Conference Program

2022 Innovations in Invasive Species Management Conference

Gaylord Opryland Resort and Convention Center and the Warner Parks

Nashville, TN

December 14th and 15th, 2022

Dear Conference Participants,

On Behalf of Invasive Plant Control, Inc. and the Tennessee Invasive Plant Council I would like to welcome you to Nashville, TN for the Innovations in Invasive Species Conference being held at the Gaylord Opryland Hotel and Convention Center December 14th through the 15th, 2022.

We have an exciting mix of professional and novice land managers in Nashville this week excited to hear about new innovations in the invasive species industry. After a long delay, we are also very excited to welcome back our international speakers. Look around and you will find not for profit land managers, Department of Defense resource managers, NPS, USFS and DOE invasive species experts. We have state parks, garden club members, agricultural extension agents and academia with us plus representatives from many other organizations. We would like to thank all of the speakers, vendors and attendees for making the time and financial commitment to be here with us in Nashville. We urge you to visit with one another, make new contacts and ask questions this week. There are many experts here with hands on knowledge of techniques that might be the tool you are missing to control the invasive species on your property.

Again, on behalf of the host organizations, welcome to Nashville!

Sincerely,

Steven T Manning
Conference Coordinator
President
Invasive Plant Control, Inc.

Conference Hosts

Invasive Plant Control, Inc. was established in 1997 and has operated as an entity exclusively focused on the control of invasive species for more than 25 years. IPC's team consists of highly skilled restoration specialists with extensive experience in ecological restoration with a focus on invasive species management. To find out more, please visit our website at www.invasiveplantcontrol.com

The Tennessee Exotic Pest Plant Council was established March 12, 1994 in Nashville at the first annual Tennessee Exotic Pest Plant Symposium with assistance and support from similar organizations in California and Florida. TN-IPC's role is to raise public awareness about the spread of invasive exotic plants into Tennessee's natural areas, facilitate the exchange of information concerning management and control of invasive exotic plants, provide a forum for all interested parties to participate in meetings, workshops, and an annual symposium, and to share the benefits from information provided by TN-IPC, serve as educational, advisory, and technical support on all aspects of invasive exotics and initiate campaign actions to prevent further invasive plant introductions. http://tnipc.org/

Innovations in Invasive Species Management Conference
2022 Agenda

December 14th, 2022 Canal AB in the Delta Atrium	
7:30am – 8:00am	**Registration**
8:00am – 8:05am	**Presenter: Steven Manning** ***Welcome***
8:05am – 9:00 am	**KEYNOTE: Dr Tanja Strive** Principal Research Scientist CSIRO Health & Biosecurity ***Biological control of rabbits in Australia – 70 years of landscape-scale management of a vertebrate pest.***
9:00am – 9:30am	**Presenter: Brian F Jorg** Manager Native Plant Program Cincinnati Zoo & Botanic Garden ***Bowyer farm-Restoring a Historic Wetland***
9:30am – 10:00am	**Presenter: Dwayne Estes** Co-Founder & Executive Director, Southeastern Grasslands Institute ***Historical considerations for restoring native grasslands of the Mid-South***
10:00am – 10:15am	**BREAK**
10:15am - 10:40am	**Presenter: Nick Rice** Environmental Biologist II Southern Nevada Water Authority ***Las Vegas goes "all in" on tamarisk removal***

10:40am – 11:05am	**Presenter: Casey Williams** Aquatic Plant Ecologist, BIO-WEST Inc. Round Rock, Texas ***Utilizing biological monitoring to guide implementation of an aquatic plant restoration project for the Fountain darter (Etheostoma fonticola)***
11:05am – 11:30am	**Presenter: Adam Berland, PhD** Associate Professor of Geography Ball State University ***Invasion Superhighways: How Lake tourism paves the way for the spread of exotic species***
11:30am – 12:15pm	**KEYNOTE: Prof. Iain Paterson** Centre for Biological Control, Rhodes University, Makhanda, South Africa ***Biological control of weeds: opportunities to control invasive alien plants through North American-African collaborations***
12:15pm – 12:45pm	**LUNCH in Canal CD**
12:45pm – 1:30pm	**KEYNOTE: Dan Tompkins** Science Director: Predator Free 2050 ***The research and tool development driving New Zealand's Predator Free 2050 mission***
1:30pm – 1:50pm	**Presenter: Robyn Carlton & Umar Muhammad (Intern)** CEO Lookout Mountain Conservancy ***Land and Life Lessons for Inner City Youth***
1:50pm – 2:15pm	**Presenter: Cayce McAlister** Garden Club of America **Presenter**: **Terri Hogan** Invasive Plant Program Manager, The National Park Service ***Creating a Collaborative Culture of Stewardship***
2:15pm – 3:00pm	**Session Leader: Dawn Slack** ***Indiana's CISMAs Tackle Invasive Species On Over 30,000 Acres Head On and Statewide Through Collaboration and Partnerships*** • Heather Shireman, Bartholomew County SWCD District Manager and

