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# ABSTRACTS AUTHOR BIOSKETCHES

## Iowa Invasive Species Conference

Honey Creek Resort at  
Rathbun Lake, Moravia, Iowa



**MARCH 28 & 29, 2017**

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# TUESDAY, MARCH 28, 2017

## TUESDAY MORNING 8:15 am – 9:45 am

### Workshop: Terrestrial Plant Identification

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Attendees wishing to brush up on their invasive plant identification skills and newcomers to the field are invited to attend this workshop. Participants will view the most common invasive plant species found growing in Iowa's roadsides, parks, prairies and uplands. A powerpoint presentation will be shown and participants will have a chance to handle several live or preserved examples for close observation.

## TUESDAY MORNING: 10:00 am – 11:30 am

### WELCOME PLENARY

#### The 2000 Iowa Invasive Species Conference: Where Have We Come Since?

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On October 6–7, 2000, Dr. James J. Dinsmore of Iowa State University and Dr. Neil P. Bernstein of Mount Mercy College organized a symposium on Invasive Species in Iowa. The event was held at Iowa State University and sponsored, in part, by the Iowa Academy of Sciences. The proceedings of the symposium were published in the December 2001, Volume 108, of *The Journal of the Iowa Academy of Science*. Eighteen researchers presented information on the current status of invasive species impacts on the natural resources of Iowa with information on fungi, terrestrial forbs, grasses, woody plants, forests, fishes, amphibians, reptiles, birds, and mammals. Focused papers were also presented on purple loosestrife and Eurasian watermilfoil. I will review the information presented at this symposium, outline the recommendations and predications of the researchers, and reflect how the current symposium can build on the data presented over 25 years ago.

#### Planning for Success: Landscape-scale Management of Invasive Plants

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Invasive species do not recognize property boundaries and can readily move through a landscape or watershed without regard to who owns the land their roots are anchored in. As such, successful, long-term management must be able to address invasive species at the landscape scale. Endeavors such as this take careful planning, cooperation, and coordination. Using case studies from Illinois and Georgia, this presentation will review the processes and properties of successful large-scale management projects.

#### Workshop: Great Lakes Early Detection Network (GLEDN) 12:15 pm– 12:45 pm

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The Great Lakes Early Detection Network (GLEDN) app allows users to collect invasive species reports using their smartphone or cell-enabled tablet. This free, easy-to-use app can be used by professionals and volunteers alike to improve detection and monitoring of terrestrial and aquatic invasive species. The built-in reporting form allows users to map the invasive species, add photos for verification, and include other details about the infestation. Submitted reports are verified and then integrated with the Early Detection and Distribution Mapping System (EDDMapS), a national database of invasive species observations. Other features of the app include species identification information and maps of previously-submitted reports. In this workshop, participants will practice using the basic functions of the GLEDN app. Participants will also get tips for using the app in the field and for accessing data from the reports. Please bring your smartphone or tablet.

## TUESDAY AFTERNOON I: 1:00 pm – 2:40 pm

### Using Animals to Find / Control Invasive Plants — 1

#### Goat Grazing in an Integrated, Multi-Year Management Protocol

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Targeted grazing with goats is gaining popularity with both public and private land managers in Iowa as a means of controlling invasive weeds and brush, often without the use of pesticides or mechanical disturbance. The public relations and educational opportunities presented by grazing are no doubt part of its appeal. To date, however, Iowa has only a relatively few small-scale targeted grazing experiences with which to evaluate the tool's effectiveness. These have mostly been short-term in nature and variables in vegetation conditions, treatment philosophy, and management keep them from being directly comparable. Their expense on a per-acre basis has also been out-of-scale with Iowa's daunting invasive vegetation problem. The presenters propose a multi-year protocol for integrating goats into an invasive vegetation management strategy to address large acreage in a cost-effective manner. In doing so, the fundamentals of targeted grazing will be discussed, as will the economic realities of deploying a goat herd. The proposal calls heavily on the results of a case study funded by a Sustainable Agriculture Research and Education (SARE) grant on a private woodland near Boone, Iowa. Projects at the IDNR's Dewey's Pasture complex in Northwest Iowa and on various private properties will also inform the presentation.

### Reduction of Tree and Brush Encroachment in Grassland Complexes Utilizing Goat Browsing

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Tree and brush (numerous species) encroachment into grassland/wetland complexes managed by government agencies and non-profit organizations is a complex, and widespread problem. Typical management choices include prescribed fire, mechanical removal, manual removal, or broadcast herbicide treatments. Each has its merits, but also its drawbacks; severe disturbance, chemical drift, and large investments in time and money, just to name a few. The Prairie Lakes Wildlife Unit staff with the Iowa DNR has been exploring a new alternative to brush management. Goats are known to eat anything. This is mostly true, and they tend to target most the species that managers desire the least; honeysuckle (*Lonicera sp*), common buckthorn (*Rhamnus cathartica*), sweet clover (*Melilotus sp*), and most other non-native and native tree and brush species. At the same time, they tend not to target grasses and other forbs, leaving desirable vegetation virtually untouched. During the 2016 growing season, goats have been munching their way across portions of the Trumbull Lake shoreline on the Dewey's Pasture Wetland Complex in Clay County. They have shown a propensity to drastically reduce woody cover in the grazed area, eliminating leaves up to 6 feet high. This is allowing sunlight to reach the ground consistently, and aiding in the establishment of native grasses from the seed bank, and increasing the vigor of those already present. The site has been grazed twice during the 2016 growing season, and will be grazed again at least once during the 2017 growing season. The hope is to greatly reduce the root reserves of the woody species that are present, allowing the native herbaceous cover to reestablish.

### Managing Invasives Using Conservation Grazing

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Woody plant encroachment into grasslands threatens a range of ecosystem services including reduced native plant and animal biodiversity, stresses to populations of key wildlife species (e.g. upland bird populations), and impacts to soil quality (WI-DNR 2008). Managed grazing on public lands has the potential to slow or reverse woody plant encroachment while generating income for additional management. A five-year research project has been initiated by the University of Wisconsin-Madison with assistance from the Wisconsin Department of Natural Resources and private cattle graziers to optimize managed grazing to suppress woody shrub populations while promoting ecosystem health and profitability for the grazer. Currently in its second year, the research project is evaluating plant community dynamics, grassland bird populations, soil quality, and obstacles that are inhibiting adoption. Initial results on shrub suppression as well as biomass available and utilized will be presented after one year of grazing, in addition to results of surveys and

interviews of both land managers and graziers that identify obstacles to adoption.

### Effects of Three Years of Mob Grazing on Canada Thistle and Other Vegetation

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Canada thistle (*Cirsium Arvense*) has been identified as a problem weed in Wisconsin pastures. It can reduce forage yield and utilization, which impacts animal performance. Our research compared the efficacy of a fall herbicide application, two mob grazing treatments (one and three consecutive years), and a rotationally-grazed control on Canada thistle and the resulting forage production and utilization. Research was conducted for three years at two sites in southern Wisconsin where effectiveness at suppressing Canada thistle was measured. At each site, paddocks were arranged in a randomized complete block design consisting of four replications. Aminopyralid + 2,4-D (120+970 g ae ha<sup>-1</sup>) was applied the fall of 2011 as the herbicide treatment. Rotationally grazed treatments were grazed 3-4 times in each year (2012 - 2014) when forage was 20-36 cm and grasses were not flowering. Mob grazed plots were grazed twice when the sward was >36 cm, grasses were flowering, and Canada thistle was in the flower bud to flowering stage. All treatments were grazed to a 10 cm residual and allowed to recover until the specified height was reached. Stocking densities were 70 and 450 Mg/kg for the rotationally grazed and mob treatments, respectively. Sites behaved differently therefore were analyzed separately. At Lancaster, a productive pasture with competitive legumes and forage grasses, the fall herbicide treatment provided nearly 100% Canada thistle suppression (cover and density) after one year. Nearly complete suppression from herbicide persisted for two years. In the third year cover and density increased but was < 50% of rotational grazing only treatments. Mob grazing and rotational grazing both had similar Canada thistle density and cover during the first two years, but by the third year Canada thistle cover and density was similar to herbicide applications. Rotational grazing treatments always had the highest stem density and cover throughout the experiment, with 87% more Canada thistle stems 3 years after completion of the study. In contrast, mob grazing stimulated Canada thistle populations at Prairie du Sac, a pasture with low production and no legumes, throughout the course of the study. Mob grazed plots averaged 2-8 times more Canada thistle stems throughout the course of the study. The one-time fall herbicide treatment did reduce Canada thistle for two years, but then recovered to similar levels as the rotationally grazed control after the third year. Conflicting results between sites make it difficult to recommend mob grazing for Canada thistle suppression. We believe that the presence of a robust and competitive pasture sward composition is a key factor responsible for Mob grazing's weed abatement success within the three-year timeframe that was evaluated. Other features of Mob grazing including utilization of lower palatability weeds such as Canada thistle are likely more important than weed management when selecting this management technique.

**Prioritization Strategies and Other Tools for Early Detection and Rapid Response**

**Using Habitat Suitability Models to Prioritize Monitoring Efforts for Invasive Plants**

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Early detection and rapid response (EDRR) is recognized as the best approach to prevent the spread of isolated populations of invasive plants. However, extensive monitoring efforts have proven to be challenging for land managers due to reduced budgets, staff, and increased species of concern to monitor for EDRR. Habitat suitability models (HSMs) are one tool that can improve invasive plant detection. To aid in EDRR in Wisconsin, we developed 21 HSMs for regulated invasive plants from known presence points from 2015 and earlier. We used an ensemble modeling approach that employed five statistical models (boosted regression tree, generalized linear model, multivariate adaptive regression splines, maximum entropy, and random forests) to determine the locations across the state in which the environmental, topographic and climatic conditions were suitable for a given species. Suitable habitat was determined on a binary cutoff basis for each of the five model approaches and georeferenced ensemble raster maps (spatial resolution of 250m) were created to depict the level of agreement across the five approaches. Prioritized lists of species were created within each of the 72 Wisconsin counties by listing the top 10 species that have suitable habitat for that area. Species were considered a high priority if less than 10 points were present in the county. Lists were summarized along with known location points and presented to stakeholders and citizen scientists in 2016 to encourage reporting new observations. In 2016, 19,004 new occurrences were reported to our database in Wisconsin (increase of 33%) by 77 different stakeholders/reporters. Of these reports, 75% were of the 21 modeled species with 28% and 39% from the county priority or high priority lists, respectively. Results suggest that this approach was successful in improving reporting of priority species within a county. These observations will be utilized to improve existing models through an iterative approach that has been shown to be effective. Resulting models will improve our understanding of the potential spread of regulated invasive plants in Wisconsin and what factors are drivers in suitable habitat.

**Tracking Invasive Species Across North America: EDDMapS & EDDMapS Smartphone Apps**

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EDDMapS' primary goal is to discover the existing range and leading edge of invasive species while documenting vital information about the species and habitat using standardized data collection protocols. EDDMapS allows for data from many organizations and groups to be combined into one database to show a better map of the range of an invasive species. Goals of the current project include: integration of existing regional datasets, increase search options on EDDMapS website, update NAISMA Invasive Plant Mapping

Standards, and coordinate with local, state and regional organizations to develop early detection networks. After 10 years of development of EDDMapS, it has become clear that these local organizations are key to developing a successful early detection and rapid response network. The University of Georgia Center for Invasive Species and Ecosystem Health has released 25 smartphone apps to support data entry into EDDMapS. EDDMapS has been implemented in 45 states and 4 provinces.

