

Emerald ash borer impacts on visual preferences - results from an urban forest recreation setting in Minneapolis



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The study was supported by the USDA Forest Service, agreement number 14-JV-11242309-049. In-kind support from the USDA Forest Service, Northern Research Station is also acknowledged. Thanks also to the Fort Snelling State Park administration and the Forest Department of Vienna (MA49) for the permission to survey park visitors.

Short Version

Forest insect impacts



Emerald ash borer (*Agilus planipennis*; EAB), beetle native to Asia.

Invasive forest insect, has killed more than 10 million ash trees (*Fraxinus* spp.) in USA since the mid-1990s (McCullough & Osborne, 2014; Kovacs et al., 2011). In certain Michigan and Ohio sites, EAB killed over 99% of the ash within a decade of its arrival (Klooster et al., 2013); EAB had spread to 28 US states (USDA Animal and Plant Health Inspection Service, 2016)

EAB approaches Europe (Straw et al., 2013; Valenta et al., 2015), ash already heavily impacted by ash dieback.

→ Impacts on cultural ecosystem services such as recreation, tourism, and scenic beauty in the urban context?



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Previous research on forest aesthetics in the context of forest insect impacts



- Humans prefer green forest stands with an open, park-like understory, an overstory canopy of mature trees, while they dislike recently logged stands, dead wood and pristine forests (Gundersen & Frivold, 2008; Ribe, 1989; Edwards et al., 2010).
- Forests impacted by beetle activities are hardly accepted by the public (Buhyoff, Hull, Lien, & Cordell, 1986; Buhyoff & Leuschner, 1978; Sheppard & Picard, 2006).
- The color of dying needles/leaves negatively influence people's preferences (Young & Wesner, 2003).
- Viewing distances play a role: near-view forests negative (Buyhoff et al., 1980; Sheppard & Picard, 2006).

→ What is more important for public preferences: EAB impact or forest management responses (type of intervention)?

→ Visits to urban forests are not only impacted by forest appearance; viewscales & social factors (visitor numbers) play also a role: how visitors weigh trade-offs between social and biophysical forest environment factors?

Research questions



EAB infestation is significant in USA, Russia, approaching East Europe
Documenting responses to EAB among urban green space visitors is informative for both management and research.

1. What visual preferences do urban forest visitors hold for
 - EAB-impacted and non-impacted urban forest stands?
 - forest management practices in response to EAB?
2. How do viewscales depicting various land use contexts (natural to urban) affect visitor preferences and what is their importance relative to the effects of EAB impacts?
3. How do the number of trail users, number of dogs and dog walker behavior, and trail user composition affect visitor preferences and what is their importance relative to the effects of EAB impacts?

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Study site USA



Fort Snelling State Park

Minneapolis-St. Paul metropolitan area of Minnesota

Mississippi River Corridor; 1500 ha

900,000 visitors annually

Bicycle friendly area

Dogs are allowed

Ash (predominantly green ash, *Fraxinus pennsylvanica*) covers up to 30% of the state park.

Impacted by EAB

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Method



- Onsite intercept survey during summer 2015 with a standardized questionnaire; N = 316 (response rate = 39%).
- Surveys at frequently-visited park locations such as main access points; data collection stratified by day of the week and day time
- Respondents took between 10 and 20 min to complete the questionnaire
- Survey focused on visitor perceptions of EAB infestation and preferences for forest landscape scenarios (choice experiment)
- Visual choice experiment: 128 digitally calibrated scenarios with varying levels of EAB impact and urban forest management responses (3 (bio)physical and 3 social attributes); analysis with Latent Choice

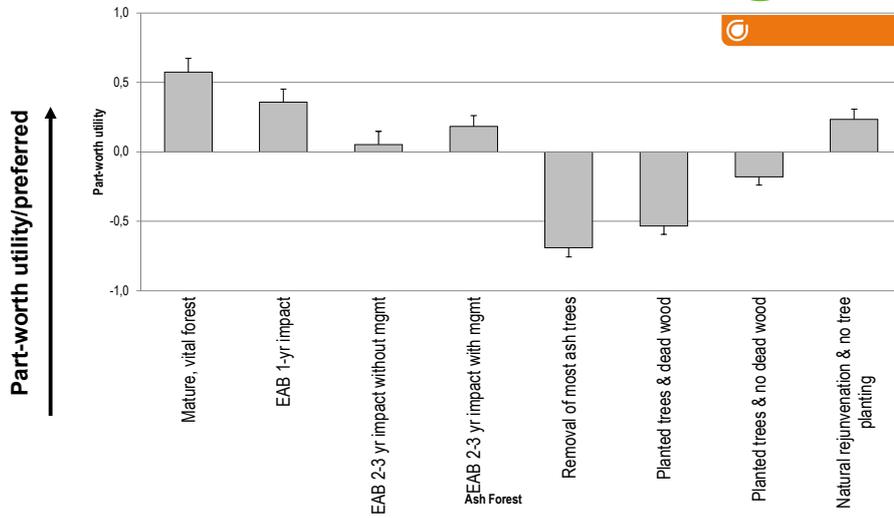
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Attributes	Levels	Attribute level description
Ash forest	8	(1) Mature, vital ash forest (2) EAB 1-yr impact with some yellow leaves (3) EAB 2-3 yr impact without mgmt, more yellow leaves (4) EAB 2-3 yr impact with cut & removal of some trees because of safety issues (5) Removal of most ash trees , logs of cut trees along trail (6) Newly planted trees, tied on a stake, natural rejuvenation, presence of dead wood (7) Newly planted trees, tied on a stake, natural rejuvenation, no dead wood (8) Advanced stages of natural rejuvenation, dead trees, no tree planting
Understorey vegetation	4	(1) No trailside vegetation (2) Some trailside vegetation (3) Dense trailside vegetation (4) Very dense trailside vegetation
Viewscapes	4	(1) High rises near-view (2) High rises far-view (3) Rural landscape with farmhouses (4) Forests
Number of trail users	4	(1) 1 Person (2) 4 Persons (3) 8 Persons (4) 12 Persons
Composition of trail users	4	(1) 50% Walkers-50% Cyclists (2) 75% Walkers-25% Cyclists (3) 25% Walkers-75% Cyclists (4) 100% Walkers
Dogs and dog walker behavior	4	(1) No dog (2) 1 dog leashed (3) 2 dogs leashed (4) 2 dogs unleashed