	Blazing Stars CISMA Member • Jennifer Whiteside, Bartholomew County, NRCS and Blazing Star CISMA Member • Terri Sanders, Harrison County Native Habitat Alliance CISMA Member • Ryan Goetz, Harrison County Native Habitat Alliance CISMA Member and Land Manager for TNC • Blair Beavers, Johnson County Native Plant Partnership CISMA Member and Johnson County SWCD District Manager • Karen Wade, Johnson County Native Plant Partnership CISMA Member • Dugan Jullian, Kosciusko Water and Woodlands Invasive Partnership CISMA Member and Regional Specialist for SICIM • Mandi Glanz, Representing the Northwest Indiana CiSMAs, Regional Specialist for SICIM.
3:00 pm to 3:10pm	**BREAK**
3:10pm-3:20pm	**Presenter: Sheila Kennedy** Owner/Operator S-K Environmental Portable Invasive Species Rinse off and Reclaim System ***Eliminating Invasive Species with Innovative Charged Technologies***
3:20pm – 3:45pm	**Presenter**: **Douglas A. Burkett, PhD**, Environmental Biologist Operations Division, Armed Forces Pest Management Board ***Operational invasive species projects and priorities in the Department of Defense***
3:45pm – 4:10pm	**Presenter : Julie Carpentier** National Advisor for Aquatic Invasive Species Biodiversity Management Directorate Aquatic Ecosystems Sector Fisheries and Oceans Canada ***DFO's Moss Ball Emergency Response: Operation Mussel Clean***
4:10pm – 4:35pm	**Presenters: Dr. Timothy J. Gaudin & Carissa Turner** **Dr. Timothy J. Gaudin** UC Foundation Professor Department of Biology, Geology & Environmental Science University of Tennessee at Chattanooga **Carissa Turner**

	Masters Student University of Tennessee at Chattanooga ***"The spread of nine-banded armadillos (Dasypus novemcinctus) in Tennessee: Determining habitat preferences of and assessing prevalence of Hansen's disease in Tennessee with assistance from community science data."***
4:35pm – 5:00pm	**Presenter: Cassie Cichorz** Outreach and Education Specialist for the Pest Program at the Washington State Department of Agriculture ***Preventing the spread and establishment of Vespa mandarinia in Washington state***
5:00pm – 5:25pm	**Presenter: Jeanine T Neskey** Biologist-Extension Specialist National Feral Swine Damage Management Program, USDA Wildlife Services ***Transboundary Collaboration to Squeal on Pigs!***
5:25pm – 6:00pm	**Presenter: Giovanni Polverino, PhD** Forrest Postdoctoral Research Fellow University of Western Australia ***Fishes and robots: The first bioinspired robot that selectively repels invasive mosquitofish (Gambusia holbrooki) and simultaneously attracts a non-invasive fish species, providing unambiguous evidence that robots can be designed to induce diverse reactions across species.***

6:00pm-7:00pm	**Opening night reception** **Located in the Detla Pavilion**
	Evening Presentation
7:00pm – 8:00pm	**KEYNOTE: Dan Tompkins** Science Director: Predator Free 2050 ***Predator Free 2050 – New Zealand's mission to eradicate key threats to biodiversity***

December 15th, 2022

Indoor Session 8:15-11:30
Outdoor Session at the Warner Parks 11:30-4:30
Meet at Canal AB at 8:00am