**What to Control and Where? Challenges of Prioritization at a Local Scale**

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Local cooperatives such as CWMAs often bring in additional resources and efforts to control invasive species. With multiple partners that, at times, have differing priorities, deciding upon the best use of resources can be challenging. This presentation discusses these challenges and gives some examples from Illinois of efforts of local-led prioritization and decision-making.

**Invasive Aquatic Animals**

**Action Plan for the Management of Asian Carps in the Upper Mississippi River Basin**

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Bighead Carp, Grass Carp, and Silver Carp have established feral populations over a notable portion of the Upper Mississippi Basin; however, large reaches of the system remain relatively free of Asian carps. The Action Plan for Management of Asian Carps in the Upper Mississippi Basin (Plan) is the result of cooperative efforts with the Missouri Department of Conservation, Illinois Department of Natural Resources (DNR), Iowa DNR, Wisconsin DNR, Minnesota DNR, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Army Corps of Engineers, Iowa State University, University of Minnesota, Southern Illinois University, and Western Illinois University. The goal of the Plan is to minimize the impact of Asian carps on the ecosystem function, recreation, and navigation in the Upper Mississippi River Basin. Achieving this goal means finding ways and places to prevent new introductions, deter spread, and control populations of Asian carps through coordinated surveillance, monitoring, and control. Although eradication of Asian carps is likely not possible in areas where they have become established and are reproducing, there may still be ways to slow their invasion and reduce or control their numbers to reduce negative impacts to river ecology and river uses. The Plan is a coordinated approach to implement successful and effective management of Asian carps in the Upper Mississippi River Basin using strategically prioritized and properly sequenced strategies and tasks. A similar plan for the Missouri River Basin is also being drafted.

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### Reproduction of Asian Carp Along the Leading Edge of Invasion in the Upper Mississippi River

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Bighead (*Hypthalmichthys nobilis*) and Silver Carp (*H. moltrix*) are highly invasive fishes. Currently, Asian Carp are highly abundant below Lock and Dam 19 (LD 19) near Keokuk, IA and appear to be spreading further north in the Upper Mississippi River (UMR). Invasion success and expansion could be due to immigration of adults from other locations and/or reproduction in newly invaded areas. Although both Bighead and Silver Carp are present above LD 19, the impounded and lentic features of the UMR may limit reproductive success of invasive carp. However, Asian Carp may be able to successfully reproduce in tributaries of the UMR during periods of high flow in the spring and early summer. Our objective was to evaluate larval Asian Carp densities along the leading invasion edge within the UMR to see when and where reproduction is occurring that may lead to further and more rapid population expansion. Ichthyoplankton tows were conducted every ten days from April through September 2016 to sample eggs and larvae within the thalweg, channel border, and backwater in pools 14-20 at the Des Moines, Skunk, Iowa, Rock and Wapsipinicon tributary confluences. Sampling occurred above, below and within tributary confluences in the UMR to assess reproduction in tributaries compared to the mainstem Mississippi River. If reproduction occurs in lentic pools of the UMR, populations may be able to increase at a higher rate than if they were supported by immigration alone. Larval sampling will be continued in 2017 to further assess reproduction along the leading edge of the Asian Carp invasion.

### When Clean Drain Dry Doesn't Get It All: The Risk of AIS Transport in Residual Water of Recreational Watercraft

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The Stop Aquatic Hitchhikers guidance of "Clean Drain Dry" has been proven to be effective at reducing the risk of aquatic invasive species (AIS) transport in recreational watercraft. However, due to design issues, some watercraft still contain water even after a boat owner's best effort to drain the water. Recent research has outlined the amount of residual water and the contents of that water in certain recreational watercraft. This presentation will review that literature and discuss efforts that have been implemented to help mitigate the risk of AIS transport through residual water.

### Status of the Invasive Rusty Crayfish in N.E. Iowa Watersheds

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The Rusty crayfish (*Orconectes rusticus* Girard, 1952) is a species not native to the Upper Midwest. It has been reported in Minnesota and Wisconsin as early as the 1960s and is now widespread. Wetzel et. al. (2004) noted the presence of rusty crayfish only in the Wapsipinicon drainage (Buffalo Creek) during their 2002 survey and indicated most, if not all, earlier Iowa reports were mistakenly identified specimens of the golden crayfish (*O. leuteus*). Our survey (Leon et. al., 2016) examined 100 sites and indicates a much wider distribution with *R. rusticus* relatively common in both the Cedar and Wapsipinicon drainages. Genetic analysis supports field identification and indicates a recent common origin of introduction. This introduction in NE Iowa is of concern because of the documented aggressive displacement of native species by rusty crayfish and resulting potential decline of native populations and disruption of natural ecosystems. Of technical interest is that capture results indicate cylindrical minnow traps are significantly more effective at capturing crayfish than flat traps designed specifically for crayfish.

**TUESDAY AFTERNOON II: 3:10 pm – 4:50 pm**

### Using Animals to Find / Control Invasive Plants-2

#### Invasive Species Control Through Combined Methods of Browsing and Prescribed Burning

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The project incorporated the USDA approved methods of goat browsing and prescribed burns to maximize control of invasive species and invigorate native savanna growth in a multi-use timber stand. Primary target species included Bush Honeysuckle (*Diervilla mill*) and Multiflora Rose (*Rosa multiflora*). An on-farm research/demonstration plot was established for comparing the effectiveness of individual and combined control methods for invasive species in existing timber. The project team identified 12 acres within an existing timber stand that was conducive to setting up replicated trial plots that compared USDA-NRCS EQIP approved methods for controlling invasive species. Pre- and post-evaluation assessments were conducted for each plot and additional long term impact assessments were conducted at 6-12 month intervals. Assessments included stand counts for invasive species as well as desired native savanna plants.

**Writing Effective Bid Specifications for Targeted Grazing Projects**

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Targeted grazing is a novel approach to controlling invasive vegetation. Consequently, there is little shared understanding as to how grazing projects should be structured and what qualifications should be sought from commercial grazing service providers. To further complicate matters, the commercial grazing industry is very young and a variety of business models are still being developed and tested. Apples-to-apples comparisons between methods and pricing structures are nearly impossible to come by. Land managers, many of whom are entrusted with public or donor funds, must solicit bids in a way that generates competitive interest, produces consistent responses, and focuses on performance. Careful planning can result in a project structure that takes advantage of often-overlooked efficiencies, lowering costs for commercial graziers and saving money for land managers. Further, a good bid spec can ensure the right service provider - not just the cheapest one - is chosen to professionally represent and preserve the reputation of the customer. This presentation will walk attendees through a model bid specification, highlighting critical provisions and identifying common pitfalls to be avoided.

**Utilizing Conservation Dogs to Detect Select Species of Invasive Weeds**

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Conservation dogs contribute to the eradication of invasive weed species by locating plants early in the growing season before they can seed and can locate root remnants from the previous season's pulling efforts. They use their olfactory capabilities to identify target plants among prairies and forests filled with a multitude of other types of flora. Target weeds can include garlic mustard, *Lespedeza sericea*, and many others. Conservation dogs are trained to detect the volatile organic compounds (VOCs) related to the target plants by using operant conditioning. The repetitive process of the training strengthens their behaviors so that they will reliably alert on the target scent. The emission of VOCs from plants varies extensively depending on the species, organs, development stage and environmental conditions.

**Biology and Management of Invasive Plants**

**Palmer Amaranth: An Uninvited Guest to Conservation Plantings**

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Palmer amaranth is native to the Southwest United States, but in the past 30-40 years it has been moving east and north. It was first reported to Iowa in 2013 and was known to be in five counties in the spring of 2016. It is a dioecious pigweed, closely related to Iowa's number one weed problem in agronomic crops - waterhemp. In late July of 2016 two

landowners identified Palmer amaranth in new seedings of native seed mixes, and by the end of August, Palmer amaranth had been identified in similar seedings in over 20 counties across the state. We suspect it is in nearly every county due to the popularity of the current CRP programs. The biology of Palmer amaranth, what is known about the introduction of the weed to the state, and concerns with the weed will be discussed.

**Japanese Hops Control and Management in the Upper Mississippi River System**

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Japanese hops (*Humulus japonicus*) is an invasive vine species that has been spreading throughout floodplain habitats in the Upper Mississippi River System, where it establishes in open areas such as forest canopy gaps and suppresses tree regeneration and native vegetation. This project evaluated the use of pre- and post-emergent herbicides and tree plantings to control and manage Japanese hops on five Mississippi River islands near St. Louis, Missouri. From 2012-2015, randomly selected subplots in dense hops patches were treated with sulfometuron methyl (Oust XP) at 1 ounce/acre, glyphosate (Rodeo) at 1.25 quarts/acre, or a combination of both. Containerized trees were planted in the fall of 2013, and bare root seedlings in the spring of 2014. Japanese hops biomass was significantly lower in all herbicide treatments than in control plots in 2012 and 2015, but there was no significant difference between the control and pre-emergent treatments in 2014. Post-emergent and combination treatments were also significantly more effective than pre-emergent treatments in 2012 and 2014. After two years, average survivorship of containerized trees was 36%, and bare root seedlings had experienced near 100% mortality. Results indicate that post-emergent treatments, used alone or in combination, are more effective than pre-emergent treatments alone. However, large flood events such as occurred during the 2013 growing season can re-establish hops in treated areas. Reforestation, if combined with herbicide treatments and actively managed, is therefore likely a more successful long-term control and management option for Japanese hops in large river floodplains

**Early Detection and Persistence Can Control the Spread of Garlic Mustard (*Alliaria petiolata*)**

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Our work on public lands in northeastern Iowa demonstrates that it is possible to control the spread of garlic mustard with extremely limited resources. Since 2000, the total area with garlic mustard and the density of those populations have increased rapidly in Winneshiek County. In this presentation I describe our achievements at one preserve, but we have witnessed a similar pattern of control in several city parks and on 350 ha of land owned by Luther College. In 2009, one of us discovered a large, well-established patch of garlic mustard at Malanaphy Springs State Preserve. With permission from the Iowa DNR, we have systematically worked to reduce the

\*Presenting Author

size and density of the population and eliminate the satellite populations. For the first four years this required herbicide application (2% glyphosate) and hand-pulling plants. By 2014, we reduced the population to a point where herbicide use is no longer necessary. Since then we have been able to hand-pull >90% of the second-year plants. Each year we find new populations; there continues to be seed pressure from the soil seed bank and from plants growing on adjacent private property. Annual effort will be required to detect and control garlic mustard spread in this preserve. Our experience confirms that eradication of garlic mustard is not possible. However, strategic and persistent efforts to control the spread in key habitats are possible and should be encouraged on public and private lands in the region.

