic upland, 3)Mesic upland, 4)Mesic floodplain, **5)Wet-mesic floodplain**, **6)Wet floodplain**, 7)Bluegrass till plain flatwoods*, 8)Boreal flatwoods*, 9)Central till plain flatwoods, 10)Dry flatwoods*, 11)Sand flatwoods*, 12)Southwestern lowland mesic flatwoods*

Savanna: 13)Mesic savanna*, 14)Dry sand savanna*, 15)Dry-mesic sand savanna*

Barrens: 16)Limestone bedrock*, 17)Sandstone bedrock*, 18)Siltstone bedrock*, 19)Chert*, 20)Gravel*, 21)Sand*, 22) Clay*

Prairie: 23)Dry-mesic prairie*, 24)Mesic prairie*, **25)Wet prairie***, 26)Dry sand prairie*, 27)Dry-mesic sand prairie*, 28)Wet-mesic sand prairie*, **29)Wet sand prairie***

Wetland: **30)Marl beach***, **31)Acid bog***, **32)Circumneutral bog***, **33)Fen***, **34)Forested fen***, **35)Muck and Sand flats***, **36)Marsh**, **37)Sedge meadow***, **38)Panne***, **39)Acid seep***, **40)Calcareous seep***, **41)Circumneutral seep***, **42)Forest swamp**, **43)Shrub swamp**

Lake: **44)Lake**, **45)Pond**

Stream: **46)Low-gradient creek**, **47)Medium-gradient creek**, **48)High-gradient creek**, **49)Low-gradient river**, **50)Medium-gradient river**, **51)Major river**

Primary: **52)Aquatic cave***, 53)Terrestrial cave*, 54)Eroding cliff*, 55)Limestone cliff*, 56)Overhang cliff*, 57)Sandstone cliff*, 58)Lake dune*, 59)Gravel wash*

Additional comments from reporters on Norway Maple:

Dear Ellen,

I enjoyed the invasive workshop and your talks and presentation about planning. I realized that I failed to respond to the email request because I wanted to comment on your comments about ailanthus and Norway maple.

I believe that ailanthus is a gap phase species like you stated, but I also believe that Norway maple is comparable if not a worse threat. I am convinced that Norway maple will invade under ailanthus and eventually crowd it out. According to Dr. Stacey Leicht-Young who is working with me, all you have to do is look at the record of Norway maple invasion in the northeast. Here at the Indiana Dunes Norway maple from homesites is invading second growth forests, fire suppressed oak forests, oak hickory forests, and mesophytic forests. Populations are scattered across a 6 mile stretch of the Glenwood and Calumet dunes in the Indiana Dunes east unit. I am convinced that without control it will convert these to Norway maple stands with deep shade forests. I have been removing subcanopy trees from my oak ravine in the Glenwood dunes. So even though it may not be a problem in central and south Indiana, I think it may only be a matter of time before it invades in your part of the state.

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The only one I have information on in Norway Maple, and some city foresters in Indiana see it escaping...others do not.

Pamela C. Louks

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HI Ellen. I am just back from an urban forestry meeting in New Hampshire. We went to a park in Portsmouth that a neighborhood is trying take back, clean up etc. They were working on invasive issues and reforestation. The reforestation is difficult for them because the park is FILLED with mature and young Norway Maple--nothing else. They are everywhere, taking over, and took over. NO other trees are in the park except in an area where conifers grow. Of course, it is a battle to remove some of the trees and replant appropriate species that won't take over the park. But, it re inforced my thought process that these trees are escaping into woodlands in Indiana. In fact, the CUF office will not fund Norway Maples in any of our grant programs. Just a story from the urban forestry world!

Pamela C. Louks

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Ellen,

A few years ago, I attended a meeting Richmond at Hayes Arboretum in Wayne County. The understory of the surrounding natural area had a significant population of Norway maple (in addition to bush honeysuckle and privet). I don't recall recognizing it anywhere else.

Darrell Breedlove

Ellen:

I have observed Norway Maple invading intact forested parkland owned by the city of Goshen (Elkhart County). It is a mature Oak-Hickory forest which is bounded on one side by a busy city street at the edge of the municipality. It appears the major infestation is along this edge of the tract (1 ac) though there are scattered specimens toward the interior. Interestingly, at Merry Lea, I found one mature specimen planted on the site of a long-removed vacation cottage. I removed that specimen-- but have never come across this tree in the surrounding oak-hickory, or lowland forests.

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Bill Minter

Ellen, I have seen Norway Maple spreading aggressively into the St. Mary's Natural Area, in St. Joseph County.