8:15am - 9:00am	**Keynote Speaker: Dr Tanja Strive** Principal Research Scientist CSIRO Health & Biosecurity ***Prospects for genetic biocontrol of vertebrate pests in Australia***
9:00am-9:30am	**Keynote Speaker: Stephen Enloe** Professor and Extension Specialist UF/IFAS Center for Aquatic and Invasive Plants Department of Agronomy University of Florida ***Innovations in IPT herbicide techniques: challenging old paradigms and forging new paths forward***
9:30am – 9:50am	**Presenter: Derek Yorks & Ben Stookey** Co-Founders of Wild Vision Systems ***A Smart-trapping System for the Live-Capture and Monitoring of Invasive Reptiles***
9:50am-10:10am	**Presenter: Chuck Bargeron** Director and Senior Public Service Associate University of Georgia – Center for Invasive Species and Ecosystem Health ***What's New with Smartphone Cameras and GPS and How it Can Help You***
10:10am – 10:40am	**Presenter: Jeremy French** Interior Low Plateau Ecoregion Coordinator RCPP Coordinator |Southeastern Grassland Initiative Quail Forever Austin Peay State University ***RCPP Grasslands: Restoring Grasslands on private land in Kentucky and Tennessee***
10:40am – 11:05am	**Presenter: Jenny Hannon** President Friends of Warner Parks

	Large scale restoration efforts underway at Nashville's 3,200-acre Warner Parks		
11:05am – 11:30am	**Presenter: Sam King** Stewardship Ecologist Tennessee Department of Environment and Conservation Division of Natural Areas ***A Case Study: Removal of Invasive Vegetation in the Presence of Endangered Invertebrates***		
11:30am	**Depart for Warner Parks**		
	Invasive Free at the WP Sheep Grazing, Backpack Applications, Hot Water Treatments, Volunteers		
12:00pm	**Catered Lunch at the Warner Parks Nature Center**		
1:00pm – 3:00pm	**Heatweed Station**	**Foamstream Station**	**Flaming Station**
	Stump Stopper	**Uprooter/Weed Wrench**	**RTV Sprayers**
	Green Climber	**Mechanical station**	**Green Shoots**
	ATV Sprayers	**Drone Spraying Demo**	**Mapping with Drones**
	Grassland Restoration	**Chew Crew**	
3:00-4:00	**2-mile hike for those interested**		
4:00pm – 4:45pm	**Return to Opryland Resort Hotel**		
5:00 pm to 6:00 pm	**Closing reception located at the Delta Pavilion**		

Speaker Abstracts and Biographies
(In alphabetical order by last name)

Presenter: Charles T Bargeron

Title: Director

Affiliation: Center for Invasive Species and Ecosystem Health, University of Georgia

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Title of Presentation

"What's New with Smartphone Cameras and GPS and How it Can Help You."

Abstract for Presentation

Every year, Apple, Samsung, and Google launch a new version of their smartphones and tablets, and the improvements seem less exciting every year. This year the improvements to the GPS and camera are very significant and will help you do your job better. This presentation will explain the new specifications in easy-to-understand terms and show real-world examples of the improvements.

Speaker Biography

Chuck has been with the University of Georgia for 23 years, where his work focuses on invasive species and information technology. He has a B.S. and M.S in Computer Science. 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 the development of 73 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 and elected as Chair in 2017. Chuck has been an invited speaker at over 300 regional and national conferences and co-authored over 62 journal articles and outreach publications. Chuck is the past president of the North American Invasive Species Management Association.

Presenter: Adam Berland

Title: Associate Professor of Geography

Affiliation: Ball State University

Contact Information

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Telephone: 765.285.1334

Address: Ball State University, Department of Geography & Meteorology (CP 204N), 2000 W University Ave, Muncie, IN 47306

Title of Presentation

"Invasion Superhighways: How Lake tourism paves the way for the spread of exotic species"

Abstract

Human activities are the leading cause of biological invasions that cause ecologic and economic damage. Aquatic invasive species are often spread by recreational anglers who visit two or more bodies of water within a short time frame. However, information about the human networks through which aquatic invasive species are spreading is limited by a lack of extensive human movement data. We used big data from a popular fishing app to reveal a dense network of short-distanced movements that combine to form invasion superhighways spanning the contiguous United States. Our study also revealed potential invasion fronts and invaded hubs that may be superspreaders for two relatively common aquatic invaders. Our results provide insight into a national network of aquatic invasions, and highlight both the potential of big data sources, and the role that anglers can play in preventing aquatic invasions.

Speaker Biography

Adam Berland is an Associate Professor of Geography and Ball State University in Muncie, IN. He received a bachelor's degree in Geography and Environmental Studies from the University of St. Thomas in St. Paul, MN. From there, he completed a master's and PhD in Geography at the University of Minnesota. Before arriving at Ball State, Adam spent two years as a research associate at the US Environmental Protection Agency, and two years as a visiting professor of Environmental Science and Geography at Miami University in Ohio.