### Wild Parsnip: History, Biology, and Management

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Wild parsnip is an exotic species introduced to North America in the early 1600's. It was described as common in roadsides across Iowa in a book published in 1913, so it is not a new problem. The plant contains chemicals that hypersensitizes skin to UV light, resulting in severe blistering and long-lasting pigmentation changes after contact with the plant and exposure to sunlight. It is a biennial weed adapted to areas with perennial vegetation such as roadsides and native prairies. Wild parsnip has gradually increased in the Iowa landscape over the past 30-40 years due to less intensive roadside management. Large increases in the amount of flowering wild parsnip were observed across much of Iowa in 2016. Causes of this increase and management strategies for wild parsnip will be discussed.

### Control of Callery Pear in Pastures, Rights-of-Way, and Natural Areas

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*Pyrus calleryana* Dcne. (Rosales: Rosaceae), a native of Southeast Asia, was introduced to the United States in the early 1900's to confer fire blight resistance to common pear (*P. communis*) via grafting. By the early 1950's the ornamental qualities of *P. calleryana* were recognized and led to the development of multiple cultivars, starting with 'Bradford' in 1962. Today, cross pollination between fast growing and prolific flowering cultivars has created one of the most widespread, aggressive invaders of Rights of Way (ROW), natural areas, and pastures. Experiments were implemented in Missouri from 2012 through 2015 to evaluate herbicide options to control *P. calleryana*. The objectives of these studies were to: i) determine the sensitivity to *P. calleryana* to aminopyralid-, triclopyr-, and picloram-containing products; ii) determine efficacy of low volume basal bark (LVB) compared to foliar broadcast applications; and iii) determine efficacy when using either a non-ionic surfactant (NIS) or a methylated seed oil (MSO) as an adjuvant. Low volume basal bark application with 25% Garlon® 4 Ultra herbicide+ 75% basal oil was the most effective treatment, controlling 100% of treated trees. Surmount® herbicide

(picloram + fluroxypyr) applied at 4 pints/acre was the most effective foliar application with control ranging from 70 to 85% when applied with a NIS (0.25% v/v) and 93% when applied with an MSO (1% v/v). Methylated seed oils improved efficacy of GrazonNext® HL herbicide and Surmount® but do not improve efficacy of Remedy® Ultra nor Chaparral™ herbicides. Garlon® 4 Ultra, Capstone™, and Opensight® herbicides all provided partial control of *P. calleryana* but follow-up applications will be required to achieve the desired level of control.

## Managing Invasives in Prairies

### Influence of Richness and Seeding Density on Invasion Resistance in Experimental Tallgrass Prairie Restorations

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Agricultural producers and non-governmental organizations and agencies have restored thousands of hectares of cropland to grassland in the Great Plains of the United States. However, little is known about the relationships between plant species richness and seeding density in these restorations and resistance to invasive plant species. We assessed the effects of richness and seeding density on resistance to invasive and other unseeded plant species in experimental tallgrass prairie plots in central Nebraska. In 2006, twenty-four 55 m x 55 m plots were planted with six replicates in each of four treatments: high richness (97 species typically planted by The Nature Conservancy), at low and high seeding densities, and low richness (15 species representing a typical Conservation Reserve Program mix, CP25), at low and high seeding densities. Increasing seed mix richness was more effective than increasing seeding density for decreasing invasion by unseeded perennial species, bull thistle, and smooth brome during the 2nd-4th growing seasons of the plots.

### Effects of Management on Wild Parsnip (*Pastinaca sativa*) in a Low-Diversity Grassland

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Wild parsnip (*Pastinaca sativa*) is a rapidly spreading, non-native biennial forb with a high need for management because of its negative effects on human skin. We tested three different treatments to control *P. sativa* adults prior to setting seed: scything (similar to mowing), root-cutting, herbicide, and unmanipulated control plots. We also tested the effect of prescribed fire in a burn and no-burn design, with burn plots exposed to annual, late spring controlled burns. All treatments were applied in a low diversity, smooth brome dominated field, replicated x 7 (x burn/no-burn). After two years of targeted control measures and three consecutive years of prescribed fire, number of reproductive *P. sativa* was one half to one third less abundant in burn plots than no-burn plots. In burn and no-burn plots, number of *P. sativa* adults was greatest in the scythe treatment, and similar among control, herbicide, and root-cut treatments.

# WEDNESDAY, MARCH 29, 2017

WEDNESDAY MORNING I: 8:00 am – 9:40 am

## Local Invasive Species Programs / Community Engagement

### Building Invasive Species Partnerships in Eastern Iowa: The Hawkeye CWMA

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The Hawkeye Cooperative Weed Management Area in East Central Iowa is made up of multiple Federal, State, County, City, and Private natural resource managers who are striving to manage invasive species across political boundaries. The HCWMA focuses on educational efforts for landowners as well as on the ground control of many invasive species. This presentation will focus on how a CWMA is started, how a CWMA can benefit your invasive species management program, and discuss some of the issues and successes the Hawkeye CWMA has faced.

### Empowering and Engaging Volunteers

Pat Spain, Polk County Conservation  
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Polk County Conservation (PCC) has used volunteers in the ongoing battle against invasive species since the inception of a Corps of Recovery Program in 2001. This program has revolved around training volunteers as Stewards/Co-Stewards to work in PCC parks and natural areas removing invasive species (e.g. honeysuckle, Autumn Olive, etc.). By 2004, there were 65 volunteers putting in over 800 hours, eleven of which were Stewards. The program has now grown into thousands upon thousands of hours that are dedicated to woodland and prairie restoration each year by our family of volunteers. Part of the success of the program lies in empowering volunteers. This sense of empowerment is achieved by cultivating a sense of ownership in projects by providing volunteers with training, access to storage, equipment and vehicles. What has also attributed to a successful program is providing educational, hands-on opportunities where volunteers gain a love for the outdoors, and foster that love as an integral part of their lives.

### Expanding Your Volunteer Base

Linda King, Iowa Department of Natural Resources  
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Reaching beyond traditional volunteers groups creates new networks of programs and partners that benefit your organization beyond episodic projects completed in short periods of time. Volunteers react well to definitions, requirements and objectives for projects. By specifically defining needs, your organization can pinpoint long-term volunteers who become committed to your mission and

This pilot study indicates that multiple, annual, late spring burns may provide significant reduction of *P. sativa*, possibly resulting from mortality of adults, rosettes, and/or seed bank. In contrast, scythe treatments appeared to create favorable growth conditions for *P. sativa*, possibly because competing vegetation was also reduced by the mowing. While pre-flowering mowing is suggested as a control measure for many invasive species, our results indicate that response to mowing is more complex than a simple reduction of the target species.

### Grassland Invasives

Jerod Huebner, Missouri Prairie Foundation  
417-414-4700  
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Overview of problematic exotic/invasive species throughout Missouri's grassland ecosystems. Species identification and treatment methods for each, including management of urban sites which are usually more difficult.

### Adaptive Management for Pollinators and Prairie Plants in Midwestern Working Landscapes

Nicholas Lyon<sup>\*1</sup>, Diane Debinski<sup>1</sup>, James Miller<sup>2</sup>, Walter Schacht<sup>3</sup>, David Stein<sup>1</sup>; <sup>1</sup>Iowa State University, <sup>2</sup>Illinois State University, <sup>3</sup>University of Nebraska-Lincoln  
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Midwestern prairie habitats have been extensively developed for agricultural and urban use and, once modified in these ways, are often overrun by invasive plant species. As such, land managers need effective management strategies that remove invasive species while also encouraging the recruitment of key prairie plant species and the pollinators that depend upon them. Management of grazed pastureland has untapped potential as an experimental system for testing restoration tools, given the grazing-dependent nature of prairie habitats. Prescribed burning of pastureland can also be implemented to reduce encroachment by woody plant species, and perform another historic ecosystem service. Despite the efficacy of grazing and prescribed burning, alone they are not enough to remove many invasive species, and further action is necessary. The invasive grass tall fescue (*Schedonorus arundinaceus*) offers a valuable metric for evaluating and comparing different management procedures. This research examines the effect of treating grazed pastures with herbicide and prairie plant seed-mix additions on prairie plant and pollinator abundance richness and diversity. Our preliminary results suggest that the plant community responds more quickly than the insect community to herbicide and seeding and that combinations of herbicide and seeding treatments may prove to be more effective restoration tools than either tool does individually.

\*Presenting Author

become your champions. Developing a “must have” list for the volunteer’s skill set and “to-do” objectives sets up the volunteers for success when they find a meaningful task that is easy to accomplish with their skill set. Once success has been achieved by managing expectations; volunteers become excited and engaged at higher levels. The volunteer spectrum at the Iowa Department of Natural Resources includes Friends groups, AmeriCorps members, and unlikely partners such as the Army National Guard and union organizations. Each of these groups brings a renewed commitment to projects that can be complicated, expensive or tedious. Learn how to look beyond traditional volunteers and expand your partnerships.

**Engaging Students in Prairie Management**

Mike Todd, Ames High School, Ames, IA  
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For the past 10 years, I have helped to manage the Ames High Prairie using high school students. Come learn about these efforts and get ideas for engaging your local school district students in land management.

**Landowner Perceptions of Risk: Woody Plant Encroachment and Fire in Grassland Management**

Ryan Harr<sup>1</sup>, Lois Wright Morton<sup>2</sup>, Shannon Rusk<sup>3</sup>, David Engle<sup>4</sup>, James Miller<sup>5</sup>, Diane Debinski<sup>2</sup>; <sup>1</sup>Iowa Department of Natural Resources, <sup>2</sup>Iowa State University, <sup>3</sup>Iowa Department of Agriculture and Land Stewardship, <sup>4</sup>Oklahoma State University, <sup>5</sup>University of Illinois  
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Grassland researchers increasingly recognize that fire and herbivory are essential functions in healthy grassland ecosystems and are using grazing and prescribed fire on public reserves to increase plant diversity, improve grassland productivity, and control encroachment of woody plants, especially eastern red cedar (*Juniperus virginiana*). However, prescribed fire in particular has not been widely adopted as a tool by private landowners. Fire suppression and prescribed fire are two technologies which present different and competing risks to grassland landowners making management decisions. We explore landowner perceptions of risk associated with eastern red cedar and deliberate use of fire in the Grand River Grasslands of southwest Iowa and Northwestern Missouri. We find that although aerial image data on eastern red cedar over the last 30 years in this region reveal significant woody plant encroachment on grasslands, conceptual mapping of landowner beliefs and in person interviews reveal that the risks associated with prescribed fire seem to outweigh perceived risks associated with loss of forage and grassland habitats.

**Biology and Management of Perennial Invasive Plants**

**Management of Japanese Knotweed by Dallas County, IA**

Jim Uthe, Dallas County Secondary Roads  
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Japanese knotweed not only is a detriment to native ecosystems, but it can also adversely impact transportation systems by threatening the integrity of structures, and impeding sight distance and drainage. This presentation will focus on the identification of Japanese knotweed and will give insight into how Dallas County has been managing several infestations within its rights-of-way over the last decade.