John

John A. Bacone
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Dear Ellen and Rich,

Barb Hellenthal forwarded your query about the George and Juanda Bick Nature Area to me. I can confirm that both Norway maple and Japanese barberry are in that woods.

Unfortunately, access to that woods is restricted because of a construction project (putting another major storm sewer line through the center of the area). As John well knows, the Congregation of the Sisters of the Holy Cross, who own the woods and never ceded any oversight rights to the College, have decided to manage the woods as a timber site (a state forester prepared a TSI proposal for them and they ignored all objections raised in the local community). Last spring, about 200 red and white oaks, along with a few sycamores and walnuts, were removed from the woods. Several parts of the woods were severely (in my mind) overcut, including the area where the barberry was growing. Many of the harvested trees were healthy 100-150 year-old red and white oaks.

I have not been in the woods much since March 2006. It was off limits for classes all last fall and access is still limited. I will be teaching general ecology this fall and do plan to conduct several labs on forest community description to compare with the same exercises done before the harvest.

I won't have time to conduct the inventory you have requested until early October. I could then do it as part of my scheduled field exercises for my ecology course.

The following links provide access to images of herbarium specimens documenting the occurrence of both species in the woods in question.

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<http://www.saintmarys.edu/~biology/Berberis%20thunbergii.jpg>

<http://www.saintmarys.edu/~biology/Acer%20platanoides.jpg>

[http://www.saintmarys.edu/~biology/Acer%20platanoides%20\(fruit\).jpg](http://www.saintmarys.edu/~biology/Acer%20platanoides%20(fruit).jpg)

Cheers,

Richard Jensen, Professor

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Acer platanoides

Norway maple

Whitley County

Merriam Quad

T 33 N, R 9 E, Sec. 3

Crooked Lake Nature Preserve

Owner: Division of Nature Preserves - IDNR

A portion of the preserve was farmed until the 1970's. It was open field dominated by tall goldenrod in 1983. Norway maple has spread from one or two parent trees on the old farmstead and become the dominant tree colonizing the farm fields. While this is not a natural area it shows that Norway maple can spread rapidly, form dense monocultures, exclude other trees and herbaceous growth, grow to large size and reproduce prolifically.

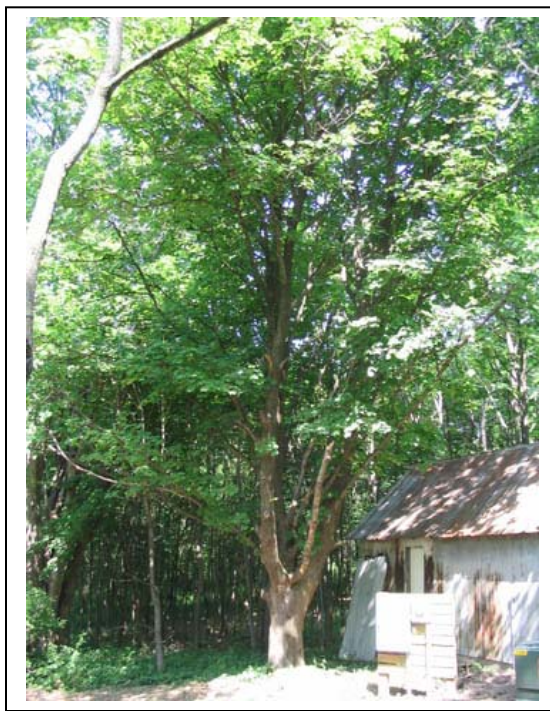
Four photographs are attached:

Norway maple parent - shows the large parent tree. Note the dense stand of small diameter trees behind and spreading outward from the parent tree.

Dense Norway maple grove - is a closer view inside the dense stand spreading from the parent tree. Note the lack of ground flora beneath the grove. Areas of the old field with a mix of trees show more ground flora and greater diversity. This is consistent with reports that Norway maple is allelopathic.

Large Norway maple - is a tree made several 6 to 8 inch dbh. trunks growing hundred feet from the original parent Norway maple of this size are plentiful field.

Crooked Lake Norway Maple - is an aerial photograph. The 30 acre area outlined the area being colonized by Norway X marks the location of the parent tree above. The dense stand of small trees north and west from the X is the grove above. Within the 30 acre area Norway most dense near the parent tree and with a greater variety of other trees,



up of several tree. in the old

aerial in red is Maple. An pictured extending pictured maple is less dense, farther

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from the parent tree. There may have been another, larger parent tree just east of the pictured tree. This tree was struck by lightening and removed about 20 years ago so the identity is uncertain.

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