Adam's expertise lies in the use of GIS and spatial analysis to study human-environment issues. His research addresses topics including invasive species, urban greening, environmental justice, forest ecology, and the use of emerging technologies for environmental monitoring. His work has spanned a range of spatial scales from individual cities to the entire United States.

In Muncie, Adam is a founding member of the Delaware County Invasive Plant Project and he is the secretary for the city's Urban Forestry Committee. He enjoys hiking, and is over halfway toward his goal of hiking every trail in Indiana's 24 state parks.

Presenter: Douglas A. Burkett, PhD

Title: Environmental Biologist

Affiliation: Armed Forces Pest Management Board Office of Deputy Assistant Secretary of Defense for Environment and Energy Resilience

Contact Information

Office of the Assistant Secretary of Defense (EI&E), US Army Garrison Forest Glen
2460 Linden Lane, Bldg 172
Silver Spring, MD 20910
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Presentation Title

"Operational invasive species projects and priorities in the U.S."

Abstract

Invasive species have a significant global impact on U.S. Department of Defense readiness, testing and training operations. Invasive species related adverse impacts include hindrances to testing and training, human health and safety, threatened and endangered species, wildland fire, deployment / redeployment of military material, biosecurity, military infrastructure, and other land use issues. Presentation will cover invasive species policy and show several diverse operational examples of where specific invasive species have tangible mission impacts on the U.S. Department of Defense.

Speaker Biography

Dr. Burkett is the Environmental Biologist at the Armed Forces Pest Management Board (AFPMB) under the Office of the Deputy Assistant Secretary of Defense for Environmental and Energy Resilience in Washington DC. He is responsible for formulating policy guidelines and providing outreach and technical guidance for integrated pest management, invasive species, biosecurity, pollinator protection, and other conservation pest management activities. In 2014, Dr. Burkett retired from the Air Force after 24 years' active duty as a medical entomologist where he variously served as the AF Chief of Conservation; ACC Environmental Range Officer, C-130 Aerial Spray Entomologist and served as AFPMB's Research Liaison Officer managing the Deployed Warfighter Protection Grant program. Dr. Burkett is current serving as the Co-Chair for both the DoD Invasive Species Sub-Committee and the National Military Fish and Wildlife Association's Invasive Species and Pollinator Working Groups. All of his academic degrees are in entomology (ISU, KSU, UoF). Has never quite outgrew his bug stage. Loves bird and wildlife photography, native plants, mushrooms, insect/plant interactions, gardening and pretty much anything living under a rock.

Presenter: Robyn Carlton and Umar Muhammad

Title: CEO

Affiliation: Lookout Mountain Conservancy

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Umar Muhammad

Title: Intern

Affiliation: Lookout Mountain Conservancy

Presentation Title

"Land and Life Lessons for Inner City Youth"

Abstract

This session will focus on connecting inner city youth to the land and using our work with invasive plants to teach life changing lessons.

Invasive species are living life lessons and mirrors the complexities of inner city neighborhoods. Examining the depth and strong hold that root systems have and understanding the right application for change is critical for healing the land and lives. Connecting at risk youth to the land allows everlasting change to lives and family patterns. Uprooting invasive plants and replacing with native plants teaches youth that real change can happen in their lives as well as the land.

Speaker Biography

Robyn received a Bachelor of Arts in Psychology and Education from LaGrange College in LaGrange, Georgia. Later she completed her MEd with an emphasis in psychological counseling at Auburn University. Before coming to Lookout Mountain Conservancy, Robyn started and owned her own bookstore named Inglenook; taught K-12 grade and coached junior and varsity basketball, softball and tennis at LaGrange Academy; and was an adjunct professor at Chattanooga State Community College and Cleveland State Community College.

The majority of Robyn's professional career has been in the area of mental and behavioral healthcare. She held positions in the southeast that allowed her to provide direct counseling, as well as designed, developed and administered mental health programs. Adolescence was her area of concentration.

The greatest gift she received from her mother was when her mother would say, "Go play outside." The outdoors became her safe place; her foundation.

Robyn loves the performing arts and specifically ballet. She danced with the Southern Ballet Company, the Atlanta Ballet Company and traveled with the group, Up With People, performing

at the 1972 Olympics in Munich, Germany. After dance, running became a passion and she completed 18 marathons. She has since traded in the ballet and running shoes for hiking shoes and fly fishing.

Robyn has 2 daughters and considers the 18 young men and women from the Intern and Leadership Program her family. Being a good parent is the most rewarding and important responsibility she believes she will ever have. Because of this, her life has forever changed.