**Identification and Management Japanese Knotweed in Wisconsin**

Mark Renz, University of Wisconsin-Madison  
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Japanese knotweed (*Fallopia japonica*) and related species/hybrids are a nonnative invasive plant that has been identified as a problem in natural areas, urban environment, and rights of way. It is difficult to control and anecdotal information exists claiming the relative efficacy of various treatment methods. Studies conducted between 2012 and 2015 compared the effectiveness of treating Japanese knotweed with 1) different chemicals at differing rates and timings, 2) varying the spray volume and 3) and timing and number of mowing prior to treatment. Herbicides evaluated included imazapyr (Arsenal), glyphosate (Rodeo), triclopyr + 2,4-D (Crossbow), and aminopyralid (Milestone). Results found that imazapyr (Arsenal at 4 - 5.25 pt/A) applied in the summer or fall to resprouting stems that were previously mowed provided the greatest reduction in Japanese knotweed that persisted longer (88% control 18 MAT) than other herbicides. Treatments of imazapyr were more effective when applied in July than in September. In contrast, applications of aminopyralid (milestone 7-14 fl oz/A) applied in September to resprouting stems provided 85%-92% control at 12 MAT but by 18 MAT % control was reduced to 15%-59%. Treatments with aminopyralid were more effective when applied in September (92% control) vs July (85% control) at 12 MAT. Research in 2013 confirmed the effectiveness of aminopyralid and found glyphosate (8 lb ae/A) applied at the same timing provided similar control 12 MAT. Subsequent studies also found that mowing was not required to obtain similar control to treatments applied to resprouting stems mowed in July when applications of aminopyralid (milestone 14 fl oz/A) were applied in the fall at spray volumes between 20 and 100 gallons per acre 12 MAT. While imazapyr was the most effective treatment it also resulted in a greater bare ground after treatment, as few species emerged after 12 MAT. These results suggest that Japanese knotweed and related species/hybrids can be controlled with herbicides, but treatments will need to be reapplied at least once. Site specific factors also need to be considered in selecting an appropriate herbicide.

**Managing Reed Canary Grass at Big Marsh Wildlife Management Area**

Jason Auel\*, Justin Clark; Iowa Department of Natural Resources  
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Reed canary grass (*Phalaris arundinacea*) is an invasive terrestrial plant that is out competing most native moist soil plants. The managers of the Big Marsh Wildlife Management Area have been using a combination of grazing, mowing and late summer herbicide application to suppress Reed canary grass. The results show suppression of Reed canary grass allowing native moist soil plants to dominate for two to three years after herbicide application.

**Overview of Management of Canada Thistle (*Cirsium arvense*) Management in Minnesota**

Roger Becker, University of Minnesota  
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Canada thistle (*Cirsium arvense*) is the most widely distributed invasive plant in Minnesota. This weed is effectively managed in conventional agriculture currently, but remains a challenge to manage in natural areas, particular in prairie systems. This talk will provide an overview of research efforts in Minnesota toward building awareness defining management, biological control specificity testing, seed dispersal, tolerance of forbs in native prairies to herbicides that control Canada thistle, and prairie seeding techniques that minimize Canada thistle invasion. Time limitations will not allow coverage of individual topics in-depth, but it is hoped that awareness of current and past efforts will facilitate future networking and knowledge gains among conference attendees.

**Emerald Ash Borer: Management Strategies**

**Emerald Ash Borer Update in Iowa**

Mike Kintner, Iowa Department of Agriculture and Land Stewardship  
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Since the first Iowa detection in 2010, Emerald Ash Borer (*Agrilus planipennis Fairmaire*) continues to move across the landscape, killing ash trees (*Fraxinus species*) in its path. The vast majority of the spread can be attributed to accidental introduction. Many Iowa communities are already experiencing substantial economic and environmental impacts by this invasive species. What the current Emerald Ash Borer scenario looks like for Iowa and what is being done will be discussed.

**Emerald Ash Borer Invasion and Control**

Ben Slager, USDA APHIS PPO  
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The emerald ash borer (*Agrilus planipennis Fairmaire*) was likely introduced into Michigan in packing material from China in the 1990s. However, the pest was not detected until 2002 and soon after eradication efforts were put into place. By 2008 it was clear eradication was unlikely and the program shifted to a management strategy. The U. S. Department of Agriculture built the Emerald Ash Borer (EAB) Biological Control Facility to support EAB management. This facility is responsible for the production of four biological control agents--*Spathius agrili*, *Tetrastichus planipennis*, *Oobius agrili*, and *Spathius galinae*. These parasitic wasps are stingless, very small, and attack either EAB eggs or larvae. Parasitic wasps will play a critical role in the integrated pest management plan to help control EAB and benefit our urban, suburban, and rural landscapes. Here, we review the EAB invasion, the state of EAB biological control production, and some current results from the field.

**Treatment Options for Emerald Ash Borer**

Mark Shour, Iowa State University Extension and Outreach  
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Treatment options to protect ash trees from the emerald ash borer are available, but careful and thoughtful analysis is needed to circumvent spread of false information and excessive/needless use of insecticides. Dr. Shour will discuss advantages and disadvantages of the current insecticides labeled to control EAB.

**How Cities Can Prepare for Invasive Pests**

Emma Hanigan, Iowa Department of Natural Resources  
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This talk will focus on the use of tree inventories and management plans to reduce the impacts of invasive pests on urban forests.

**WEDNESDAY MORNING II: 10:00 am – 11:40 am**

**Outreach and Education**

**Digital Online Marketing Strategies to Target Aquatic Invasive Species Awareness**

Stephen Spilsbury, Tactive Digital/Nexstar Broadcasting  
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This presentation will highlight effective outreach and education using cost efficient digital marketing campaigns.

\*Presenting Author

### Case Studies of Successful Outreach and Education from Minnesota Sea Grant

Doug Jensen, *University of Minnesota Sea Grant*  
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Invasive species management is about people management. Effective public outreach is critical to invasive species prevention and control. For the last two decades, invasive species outreach has recognized the need to “move beyond brochures” to draw upon what has been learned from recent developments in social science to improve prevention efforts. Instead of information-based outcome programs, motivation-based programs are strategically planned, implemented, and evaluated. Results of evaluations show that effective invasive species outreach taps into audience values and motivations, stresses the threats posed, and delivers strong, concise, and consistent messages. Willingness to change behaviors can increase over time and audiences are generally willing to take actions if they know what to do. Building individual responsibility, social norms, and community responsibility are elements at the heart of bringing about sustained desired behaviors. This presentation will highlight two international campaigns that apply these concepts. Stop Aquatic Hitchhikers! and Habitattitude are helping to not only raise awareness and change behaviors, but also build capacity to stop spread of invasive species across the Upper Midwest and beyond. Conventional to innovative strategies will be compared to show how they worked.

### Approaches to Promoting Native and Benign Exotic Plants over Popular High-Risk Invasives Used in Landscaping ,

Clair Ryan\*<sup>1</sup>, Mark Renz; <sup>1</sup>Midwest Invasive Plant Network, <sup>2</sup>University of Wisconsin-Madison  
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In recent years the Midwest Invasive Plant Network (MIPN) has worked closely with stakeholders to reduce the sale of ornamental invasive plants in favor of native or exotic non-invasive species unlikely to have negative impacts on natural areas. Through our Invasive Plants in Trade working group, we have successfully engaged representatives of the nursery and landscaping industry in the discussion about how to work together towards this goal. This presentation will highlight several of MIPN’s projects and products related to ornamental invasives, including a survey of stakeholders to assess the state of knowledge surrounding the issue, an online list of species and their regulatory status across Midwestern states, and the development of a “Landscape Alternatives” app for iOS and Android with an accompanying brochure. Audience members will learn about available resources related to cultivated invasive species and about how to become involved in MIPN’s work.

### PlayCleanGo: Stop Invasive Species In Your Tracks

Amy Yoakum\*<sup>1</sup>, Susan Burks<sup>2</sup>; <sup>1</sup>Story County Conservation, IA, <sup>2</sup>Minnesota Department of Natural Resources  
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Invasive species are already among the greatest threats to future forest sustainability we face, and climate change will

make matters worse. PlayCleanGo is an awareness campaign, which can foster sustainable behaviors among trail users, like Stop Aquatic Hitchhikers! has among boaters. Come learn how you can help spread the word. Social research and marketing is based on the concept of social norms and thus public exposure to and acceptance of sustainable public behaviors. In three years, over 260 partner organizations in the United States and Canada have adopted PlayCleanGo as their prevention outreach campaign, contributing to a large population of forest recreationists seeing uniform messaging across state and federal borders. As a PlayCleanGo Partner, your organization would have free access to an ever-expanding graphic library and basic graphic services to help reach recreational audiences coming to your area and utilizing your forest resources. The campaign is designed to give outdoor recreationists a clear call to action. With simple, positive messaging, it urges them to be informed, attentive and accountable for stopping the spread of terrestrial invasive species. The fun, modern look and feel of the campaign is based on the results of a series of nine focus groups and a large phone survey describing the knowledge, attitudes and behaviors of recreationists visiting the Upper Midwest. This presentation will provide an overview of our social research, the campaign materials available to you, and what it means to become a PlayCleanGo partner.

### First Detectors: Using Citizen Science to Support Invasive Species Efforts

Anne Pearce, *University of Wisconsin-Madison*  
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The Wisconsin First Detector Network (WIFDN) is a citizen science network that empowers people to take action against invasive species. WIFDN provides training and resources through a combination of webinars, instructional videos, and hands-on workshops. In addition, WIFDN supports new and ongoing volunteer opportunities for citizen scientists. WIFDN’s citizen scientists take action through monitoring and managing invasive species and providing invasive species outreach in their communities. Since its inception in 2014, WIFDN has trained over 150 people via webinars and an additional 300 people at in-person workshops. These citizen scientists have gone on to contribute over 5000 hours of volunteer service, including submitting over 2500 invasive species reports via the Great Lakes Early Detection Network smartphone app. WIFDN is one successful model for harnessing the power of citizen science volunteers to support invasive species efforts. This presentation will share lessons from WIFDN’s first years, including strategies for recruiting participants, supporting volunteer opportunities, and maintaining engagement with a statewide network of volunteers and partners. In addition, participants will learn how they can use WIFDN’s free online resources for their volunteer training efforts.

**Assessing Grassland Threats in the Prairie Peninsula: Eastern Redcedar Encroachment in Iowa**

Ryan Harr<sup>\*1</sup>, James Miller<sup>2</sup>, David Engle<sup>3</sup>; <sup>1</sup>Iowa Department of Natural Resources, <sup>2</sup>University of Illinois, <sup>3</sup>Oklahoma State University

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In the central U.S., loss and degradation of grasslands has presented problems for wildlife dependent on these ecosystems as well as the grazing livestock industry for decades. Woody encroachment on remaining grasslands exacerbates losses to conversion to rowcrop and other uses by rendering the habitats that remain less productive for wildlife and grazing animals. Eastern redcedar (*Juniperus virginiana*) is a particularly aggressive colonizer of grasslands in the eastern two-thirds of the U.S., and has invaded millions of acres of the Great Plains and beyond. We assessed the current extent and rate of increase by eastern redcedar in the Grand River Grasslands of southern Iowa and northern Missouri to better understand the threat encroachment may pose to grassland-based agriculture, recreation, and habitats in the region. We documented a dramatic increase in redcedar cover, number of stands, and number of individual trees throughout the region. Encroachment has likely reached a point in which it poses an economic threat to landowners through degradation of forage production and other ecosystem services.