4 photos per choice set – 4 sets per visitor

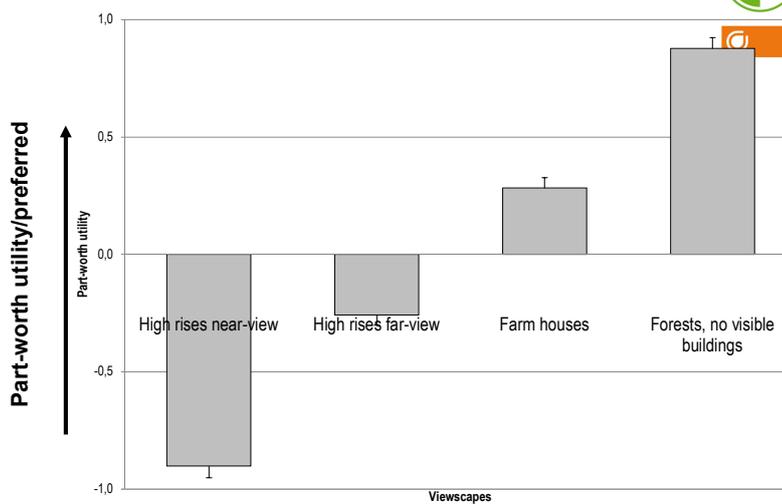


Preferences for ash forest



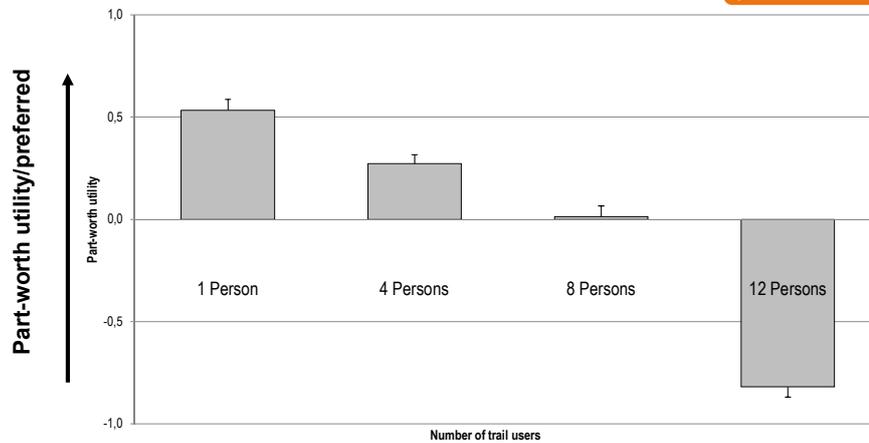
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Preferences for viewsapes



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Preferences for trail user numbers



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Discussion



- Biophysical and social aspects were relevant: trade-offs: **It was much more important for respondents to avoid seeing any high-rises than to see EAB impacts, removal of most ash trees, unleashed dogs, or varying user compositions.**
- Study confirms preferences of urban forest visitors for naturally appearing environments and the negative effect of urban land uses (Dupont et al., 2016; Ryan, 2002).
- Even in urban situations, trail planning is not only a matter of managing near-view forest conditions but also of integrating site-scale design considerations with landscape-scale issues.
- Need and opportunity for cross-sector coordination between urban foresters, recreation managers, and urban and regional planners.

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Discussion



- Respondents most prefer to see healthy green ash trees and a nearly closed canopy (Edwards et al., 2012; Ribe, 1989, 1990; Ryan, 2005), disliked higher amounts of dead wood and removal of most ash trees (Buhyoff & Leuschner, 1978; Buhyoff et al., 1986; Sheppard & Picard, 2006); initial impacts have little effect, managers might consider signage along the trail to explain the reason for ash removal
- Natural rejuvenation preferred to staked, even-aged trees of similar age, respondents preferred a more “natural” character of forest treatments compared urban park-like reforestation (staked trees).
- Participants disliked a high number of users, in line with many other crowding/visitor density studies, more relevant than visitor composition and visitor behavior (Arnberger & Eder, 2015; Arnberger et al., 2018a,b; Manning, 2007, 2011; Needham et al., 2014; Shelby & Heberlein, 1986; Van Riper et al., 2011).
Visitors might tolerate higher EAB-impacts on the forest landscape when the number of trail users is very low.

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Are You an Optimist or a Pessimist?



Ongoing cross-national work on trail preferences in the context of EAB-infestations

See:
Arnberger et al. (2017). Emerald ash borer impacts on visual preferences for urban forest recreation settings. *Urban Forestry & Urban Greening*, 27, 235-245.

Thank you!

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