Presenter: Cassie Cichorz

Title: Outreach Specialist
Affiliation: Washington State Department of Agriculture

Presentation Title

"Response to murder the hornets – Washington State eradication efforts to prevent the establishment of northern giant hornet"

Contact Information
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Abstract

Vespa mandarinia Smith, 1852, is the largest hornet in the world. In 2019 several specimens were detected in Canada and the United States. The Washington State Department of Agriculture (WSDA) and the United States Department of Agriculture collaborated to survey Washington for Vespa mandarinia or in 2020, deploying traps staffed by agency personnel, cooperators, and citizen scientists. Agencies produced extensive outreach and fielded numerous requests from media outlets and members of the public, they also responded to thousands of suspected reports. Public participation and agency's rapid response ultimately led to the discovery and removal of the first northern giant hornet nest in the United States. Efforts continued however, including additional research into pheromone attractants and genome sequencing. Season two's hornet hunt expanded in 2021 leading to multiple tracking events and three nest eradications. Learn how season three's investigation continues to prevent the spread and establishment of Vespa mandarinia in Washington state.

Speaker Biography

Cassie Cichorz is fueled by a passion for education and agriculture. She works as an outreach specialist for the Washington State Department of Agriculture. She is a transplant that comes from the rolling plains of South Dakota, sand hills of Nebraska, and Rockies of Colorado.

Cassie obtained her formal education through the University of Nebraska-Lincoln. Since then she has restored degraded watersheds, tracked endangered species, and battled educational inequities. Cassie works as a coconspirator informing farmers, sovereign nations, agencies, and community members. Cassie's goal is to help prevent the establishment and spread of invasive species by delivering project information, implementing outreach activities, and creating a positive community momentum.

Presenter: Julie Carpentier[1], Michael (Chi Hui) Zheng[1], Tim Gingera[1], Susan Roe[1].

[1] Fisheries and Oceans Canada, AIS NCP NCR

Presentation Title

"DFO's Moss Ball Emergency Response: Operation Mussel Clean"

Abstract

In early March 2021, Fisheries and Oceans Canada's (DFO) Aquatic Invasive Species National Core Program (AIS-NCP) in the National Capital Region (NCR) was notified by provincial partners that moss balls (an aquarium ornamental algae) infested with Zebra Mussels (*Dreissena polymorpha*) were being imported and sold in Canada. Zebra Mussels are a highly invasive bivalve mollusk that can cause irreparable damage to Canada's freshwater habitat and economy. Zebra Mussels are also a prohibited species under the Canadian federal *Aquatic Invasive Species Regulations* (Fisheries Act). In response, the AIS-NCP NCR stood up an emergency response structure using the Incident Command System (ICS). Command and General staff included DFO personnel from across the country in various fields, program staff, communications and enforcement, and Canada Border Services Agency. "Unified Command" was also formed with parallel emergency response structures led by Canadian western provinces.

This presentation will review the objectives of the response, how DFO collaborated with partners, and what tactics were used to address moss ball exporters, importers, retailers, the public, and e-commerce platforms. The national emergency response structure for moss balls stood down March 29th 2021 and the AIS-NCP continues to manage infested moss balls in Canada under a Sustained Action Plan.

Speaker Biography

Julie is a biologist in the Aquatic Invasive Species National Core Program at Fisheries and Oceans Canada (since 2019). Julie has a B.Sc. in biology from Laval University and a diploma in environmental management from the University of Sherbrooke. Julie has worked in the federal public sector for 22 years working on a variety of files, including the management of contaminated sites, environmental emergencies, and the development and implementation of federal regulations and policies.

Presenter: Dr. Stephen F Enloe

Title: Associate Professor

Affiliation: Agronomy Department/Center for Aquatic and Invasive Plants

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Presentation Title

"Innovations in IPT herbicide techniques: challenging old paradigms and forging new paths forward"

Abstract

Individual plant treatment techniques are widely used across the United States for management of a broad range of invasive plants. Many IPT techniques currently used for invasive plants were developed decades ago but were focused on silvicultural, rangeland, or rights-of-way weed control. The paradigms established from early work in these fields have generally been applied to natural area invasive plant management. However, they have at times, led to varying degrees of success due to unrealistic expectations, a lack of long-range planning, poor training, and ineffective allocation of limited resources for management efforts. This talk will examine current thinking on IPT approaches for invasive plant management and will challenge us to not only think outside the box, but to challenge the IPT box itself.