**Sericea Lespedeza Management on Public Land in South Central Iowa**

Andy Kellner<sup>\*</sup>, Josh Rusk; Iowa Department of Natural Resources - Grand River Wildlife Unit

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Sericea lespedeza (*Lespedeza cuneata*) is an invasive, terrestrial legume that continues to spread through the Midwest, southern U.S., and eastern U.S. Sericea was planted for erosion control, mine reclamation, and wildlife forage and cover but this erect perennial is difficult to control once established due to its high seed production and longevity of its seed bank. Originally introduced on the Mount Ayr Wildlife Management Area (WMA) in south central Iowa as a quail food source, sericea is now present on at least 13 of the 15 WMAs that the Grand River Wildlife Unit manages. Wildlife staff has applied triclopyr at 1.00 lb ae/10 gal solution (2.5% solution of Garlon 4 Ultra or Remedy Ultra) and triclopyr + fluroxypyr at .38 + .12 lbs ae/10 gal solution (1.2% solution of PastureGard). Intensive locating efforts, identification, and spraying of Sericea have been ongoing since 2010. In addition to spraying, areas known to contain sericea have been grazed, mowed, disked, and subject to tree thinning and prescribed fires as part of other management practices. The presence of sericea seemed to be declining; however, in 2016 sericea was found in higher densities and new locations even where systematic searching and spraying occurred previously. Factors such as yearly precipitation, winter temperatures, wildlife usage, and fire activity may influence the vigor and spread of sericea more than select herbicide application. Best management practices need to be analyzed to fit budgets for effort and cost of controlling this species.

**The Ecology, Morphology and Control of Oriental Bittersweet (*Celastrus orbiculatus*)**

Megan Korte<sup>\*</sup>, Noel Pavlovic; U.S. Geological Survey Great Lakes Science Center

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Oriental bittersweet (*Celastrus orbiculatus* Thunb.) is a nonnative invasive woody vine that is spreading throughout the deciduous forests of the eastern half of the United States. American bittersweet (*Celastrus scandens* L.) populations are declining and are now difficult to find where they were historically abundant. *C. orbiculatus* is spreading westward quickly and has the ability to occupy and exceed the historical range of *C. scandens*. A review of research that has been conducted in northwestern Indiana and on the east coast by the USGS and partners is summarized to provide information on the ecology, identification, hybridization and control between these two congeners. New frontiers of research focusing on the complex relationship involving soil, indigenous microbes and this invasive plant will be discussed. The results of these studies suggest that land managers should take into consideration the presence of this highly invasive exotic vine and consider the use of several different treatments in habitats susceptible to invasion.

**Bush Honeysuckle, Autumn Olive, and Sericea lespedeza Control on Public Lands in Central Iowa**

Perry Thostenson<sup>1</sup>, Todd Gosselink<sup>2</sup>; <sup>1</sup>US Army Corps of Engineers, <sup>2</sup>Iowa Department of Natural Resources

Intensive control of invasive plant species is often a significant task of land managers of public lands. Managers at the Lake Red Rock Project and Hooper Wildlife Management Area in Iowa have been aggressively reducing invasive bush honeysuckle (*Lonicera morrowii* and *L. maackii*), autumn olive (*Elaeagnus umbellata*), and sericea lespedeza (*Lespedeza cuneata*). Since 2009, over 1500 acres of invasive control has been accomplished using herbicide, mechanical, and intensive goat grazing on public lands in central Iowa. Herbicide treatments included basal bark spraying, spot spraying, vehicle broadcast spraying, and aerial helicopter spraying using primarily glyphosate (Roundup) at 2.5% - 7% (foliar), 50-80% hack and squirt, at 2 qt/acre, triclopyr (Garlon) 2%-2.5% (foliar) at 12 oz. per acre, metsulfuron methyl (Escort) 1 oz per acre, and triclopyr/fluroxypyr (PastureGard) 2% foliar at 2 quarts per acre. Reduction of invasive growth was accomplished in savannas, prairies, and old fields with varying management approaches and success. Mechanical removal using forestry mulchers and tree chippers were ideal in dense invasive growth areas, where spot spraying individual plants was effective in the higher quality sites with lower density. Aerial helicopter spraying was very effective for honeysuckle in November, and the most cost effective for honeysuckle control in woodlands. Intensive goat grazing was very effective in initially reducing honeysuckle, but the most costly per acre, with subsequent treatments after the goats were removed. The varying sites and approaches of control will be discussed based on the experiences in the field, with recommendations for field staff on the control of honeysuckle, autumn olive, and sericea lespedeza.

## Strategies for Managing Sericea Lespedeza In Native Prairie Restorations

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*Sericea lespedeza* (*Lespedeza cuneata*) is a problematic invasive species that is becoming more widespread in Iowa. Its aggressive nature and long-lived seed present problems for control. *Sericea lespedeza* was first discovered at Chichaqua Bottoms in 2007 in an area restored to native prairie in 2003. (NEA). We suspect the *sericea lespedeza* may have colonized the area from contaminated seed. A second infestation was found in 2010 in an area nearly 3 miles SSE of the original discovery (Southpoint). This was in an area planted to native prairie vegetation in 2004. Again, contaminated source seed was the suspected origin. Efforts to control *sericea lespedeza* were initiated the year of its discovery in both instances and as a result, the plant has not been reported in the Southpoint areas since 2013. Control efforts continue at NEA, where new infestations were discovered after the original discovery. As Central Iowa is on the edge of the current range of this species, we expect that additional infestations will occur in the future. Control efforts will focus on scouting, timely herbicide application and conversion of infested acres to row crop.

## WEDNESDAY MORNING II: 10:00 am – 11:40 am

### Forest Pest Challenges and Management Strategies

#### Gypsy Moth Survey and Control in Iowa

Mike Kintner, Iowa Department of Agriculture and Land Stewardship  
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Since its introduction into the United States in 1869, Gypsy Moth (*Lymantria dispar*) has slowly been expanding its range. How its spread is being tracked and managed along the advancing front in Iowa will be discussed.

#### Etiology and Epidemiology of Thousand Cankers Disease in the Eastern USA

Jennifer Juzwik<sup>1</sup> and Matthew Ginzel<sup>2</sup>; <sup>1</sup>U.S. Forest Service, <sup>2</sup>Dept. of Entomology, Purdue University  
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Progressive branch dieback and death of mature eastern black walnut (*Juglans nigra*) was first attributed to a newly described disease, Thousand Cankers (TCD), in Colorado in 2009. The complex interaction of the walnut twig beetle (*Pityophthorus juglandis*) and a canker-causing fungus (*Geosmithia morbida*) results in symptom development and disease progression. Subsequent detection of TCD in eastern states, the native range of *J. nigra*, was accompanied by establishment of state-enacted quarantines due to the high potential for significant economic loss of the species. Greater understanding of the etiology and epidemiology of TCD are needed to properly assess the threat that TCD poses to *J. nigra* timber and nut production in the region and to

develop appropriate disease management tools and tactics. Key findings of observational and experimental field studies conducted in the region since 2010 will be presented. Multiple year studies in Ohio, Tennessee and Virginia have identified abiotic factors and additional biotic agents associated with branch dieback in TCD-diagnosed trees. In addition, discovery of *G. morbida* on other scolytine insects besides *P. juglandis* in Indiana and Ohio suggests the distribution and spread of the pathogen are more complex than the walnut twig beetle - *G. morbida* association originally described in 2009.

#### Environmental and Biological Factors Associated with White Oak Mortality in the Missouri Ozarks

Sharon Reed<sup>\*1</sup>, James English<sup>1</sup>, John Kabrick<sup>2</sup>, Rose Marie Muzika<sup>1</sup>; <sup>1</sup>University of Missouri, <sup>2</sup>USDA Forest Service  
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A new pattern of white oak mortality was observed in the Missouri Ozarks circa 2011. Foresters and land managers reported that white oaks growing in drainages and at the base of slopes died abruptly while other species were not affected. A multi-year project was initiated to describe the types of trees affected as well as investigate the pathogens, insects, and environmental factors associated with the mortality. During 2015, 28 sites with low, moderate and severe levels of white oak mortality were surveyed in the Missouri Ozarks. So far, a root rot pathogen, *Phytophthora cinnamomi*, was isolated from several sites with white oak mortality. In addition, there is evidence that plant-water relations may play an important role in determining the severity of white oak mortality.

#### Oak Wilt: A Delicate Diagnosis of an Imminent Spreading Disease

Dr. Lina Rodriguez Salamanca<sup>\*1</sup>, Anna Yang<sup>2</sup>, Jennifer Juzwik<sup>3</sup>; <sup>1</sup>Iowa State University PIDC, <sup>2</sup>University of Minnesota, <sup>3</sup>U.S. Forest Service  
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Oak wilt is a devastating disease of oaks in the Midwest impacting landscapes and natural woodlands. The fungal pathogen *Ceratocystis facacearum* causes rapid death of oak trees in the red group and can be spread long distances with the aid of a vector and short distances through root grafting. Early and accurate detection of the pathogen is important to guide prompt disease management tactics needed to reduce the risk of the disease spreading to healthy oaks. Symptoms of oak wilt may be confused with two-lined chestnut borer, bur oak blight, bacterial leaf scorch, physiological scorch, and oak decline. Laboratory diagnosis protocols developed by the Forest Service are reliable and routinely used by local diagnostic clinics in the north central states to diagnose this disease. However, sample collection instructions including the importance of sample refrigeration chain, when disregarded, can result in false negatives. Resources from the Forest Service, the ISU Plant and Insect Diagnostics Clinic will be presented to aid in collecting and submitting a sample for oak wilt testing.

**Invasive Jumping Worms: Addressing the Impact of a New Soil Invader**

Brad Herrick<sup>\*1</sup>, Bernadette Williams<sup>2</sup>; <sup>1</sup>University of Wisconsin-Madison Arboretum, <sup>2</sup>Wisconsin Department of Natural Resources  
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In fall 2013, jumping worms (*Amyntas spp.*) were confirmed at the University of Wisconsin-Madison Arboretum, marking the first record of this aggressive, non-native species in Wisconsin. Endemic to Southeast Asia, jumping worms are found in at least 16 states from the Southeast to Northeast and Midwest. Jumping worms have been shown to cause significant changes to soil structure and nutrient cycling as well as out-compete native soil fauna and other non-native earthworms. This presentation will focus on mechanisms for spread, potential threats, best management practices (BMP's) for mitigating the spread, and current research being conducted at the UW-Madison Arboretum.

**Lunch Plenary 12:00 pm – 1:15 pm**

**Changes in Climate that Impact Invasive Species**

Gene Takle, Iowa State University

Changes in climate means and variability are well documented on the global, national, state and local scales. Human contributions to climate change (HCCC) surpassed natural variability on the global scale in the 1970s and have become increasingly larger than natural variability since that time. Influences of changes in climate means and variability on local ecosystems are widely known but differ with location based on ecosystem compositions. Climate change at reproductive and juvenile growth stages can have particularly high impact. In the normal pushing and shoving in competition for nutrients, light, and water in a healthy ecosystem the passing of critical climate thresholds will cause some species to blink on and others to blink off. Foraging activities of animals and insects, and parasitic impacts of fungi and mold also emerge or vanish as the climate windows changes. Oh wait, I forgot about soil ecosystems – multiply everything I have just said by a factor of two!

**WEDNESDAY AFTERNOON: 1:30 pm – 3:10 pm**

**Innovative Methods to Manage Invasive Plants**

**New Ultra-Low Pressure Herbicide Dispenser Reduces Drift and Increases Target Adhesion**

John Lampe, Green Shoots, LLC  
651-245-4682  
john@greenshootsonline.com

This presentation focuses on a new ultra-low pressure electric dispenser for herbicides. Ultra-low pressure (below about 20 pounds per square inch) has been used in the commercial spray coatings industry to increase “transfer efficiency” – i.e., the amount of spray material that adheres to the target compared to the amount of spray material released from the dispenser. The new ultra-low pressure electric dispenser for herbicides is designed to release slower spray drops of a more

uniform size. The possible benefits of this technology include reduced spray drift and off-target spray; increased target adhesion; and decreased power demands on the dispenser.

**Biological Control of Garlic Mustard (*Alliaria petiolata*)**

Roger Becker<sup>\*1</sup>, Jeanie Katovich<sup>1</sup>, Mary Marek-Spatz<sup>1</sup>, Laura Van Riper<sup>2</sup>; Ghislaine Cortat<sup>3</sup>; <sup>1</sup>University of Minnesota, <sup>2</sup>Minnesota Department of Natural Resources, <sup>3</sup>CABI Switzerland  
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Garlic mustard (*Alliaria petiolata*) is an invasive biennial plant native to Europe. In North America, garlic mustard poses a threat to regeneration of native herbaceous and woody plants in the forest understory. Problems caused by garlic mustard and updates on two of the most promising biological control insects, the European weevils *Ceutorhynchus scrobicollis*, a crown-miner, and *Ceutorhynchus constrictus*, a seed-feeder, will be presented. Culminating efforts since 1998, we petitioned APHIS to gain approval for release of *C. scrobicollis* for biological control of garlic mustard in June of 2016. At that time, we had tested 111 species, within 23 families, including 7 endangered species one threatened species, plus 18 surrogates for threatened and endangered species. Eighty-five species have been tested in the Brassicaceae family alone, comprising 20 tribes, and 35, 42, and 3 species in Brassicaceae lineage I, II, and III, respectively. Based on fundamental and realized host range testing, *C. scrobicollis* should be approved for release as the first biological control agent for control of garlic mustard in North Americas. We anticipate petitioning for release of *C. constrictus* by 2018. We will also discuss our history of and perspectives on long-term garlic mustard population monitoring.

**Aerial Herbicide Application for Control of Bush Honeysuckle**

Josh Rusk, Iowa Department of Natural Resources  
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Bush honeysuckle (*Lonicera spp.*) is an invasive shrub species that has invaded many woodlands in the Midwest. A unique characteristic of this shrub is that it retains its leaves and stays green much later in the fall than most native woody and herbaceous plant species. This provides a window for aerial herbicide application that will have minimal effect on native plant species. In early November of 2014 we applied glyphosate at a rate of 3 qts/acre to 50 acres of bush honeysuckle using a helicopter on the Ringgold Wildlife Management Area (WMA) in southern Ringgold County in south central Iowa. The kill on honeysuckle was observed to be patchy. In October of 2015 thirty 7x7 yard plots were surveyed on areas containing bush honeysuckle on the Mt Ayr and Ringgold WMAs. Live stem count and estimated canopy cover of bush honeysuckle was recorded for each plot. Photos were also taken in the four cardinal directions from the northwest corner of each plot. In early November of 2015, 50 acres of woodland containing honeysuckle on the Ringgold WMA was sprayed (partial overlap with 2014 application). Ninety acres of oak hickory woodland containing an understory of bush honeysuckle was sprayed on the Mt Ayr WMA. As of August of 2016 the observed kill of bush honeysuckle has been fairly high. With the total cost of

\*Presenting Author

herbicide application around \$50/acre this has the potential to be one of the most efficient and effective methods of control for bush honeysuckle. The plots will be surveyed in October of 2016 and these results would be presented at this conference. In the fall of 2016 the unit plans to spray another 411 acres of honeysuckle using this technique.

**Aquatic and Wetland Plant Identification and Management**

**Identification and Distribution of Aquatic Invasive Plants in Iowa and Emerging Aquatic Invasive Plant Threats to Iowa**

*Kim Bogenschutz, Iowa Department of Natural Resources*  
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Multiple species of invasive aquatic plants are having or have the potential to impact aquatic habitats and recreation in Iowa. This presentation will profile the identification and distribution of some of the invasive aquatic plants already found in Iowa (e.g., Eurasian watermilfoil (*Myriophyllum spicatum*), brittle naiad (*Najas minor*), curlyleaf pondweed (*Potamogeton crispus*) and other species of invasive aquatic plants threatening to spread into Iowa (e.g., hydrilla (*Hydrilla verticillata*), Brazilian waterweed (*Egeria densa*), and salt cedar (*Tamarix spp.*)).

**Management of Reed Canary Grass on NW Iowa Floodplains**

*Lucas Straw\*, Steve Woodruff; Iowa Department of Natural Resources*  
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Reed canary grass (*Phalaris arundinacea*) is a common graminoid invasive species of wet and wet/mesic communities. When found in these communities, it often becomes a mono-culture, out competing native plants and reducing the value for both game and non-game fauna dependent on these communities. Control is difficult using standard management practices, and eradication is nearly impossible. With this in mind, we decided to try and manage the infestation using a deliberate management technique first put forth by Carl Kurtz. Our experimental area is located on the Hawk Valley WMA in the Little Sioux River Valley of Clay County. This property is in the NRCS WRP program, and was allowed to re-vegetate naturally. This area is inundated with each flood, and is dominated by reed canary grass (RCG), with sporadic native grasses and forbs. We decided to experiment on a small area of the WMA, setting up 3 side by side treatments for reed canary grass. The three treatments consist of a one-year treatment, a two year (back to back) treatment, and a two year (every other year) treatment. For each, a late summer hay cut is taken in mid-August by a local cooperator. If re-growth exceeds 8 inches, a second cutting is taken, but no later than September 15. The area is then allowed to green back up until the first hard freeze. After this first hard freeze, a 2% solution of glyphosate (Roundup) is applied. At this time, the native species that are present have senesced, leaving only the RCG green and able to take up chemical. Upon visual survey over subsequent years, it appears that RCG can be reduced in this setting by 75-90%. Native wet prairie/sedge meadow vegetation response has been tremendous, with sedges and wetland forbs now dominating the site.

**Herbicides Available For Use on Submersed, Wetland, and Riparian Plants**

*Brian Isaacs, Aquatic Control, Inc.*  
800-753-5253  
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This talk will highlight the various herbicides registered for use in controlling plants in aquatic sites. Focus will be given to the control of invasive species that threaten the aquatic resources of Iowa and other states in the Midwest such as: Curlyleaf pondweed, Purple loosestrife, Eurasian watermilfoil, Northern watermilfoil and their hybrid species.

**Management of Eurasian Watermilfoil and Brittle Naiad in Iowa**

*Jason Euchner\*, Kim Bogenschutz, Iowa Department of Natural Resources*  
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The Iowa Department of Natural Resources has been managing Eurasian watermilfoil (*Myriophyllum spicatum*) and brittle naiad (*Najas minor*) in waterbodies throughout the state since 1994 and 2004, respectively. Case studies will be used to show lessons learned using physical (e.g., water level drawdown) and chemical (e.g. fluridone, triclopyr, diquat dibromide) methods to manage these species in Iowa waterbodies. Current strategies for managing Eurasian watermilfoil and brittle naiad in Iowa will be also described.

**Workshop: Verbal Judo (Communication): Tools for Challenging Invasive Species Situations**

*Bill Daleske, Retired State Patrolman*  
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State employees and contractors work in the field directly with residents and land owners who have a personal vested interest in their land and surrounding natural resources. As governments or conservationists working to resolve environmental issues we must frequently work with others who may have a much different view of the situation. Ultimately, our goal is to respectfully discuss the situation and actively listen to the other side. Make sure we understand and take investment in their opinions. We will learn to convey that our goals are to improve the natural environment. Verbal Judo teaches the skills necessary to remain centered and focused during any verbal circumstance. You will learn to redirect behavior, diffuse difficult situations and attempt to generate voluntary compliance from people. The goal is not that they agree with your objectives, but they hopefully will gain understanding of your goals and recognize they are not antagonistic to their opinions, rather the field representative is trying to complete an assignment. The mediation efforts will often allow you to complete your tasks without undue violence or obstructionism. The class format will have active participation in role-playing several situations and showing how to use words and actions to redirect the situation and actively defuse negativity and obstructionism. The role-playing by the instructor will be fun for the class to watch and a great break from the conference! Sign up and be ready to defuse a heated battle over wild carrot!

# AUTHOR BIOSKETCHES

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Jason Auel is the Wildlife Biologist for the Iowa Department of Natural Resources at the Cedar-Wapsi Wildlife Unit.

**Chuck Barger**

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Chuck has been with the University of Georgia for 20 years where his work focuses on invasive species and information technology. Websites that he designed have been featured twice in Science Magazine and have received over 1.7 billion hits since 2002. Chuck developed the infrastructure behind Bugwood Images which runs the ForestryImages.org and Invasive.org websites. Recently, Chuck has focused on mapping invasive species and tools for Early Detection and Rapid Response using EDDMapS and smartphone applications. He has led development of 35 smartphone applications including the first apps for the U.S. Forest Service and National Park Service. He was appointed to the National Invasive Species Advisory Council in 2013. Chuck has been an invited speaker at over 80 regional and national conferences and co-authored over 20 journal articles and outreach publications.

**Roger Becker**

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Roger Becker is a State Extension Agronomist - Weed Scientist. He researches and implements management strategies in annual and perennial systems in disturbed and undisturbed habitats. Current projects include management of purple loosestrife in wetlands; garlic mustard and buckthorn in woodlands; and Canada thistle in native prairies, pastures and right-of-ways. Also prairie establishment, weed management in forages and in processing vegetables, and, the environmental impacts of herbicide and non-herbicide weed management systems.

**Dr. Neil Bernstein**

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Neil P. Bernstein is professor of biology at Mount Mercy University. His current research includes conservation ecology of ornate box turtles as well as sand prairie ecology in Iowa.

**Kim Bogenschutz**

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Kim has been the Aquatic Invasive Species Program Coordinator for the Iowa Department of Natural Resources since 2000. She has a BA in Biology from Gustavus Adolphus College and an MS in Fisheries Science from South Dakota State University and has worked on aquatic habitats in Minnesota, Indiana, and Iowa for over 25 years. Kim is vice-chair of the Association of Fish and Wildlife Agencies Invasive Species Committee, served as chair of

the Mississippi River Basin Panel on Aquatic Nuisance Species (ANS), is on the Executive Committee of the Midwest Invasive Plant Network, and is a member of the ANS Task Force and American Fisheries Society Introduced Fish Section.