Speaker Biography

Dr. Enloe is a professor and extension specialist at the IFAS Center for Aquatic and Invasive Plants at the University of Florida. He has been involved with invasive plant research and extension for the past two decades and has worked throughout the western and southeastern United States on developing innovative management strategies for many of the worst invasive tree, shrub, vine, and herbaceous species in the US. Dr. Enloe earned his Ph.D at UC Davis in Plant Biology under Joe DiTomaso, a Master's degree in weed science from Colorado State University under Phil Westra and Scott Nissen, and an undergraduate degree in Agronomy from N.C. State.

Presenter: Dwayne Estes
Title: Co-Founder & Executive Director
Affiliation: Southeastern Grasslands Institute

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Presentation Title
"Historical considerations for restoring native grasslands of the Mid-South"

Abstract
The story of how Southeastern grasslands fueled America's westward migration is fascinating but untold. In fact, SGI calls it the "Untold Story of American History and Conservation." In this presentation, I'll trace the largely unknown "grassland highways and islands" that generations followed through the Southeast from the Atlantic Coast to the American West. Southeastern grasslands had been maintained by edaphic conditions, fire, grazing, and Native Americans. Rich meadows were replaced with sterile pastures. Fertile prairies were plowed into fields of corn and cotton. Savannas turned into forests with fire suppression and loss of bison. More than 90% of Southeastern grasslands have vanished, along with much of their biodiversity. Dwayne will show examples of the grasslands that were important in westward expansion and examples of some that managed to survive the past 500 years. A key component will be highlighting the indicator factors of historical grasslands that can guide modern restoration, management, re-creation, and preservation.

Speaker Biography
Dwayne Estes is the co-founder and executive director of the Southeastern Grasslands Institute, a conservation organization affiliated with Austin Peay State University that is dedicated to the protection and restoration of the Southeast's native grasslands. In addition to his role as executive director of the Southeastern Grasslands Institute, Dwayne is a Full Professor of Biology and Principal Investigator for the Center of Excellence for Field Biology at Austin Peay, where he teaches courses in botany and ecology and directs the research of graduate students.

Presenter: Jeremy French

Title: Interior Low Plateau Ecoregion Coordinator | RCPP Coordinator

Affiliation: Southeastern Grassland Institute | Quail Forever

Contact Information

Austin Peay State University
311 College Street, Clarksville, TN 37040
Phone: 641-295-0833

Presentation Title

"RCPP Grasslands: Restoring Grasslands on private land in Kentucky and Tennessee"

Speaker Biography

Jeremy is jointly affiliated with SGI and our partner, Quail Forever, working with 10 partner organizations to implement the restoration of thousands of acres of grassland on private lands in central and western Tennessee and Kentucky funded by a multimillion dollar USDA Natural Resources Conservation Service Regional Conservation Partnership Program grant. Jeremy's love of grasslands began in childhood in the Everglades of south Florida and continued as a biology student at William Penn University, IA where he conducted research on herpetofauna response to bison grazing in tall grass prairie remnants and restoration of oak savanna habitat. Jeremy now brings his experience working with herpetofauna and as habitat management specialist working in critically endangered grasslands to 26 counties inTennessee assisting with RCPP projects.

Presenters: Dr. Timothy J. Gaudin & Carissa Turner

Dr. Timothy J. Gaudin
Title: UC Foundation Professor
Affiliation: Department of Biology, Geology & Environmental Science, University of Tennessee at Chattanooga

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Carissa Turner
Title: Master's Student
Affiliation: University of Tennessee at Chattanooga

Contact Information
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Presentation Title
"The spread of nine-banded armadillos (*Dasypus novemcinctus*) in Tennessee: Determining habitat preferences of and assessing prevalence of Hansen's disease in Tennessee with assistance from community science data"

Abstract
In the past two decades, nine-banded armadillos (*Dasypus novemcinctus)* have undergone a remarkably rapid expansion in geographic range, changing from a species confined to the Mississippi Valley regions of western Tennessee to one found in nearly every county in the state, with most of that expansion in the eastern two-thirds of the state occurring in the last 10 years. Although research funds are scarce for a species that is currently not seen as a threat or endangered animal, there are ways to use limited resources and community science to assist in filling knowledge gaps, which can then provide a baseline on where to begin researching efforts. My research used community science and roadkill surveys to study habitat preferences across the state of Tennessee, where it is now being deemed an invasive species.