**Tim Campbell**

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Tim Campbell is an aquatic invasive species outreach specialist for the University of Wisconsin Extension Environmental Resources Center, the University of Wisconsin Sea Grant Institute, and the Wisconsin DNR. He coordinates AIS prevention outreach and communications across all three programs, and works to incorporate local, regional, and national work into Wisconsin's AIS outreach. Tim has been working in the AIS outreach world since 2011. Before that, Tim completed his undergraduate work at the University of Notre Dame and his graduate work on the invasive round goby at Oakland University in Rochester, MI.

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Jason Euchner has been the technician for the Iowa Department of Natural Resources Aquatic Invasive Species Program since 2006. Jason's work focuses on field monitoring of invasive aquatic plants and animals in Iowa. He also develops management plans for submersed invasive aquatic plants infesting Iowa lakes, ponds, and reservoirs throughout Iowa. Jason is actively involved with the Mississippi River Basin Panel on Aquatic Nuisance Species and the Upper Mississippi River Asian Carp Coordination Team.

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Chris Evans is an Extension Forestry and Research Specialist with the University of Illinois Department of Natural Resources and Environmental Sciences. He received a B.S. in Wildlife Biology from Murray State University and a M.S. in Forest Biology from Iowa State University. Prior to his appointment at U of I, Chris worked as the coordinator of the Illinois Wildlife Action Plan's Invasive Species Campaign. He has served on the board of the National Association of Invasive Plant Councils and the Midwest Invasive Plant Network and chaired the Illinois Invasive Plant Species Council.

**Scott Flynn**

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Scott Flynn is a field scientist for Dow Agrosciences LLC, who specializes in range and pasture, and industrial vegetation management. Over his career Scott has focused on development of new herbicide products to improve weed control in forage

systems, the benefits of weed control on cattle production, managing fescue toxicosis with chemical seedhead suppression, and removal of invasive plant species in wildlife areas and right-of-ways. He received a B.S. in Agriculture and a Business Minor from Eastern Kentucky University; a Master's Degree in Plant and Soil Science from the University of Kentucky; and a PhD in Crop Production and Physiology from Iowa State University.

**Jacob Grace**

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Jacob Grace is a second year Master's Degree candidate in the Agroecology Program at the University of Wisconsin-Madison. He grew up on a rotationally-grazed farm in northwest Missouri and received a B.S. in biology from Truman State University. Jacob is interested in the potential of rotational grazing to accomplish both agricultural and conservation objectives. In addition to his grazing research, he is pursuing a second Master's Degree in Life Sciences Communication.

**Lyle Guyon**

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Dr. Lyle Guyon has been a terrestrial ecologist at the National Great Rivers Research & Education Center (NGRREC) since 2005, where his activities are primarily focused on floodplain forest ecology and management in the Upper Mississippi River System (UMRS). Research and monitoring projects have included ecological assessments of floodplain forests; the establishment of a long-term floodplain forest monitoring network in the UMRS; invasive species control and management; and extensive habitat surveys conducted for federal and state agencies. Dr. Guyon and his team regularly provide technical assistance to the U.S. Army Corps of Engineers and the Natural Resources Conservation Service. Additional responsibilities include teaching summer field courses and coordinating NGRREC's management of the Palisades Nature Preserve and other environmental research and demonstration areas.

**Emma Hanigan**

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Emma is the State Urban and Community Forestry Coordinator for the Iowa Department of Natural Resources. She is responsible for the statewide Community Forestry Program, providing technical assistance to all 99 counties. Her work as a coordinator includes education and training to city staff, tree boards, volunteers and others interested in managing the public tree resource. Additionally, she assists with tree inventories, urban forest management plans, mitigation planning for invasive species, updating tree ordinances, and planting selection for underserved communities. She is an International Society of Arboriculture (ISA) Certified Arborist and Certified Public Manager. Emma graduated with a Bachelor of Science degree in Forestry with an emphasis in Urban and Community Forestry from Iowa State University.

**Raymond Hansen**

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Ray Hansen is the Director of ISU Value-Added Agriculture Program and is the owner and operator of Prairiewood Farms. Hansen has over 30 years of off-farm experience working in education.

**Ryan Harr**

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Ryan Harr is a private lands wildlife biologist with the Iowa Department of Natural Resources, located in north-central Iowa. Through this role, as well as previous roles with Iowa State University, Ryan has extensive experience working with private landowners as early adopters of new and innovative conservation practices, as well as with the application of fire and grazing practices in the conservation of Midwest habitats. More recently he has continued to follow trends in the combination of fire and grazing management, including the application of such practices to wetland and riverine systems, especially in the context of reducing invasive species competition.

**Bob Hartzler**

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Bob Hartzler is a weed scientist with responsibilities in extension, teaching and research at Iowa State University.

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Chris Henze is the Roadside Vegetation Manager and County Weed Commissioner for Johnson County Secondary Road Department in Eastern Iowa. Chris has been managing noxious weeds and invasive species in roadsides for nearly 20 years along with being in charge of the Integrated Roadside Vegetation Management Program (IRVM). While on the job you may find Chris conducting prescribed burns, planting native grasses and wildflowers in roadsides, installing erosion controls, in a tractor or running a chainsaw. Chris is also chairperson of the Hawkeye Cooperative Weed Management Area and is active in grant activities as well as invasive species management and educational efforts. Chris lives in Eastern Iowa and stays busy officiating football and softball games and occasionally he gets to sneak out and spend some time hunting or trying to snag a fish.

**Brad Herrick**

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Brad Herrick is the ecologist and research program manager at the UW-Madison Arboretum.

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Jerod Huebner graduated from the University of Missouri - Columbia with a Bachelors in Fisheries and Wildlife. He spent 10 years working for the Missouri Department of Conservation in various capacities through central and eastern Missouri. The last 2 years with MDC were spent in the St. Louis region as a Wildlife Biologist. Since the summer of 2015, Jerod has been the Director of Prairie Management for the Missouri Prairie Foundation.

**Brian Isaacs**

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Brian Isaacs began full time employment with Aquatic Control, Inc in 1995. Aquatic Control, Inc has been providing products, services and staff for managing lakes, ponds, and other aquatic resources since 1966. The staff includes: Fisheries biologists, Factory trained fountain specialists and Licensed aquatic applicators.

**Doug Jensen**

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For over two decades, Doug has used science-based strategies to foster behavior change aimed at preventing AIS spread. His work supports two national campaigns, Stop Aquatic Hitchhikers!, Habitattitude, and many other regional and local programs. Doug has authored dozens of scientific papers and education resources and received dozens of national and regional awards for his work. He currently Co-Chairs the Communication, Education and Outreach Committee of the ANSTF as well as Chairs the Information & Education Committee for the Great Lakes Panel on ANS. On behalf of the Great Lakes Sea Grant Network, he leads the Great Lakes Habitattitude Collaborative. He co-chaired the fifth bi-annual 2016 Upper Midwest Invasive Species Conference, La Crosse, WI, which is now the largest invasive species venue in North America. Doug has an MS in Education and a BS in Biology, University of Minnesota Duluth.

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Jennifer Juzwik (Ph.D.) is a research plant pathologist with the Northern Research Station, U.S. Forest Service; an adjunct associate professor with the University of Minnesota - St. Paul; and a member of the Hardwood Tree Improvement and Regeneration Center, Purdue University. Dr. Juzwik conducts research on the etiology, epidemiology and management of important hardwood diseases in the Midwest and Northeast USA. Her career-long interest is the interactions of fungi and insects that are harmful to tree health. Her current work on walnut is focused on understanding the role of canker-causing fungi and of select scolytine insects in the progression and transmission, respectively, of Thousand Cankers Disease in eastern states.

**Andy Kellner**

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Andy Kellner is a Natural Resource Technician 2 with the Iowa Department of Natural Resources (IDNR) in the Wildlife Depredation Program. Andy has a B.A. in Biological Aspects of Conservation and a B.A. in Anthropology from the University of Wisconsin-Madison. As a Natural Resource Technician 1, Andy worked with the Grand River Wildlife Unit since 2011 where he carried out habitat management on 15 Wildlife Management Areas totaling 20,000 acres. Since 2014 he has been the technician for the Wildlife Depredation Program for southwest Iowa. Prior to working at the Grand River Wildlife Unit, Andy worked as a Fisheries Technician with Colorado State University's Larval Fish Laboratory, a Natural Resource Aide with the Missouri River Wildlife Unit of the IDNR, and a Biological Field Technician in Glacier National Park.

**Linda King**

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Linda has been with the Iowa Department of Natural Resources for 16 years managing programs in energy efficiency, pollution prevention and volunteers. Since 2014 Linda has been the DNR's AmeriCorps Program Director while maintaining her position as Volunteer Coordinator. She has twenty-four years of experience writing and managing grants for eight states, the US Environmental Protection Agency and US Department of Energy. Linda volunteers her time to P.E.O., a philanthropic educational organization dedicated to educating women since 1869.

**Mike Kintner**

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Mike Kintner has been with the Iowa Department of Agriculture and Land Stewardship for 9 years, and is currently the Emerald Ash Borer and Gypsy Moth Coordinator. Prior to this role, he served as a Regional Entomologist with the Department. During his time with the State Department of Agriculture, he has worked with both regulatory and outreach components.

**Megan Korte**

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Megan Korte has an M.S. in Biology from the University of Nebraska at Omaha and has worked for the US Geological Survey assisting terrestrial research at the Lake Michigan Ecological Research Station for 3 years. Her research interests include working with federally threatened plant species (Pitcher's thistle), invasive species and savanna restoration.

**John Lampe**

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John founded Green Shoots, LLC, in 2011. Green Shoots develops and markets precision devices for control of invasive plants. John has presented at numerous conferences: Upper Midwest Invasive

Species Conferences, Midwest-Great Lakes Society for Ecological Restoration Chapter Meetings, and North Central Weed Science Society Meetings. He is a licensed pesticide applicator. For more than two decades John has helped restore ecosystems burdened with invasive species - much of that work has been as a volunteer.

**Beth Lynch**

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In 2001, Beth Lynch moved from Dubuque, IA, to Decorah, IA, where she is a professor in the Biology Department at Luther College. Having witnessed the rapid spread of garlic mustard in high quality natural areas near Dubuque, she began pulling garlic mustard as soon as she discovered it growing in parks in the City of Decorah. Along with other local biologists and a growing number of citizen volunteers, she continues to manage the spread of garlic mustard on thousands of acres of public and private land in Winneshiek County. In 2015, she and Mary Lewis, also of Decorah, were awarded the Hagie from the Iowa Natural Heritage Foundation in recognition of this work in the City of Decorah.

**Nicholas Lyon**

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Jerod Huebner graduated from the University of Missouri - Columbia with a Bachelors in Fisheries and Wildlife. He spent 10 years working for the Missouri Department of Conservation in various capacities through central and eastern Missouri. The last 2 years with MDC were spent in the St. Louis region as a Wildlife Biologist. Since the summer of 2015, Jerod has been the Director of Prairie Management for the Missouri Prairie Foundation.

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Aaron is a research assistant at Iowa State University working on his master's degree in Fisheries Biology within the department of Natural Resource Ecology and Management in conjunction with the Iowa Cooperative Fish and Wildlife Research Unit.

**David McCullough**

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David McCullough is a Professor of Biology and Co-coordinator of Environmental Science and Studies at Wartburg College (Waverly, IA). His areas of expertise lie in conservation genetics and landscape ecology. Specifically the role greenspaces play in providing refugia for native organisms in altered landscapes. Invasives are always part of the equation when dealing with ecological disturbance and thus, regularly play into his studies.

**Molly McNicoll**

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Molly McNicoll is an assistant professor of Biology at Luther College in Decorah, Iowa. She also manages the college's 700 acres of natural areas with a group of student land stewardship

interns. Her interests lie at the cross section of ecology and applied conservation biology, using the two areas to inform one another. She is interested in training undergraduate students to easily move between research science, applied ecology, and land management. The land stewardship interns spend many hours managing invasive species and conducting research to provide evidence-based management. They heartily embrace any research and/or management treatment that will reduce the density of wild parsnip, and thus their encounters with it.

**Kristine Nemec**

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Kristine Nemec manages the integrated roadside vegetation management program at the University of Northern Iowa Tallgrass Prairie Center, providing training and education for Iowa's county roadside programs, and conducting outreach to raise awareness of IRVM. She received a B.S. in Environmental Studies and an M.A. in Biology from the University of Nebraska at Omaha, and a Ph.D. in Natural Resource Sciences from the University of Nebraska-Lincoln.

**Anne Pearce**

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Anne Pearce coordinates the Wisconsin First Detector Network, a statewide citizen science network that empowers people to take action against invasive species through monitoring, management, and outreach. She supports WIFDN's volunteer citizen scientists and develops and facilitates online and in person trainings. She holds an M.S. in Water Resources Management from the University of Wisconsin-Madison, in addition to a Graduate Certificate in Environmental Education from the University of Minnesota-Duluth. Prior to joining WIFDN, Anne spent several years teaching environmental education and working on conservation projects across the country.

**Jim Peters**

*Samaritan Detection Dogs*  
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Jim Peters (MS) is a partner in Samaritan Detection Dogs, LLC (SDD). Jim draws from his lifetime of living with dogs to train them (with his business partner Brett Sorrells) for search and rescue, human remains detection, historic human remains detection (pioneer and Native American burials), and conservation. SDD dogs have worked on projects to locate missing persons, Native American burial mounds, garlic mustard, and Blanding's turtles. All dogs owned, loved, and deployed by SDD have been rescued from shelters or were donated.

**Sharon Reed**

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Dr. Sharon Reed is a research scientist investigating forest health at the University of Missouri. She is currently the project lead in a multi-year project investigating the pathogens, insects and environmental factors that play a role in white oak mortality in the Missouri Ozarks.

**Mark Renz**

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Mark Renz (PhD) is an associate professor and extension weed specialist with the University of Wisconsin-Madison. Dr. Renz researches and extends information about the biology and management of invasive plants. Research goals in Dr. Renz's lab are centered on developing information that will improve management by improving the knowledge and understanding of invasive plant biology. Dr. Renz has over 15 years of experience with management of invasive plants throughout the United States in a wide range of habitats including riparian zones, roadsides, floodplains, prairies, wetlands, and forests. Education efforts focus on providing technical information and educational opportunities for agency staff, consultants, companies, and citizens concerned about invasive plants. Dr. Renz also is the president of the Midwest Invasive Plant Network whose mission is to reduce the impact of invasive plants in the Midwestern United States.

**Dr. Lina Rodriguez Salamanca**

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Dr. Lina Rodriguez-Salamanca is an extension plant pathologist and diagnostician with the Iowa State University, a member of the North Central Plant Diagnostic Network (NCPDN) and National Plant Diagnostic Network (NPDN, [www.npdn.org](http://www.npdn.org)). Lina's responsibilities in the clinic include diagnosis of diseases and disorders of ornamental and horticulture plants and crops as well as tree problem diagnosis. She is part of two NPDN committees, Diagnostics and Training and Education; both focused on advancing diagnostics nationally, but also educate diagnosticians and the general public about invasive pests and diseases.

**Josh Rusk**

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Josh Rusk is a Natural Resource Technician 2 with Iowa Department of Natural Resources, Grand River Wildlife Unit. Josh has a B.S. degree from Iowa State University in Animal Ecology and a M.S. degree from Texas A&M University Kingsville in Range and Wildlife Science. Josh has been with the Grand River Wildlife Unit since 2008. Josh oversees the day-to-day activities at the wildlife unit which primarily involves management of 15 Wildlife Management Areas totaling 20,000 acres in southern Iowa. Prior to working at the Grand River Wildlife Unit Josh worked as a Private Lands Wildlife Specialist and also as a research technician for Iowa State on the Patch Burn Grazing Research Project.

**Clair Ryan**

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Clair Ryan became the Midwest Invasive Plant Network's Coordinator in December of 2016. Prior, she worked for 7 years in the field of water quality restoration in the Northeastern U.S. This work included a project that engaged the turf fertilizer industry in discussion about how to reduce water quality impacts from fertilizer runoff. Ms. Ryan holds master's degrees in environmental science and public policy from Indiana University and a bachelors in natural resources from Cornell University.

**Doug Sheeley**

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Doug Sheeley attended Iowa State University, graduating in 1984 with a BS in Fisheries and Wildlife Biology. In June of 1984 he began graduate work at Texas Tech University, studying winter ecology of Northern Pintails. After receiving his MS degree in 1987, Doug began work at Wildlife International Ltd. in Easton, Maryland as a terrestrial ecologist doing toxicology field studies for insecticide reregistration. In 1989 he returned to Iowa, working as a roadside biologist for Hardin and Dallas Counties. He began work with his current employer, Polk County Conservation, in July 2006 as Natural Resources Supervisor stationed at Chichaqua Bottoms Greenbelt. Currently, he is in the process of transitioning into a new role with Polk County Conservation as Conservation Ecologist

**Mark Shour**

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Dr. Shour is a program specialist with Iowa State University Extension and Outreach. He is responsible for pesticide safety education and implementation of integrated pest management principles for trees, shrubs, turf, greenhouses, right-of-ways, forests, aquatic sites, households, businesses, child cares, and schools. He also responds to ornamental and forestry pest inquiries and is on the Iowa Emerald Ash Borer Readiness Team. His formal education was done at the University of Central Missouri (BS Biology/Chemistry), University of Arizona (MS Entomology), and Purdue University (PhD Entomology).

**Ben Slager**

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Ben Slager is an entomologist by training and currently directs the Emerald Ash Borer (EAB) Biological Control Rearing Facility in Brighton, MI. He joined the EAB program in 2015 and has worked to facilitate expanding the biological control release footprint, increase public awareness of EAB biological control, and communicate technical information across national working groups. Ben also collaborates with USDA colleagues to further the current understanding of the biology and interactions of the EAB and its associated parasitoids.

**Pat Spain**

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Pat Spain has worked as Polk County Conservation for 22 years, first as a carpenter and since 2002 as the Planning and Outreach Coordinator. Pat is also the Secretary of the Polk County Resource Enhancement and Protection (REAP) Committee. Pat holds a BS in Community and Regional Planning from Iowa State University.

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Stephen Spilsbury is Tactive Digital's subject matter expert on digital marketing strategies. He focuses on professionally and effectively providing client need analysis to establish and implement digital marketing campaign utilizing various online products and inventories

**Aaron Steele**

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Aaron Steele is a co-owner of Goats OnThe Go, LC, a commercial targeted grazing service founded with business partner Chad Steenhoek in 2012. Goats OnThe Go is one of Iowa's first and most active grazing services, utilizing a herd of nearly 300 goats and a network of representatives in Ames, Des Moines, Pella, Iowa City, and Cedar Rapids to deliver professionally-managed grazing throughout Iowa and beyond. Customers have included the Iowa Department of Natural Resources, Iowa City Community School District, Madison County Conservation Board, and numerous private property owners in urban, suburban, and rural landscapes. In 2014, Goats On the Go won the Environmental Planning Award from the Iowa Chapter of the American Planning Association for its lakeshore grazing project for the City of Lake Park, Iowa. Mr. Steele holds a degree in Community and Regional Planning and a Master of Business Administration, both from Iowa State University.

**Lucas Straw**

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Lucas graduated from the University of Northern Iowa with a degree in Biology. He has worked for the Nature Conservancy, the Cerro Gordo County, Linn County and Cherokee County Conservation Boards, Driftless Land Stewardship, as well as owned and operated a business restoring native habitats and establishing reconstructed prairies. He is currently a Wildlife Technician 1 with the Iowa DNR at the Prairie Lakes Wildlife Unit. He is privileged to work with an exceptional team on various projects throughout Clay and Palo Alto Counties. Lucas's™ work entails management of various habitats including remnant and reconstructed prairie, oak savanna, wetlands, and shallow and deep water natural lakes. Activities include invasive species management, remnant habitat restoration, reconstruction of native ecosystem, prescribed fire, grazing management, wildlife population surveys, and many other activities related to native Iowa habitat and wildlife.

**Gene Takle**

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Gene has been on the faculty at Iowa State University since 1971 and currently holds the title of Charles F. Curtiss Distinguished Professor in Agriculture and Life Science. He has a BA in physics and math as well as an Honorary Doctor of Science degree from Luther College and a PhD in physics from Iowa State. He is a Fellow of the American Meteorological Society and has served as AMS Commissioner for Education and Human Resources. Gene

was the Coordinating Co-author of the Agriculture Chapter of the 2014 US National Climate Assessment and has served on the Board of Trustees of the University Corporation for Atmospheric Research. His current research areas include climate change science and adaptation and microclimate impacts of utility-scale wind farms.

**Perry Thostenson**

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Perry Thostenson is an Assistant Operation Project Manager at Red Rock Project, responsible for program areas inclusive of flood risk management, environmental stewardship and real estate, and joined the Red Rock team in 2007. He also has extensive experience with county conservation boards, having worked as a Park Ranger for Scott CCB; Executive Director at Mahaska CCB and Resource Manager for Wapello CCB. Experience also includes as a Land Conservation Specialist with the Iowa Natural Heritage Foundation. He earned a Bachelor of Arts Degree in Biology from Central College, in Pella, Iowa.

**Mike Todd**

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Mike Todd has taught science at Ames High School since 2006. He was awarded a Presidential Innovation Award for Environmental Education in 2013 and an Excellence in Science Teaching award from the Iowa Academy of Science in 2014. His innovative teaching methods engage his students in student-driven, community-based Environmental Impact Projects that work to transform the environment, community member mindsets, and the students. His students are active in managing and reconstructing prairie, creating a more sustainable school campus, and sustainable food system projects through collaborations with local farmers and the Lexicon of Sustainability. Mike hopes to continue to develop unique educational opportunities that change the way students see their world and give them the tools to make the changes they want to see.

**Jim Uthe**

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Jim Uthe is a graduate of the University of Northern Iowa and has 16 years of experience in natural resources management while working for The Nature Conservancy, U.S. Fish and Wildlife Service and Dallas County, where he is currently employed as Roadside Biologist and Weed Commissioner. His responsibilities with the County revolve around managing the vegetation in County roadsides, with an emphasis on establishing and maintaining native prairie vegetation.

**Amy Yoakum**

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Amy Yoakum is the Natural Resource Specialist for Story County Conservation. She has worked for the county for 18 years. SCC is a partner organization with PlayCleanGo.

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