Speaker Biography
Dr. Tim Gaudin received his B.S. in Zoology from The University of Georgia in 1987, and his Ph.D. in the Department of Organismal Biology & Anatomy at The University of Chicago in 1993. After a year as a Visiting Professor at the College of the Holy Cross (Worcester, MA), he accepted a position in the Department of Biological and Environmental Sciences (now Biology, Geology and Environmental Science) at the University of Tennessee at Chattanooga in 1994, where he has remained since and where he is currently UC Foundation Professor. He teaches courses mainly in the areas of Vertebrate Zoology, Mammalogy, Evolution and Human Anatomy.

Dr. Gaudin is a long-time Research Associate at the Field Museum of Natural History (and the Carnegie Museum of Natural History (Pittsburgh, PA), and has twice been a Visiting Scientist at the Smithsonian's National Museum of Natural History (2002 & 2004). His research expertise lies in the area of mammalian systematics, paleontology, and evolution. More specifically, he is an expert on edentate mammals, i.e., armadillos, anteaters, sloths and pangolins. He has authored or co-authored over 100 scientific publications, including 70 peer-reviewed research articles in professional journals, and co-edited one book. He has been the recipient of two major research grants from the National Science Foundation (2001-2005, 2006-2011), and has received numerous smaller awards from different granting agencies. He has been a reviewer for scientific journals, granting agencies, and textbooks, and serves on the Editorial Board of three different journals in his field. He is a member of the UTC Alpha Scholastic Honor Society and Council of Scholars, as well as a number of scientific societies. He has been actively involved in sponsoring student research at UTC, including well over 100 students.

Dr. Gaudin is originally from Atlanta, GA. With his lovely wife of 32 years, Suzanne, he has two marvelous children, Thomas (age 26) and Eleanor (age 22).

Carissa Turner

Carissa Turner is a recently graduated student from the Master's in Environmental Science program at the University of Tennessee at Chattanooga, where she defended her thesis on armadillo habitat selection (the subject of this talk) in early November. During her years as an undergraduate student, she first believed that being a veterinarian was her calling, but during her third year in college, she discovered wildlife biology and graduated from Tennessee Technological University in 2017 with a bachelor's degree focused on wildlife science.

During her junior year, she obtained her first wildlife job as a seasonal bat technician, which sparked her interest in studying overlooked and misunderstood mammals. This led to her obtaining two more wildlife technician jobs in the western U.S. In 2019, she studied pygmy rabbits in the great basin region of Nevada, and in 2020 she assisted the Wyoming Game and Fish Department with their research on endangered black-footed ferrets.

Carissa enjoys wildlife photography and hiking with her dog, Darla, and her partner, Alex, in her free time. Although her main passion is mammalogy, she enjoys learning about and photographing all plants and animals, which allows her to share her experiences with others. She believes making nature accessible to everyone and educating others is just as important as wildlife research itself.

Presenter: Jenny Hannon

Title: President

Affiliation: Friends of Warner Parks

Contact Information

50 Vaughn Rd, Nashville, TN 37221

(615) 370-8053

JHannon@warnerparks.org

Presentation Title

"Large scale restoration efforts underway at Nashville's 3,200-acre Warner Parks"

Abstract

The Friends of Warner Parks embarked on a campaign in 2019 to manage invasive species on the entirety of the Warner Parks close to 3,000 acres by the centennial celebration of the park in 2027. Invasive Free at the WP is an integrated approach to controlling invasive plants that has already successfully managed hundreds of previously untreated acres. Jenny will describe the program, what it has taken to get here and what lies ahead.

Speaker Biography

Jenny Hannon has called Nashville home for nearly 30 years. Prior to arriving in Nashville, Jenny's career began in Sports Marketing with both ProServ in Washington DC and IMG in Cleveland, OH. Jenny landed in Nashville as the first Director of the Nashville Sports Council in 1992. As President of the Friends of Warner Parks for the last 2 years, she launched a $15M capital campaign and an initiative for "Invasive Free WP" to restore the parks leading up to the 100 anniversary of Warner Parks in 2027. She is an experienced professional in the field of Development and Community Relations having served in roles as the Executive Director of Nashville Predators Foundation, Director of Development and Alumni Relations at Montgomery Bell Academy, Director Partnerships at Nashville Capital Network and most recently as Director of Advancement at The Ensworth School. She served on the Boards of Nashville Educational Foundation, Julia Green PTO, the Metro Board of Parks and Recreation and is a member of Leadership Nashville. Jenny is the parent of four daughters, Mary Kate, Halina, Caroline and Megan. She holds a B.S from Indiana University.

Presenters: [1]Terri Hogan, [2]Cayce McAlister,
Title: [1]NPS Invasive Plant Program Manager
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Presentation Title
"Creating a Collaborative Culture of Stewardship"

Abstract
Creating a culture of collaboration to achieve sustained invasive species management requires a long-term vision, education and active engagement of the community through initiatives such as WeedWrangle®, and nurturing a sense of participant ownership of the work. We will discuss the history for collaborative conservation between The Garden Club of America and the National Park Service (NPS). This will include our current work together that is reinforced through a recently signed agreement between the organizations and our efforts to track our work together through WeedWrangle® events that include those organized to celebrate of the NPS Invasive Plant Management Team program's 20th anniversary. We will include a discussion of participant survey results to explore efforts to sustain collaborative conservation efforts over time.

Speaker Bios

Terri Hogan has been a plant ecologist for nearly 30 years and is the national lead for the National Park Service (NPS) Invasive Plant Program that addresses threats posed by invasive plant species to NPS resources. She also oversees the NPS Invasive Plant Management Team (IPMT) program that provides invasive plant management support and expertise to units of the national park system. She has natural and cultural resource management experience in national parks and has worked on landscape scale collaborative efforts, including in Tennessee, and is active in a range of interagency and non-governmental organization committees and work groups working on invasive species issues.

Terri started her conservation career on the other end of the plant spectrum, working with rare, threatened, and endangered plant species which began in the state of Tennessee. These were formative years spent as an intern with the Tennessee Natural Heritage Program under the tutelage and guidance of two extraordinary professionals, Andrea Bishop and Milo Pyne.

Cayce McAlister is a member of the Garden Club of Nashville, a member of the Garden Club of America (GCA). Cayce is currently serving as the National Chair of the GCA Conservation Committee. She also serves as the National Coordinator of Weed Wrangle®, a GCA Partners for Plants stewardship project that works to facilitate hands-on projects between local GCA clubs and land managers on federal, state, local, and other significant public lands.

Cayce has a master's degree in Social Work, which has led her to a led to a lifetime of working with others from families to conservation, it all works by creating a culture of collaboration.

Presenter: **Brian F. Jorg**
Title: Manager of the Native Plant Program
Affiliation: Cincinnati Zoo & Botanical Garden

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Presentation Title
"Bowyer farm-Restoring a Historic Wetland"

Abstract
Join us as we illustrate the journey of turning a 630 acre donated working farm into its original habitat. From creating the wetland to growing the native plant species to be used in its reconstruction, we will look at the work, the successes, and the challenges into creating and maintaining this ecosystem. We will also discuss the Native Plant Program, which grows native plants for conservation efforts, use on the property, and for sale to the general public.

Speaker Biography
Brian Jorg is Manager of the Native Plant Program for the Cincinnati Zoo & Botanical Garden. Brian also manages the Boyer Wetland, a 650-acre property in Warren County, Ohio. Among his responsibilities is the Native Plant Program. This program deals with a wide range of projects that deal directly with the propagation and conservation of our native flora. This also includes the recovery projects of endangered and critically imperiled plants.

Brian also travels extensively to study both flora and fauna of the world. Leading trips to the Galapagos, Kenya, Argentina and Madagascar.

Presenter: Sheilah Kennedy

Title: Owner/Design/Develop Portable Invasive Species Rinse off and Reclaim Weed Wash Stations.

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Title of Presentation:

"Eliminating Invasive Species with Innovative Charged Technologies"

Abstract

Over the last few years, the development of portable weed wash stations has increased due to increased wildland fire incident needs increasing. To this day, we have still not met that existing need, due to gaps in policy vs regulations vs knowledge of what weed wash systems are created and designed and developed to do, **prevent the introduction of invasive species**. S-K Environmental is proud to be one of the leaders in designing and developing one of the best portable weed wash systems that not only meet, but exceed national standards for weed wash systems. Our reclaim mat is 20X50, leaving nothing on site, our system is powered by 35KW Genset, the undercarriage is washed by rotating spinners water @ 30 GPM, high pressure washer @ 2,000 GPM address wheel wells and bumpers, our sump pumps on the reclaim mat pulls everything off the mat into the holding tanks on the trailer, empty into filtration system, filtering down to 10 microns, capturing the smallest seed and plant particles, then transferring water into clean water holding tank so the water can be reused to rinse off the undercarriage of the next vehicles/equipment entering the reclaim mat. All sludge, mud and debris is collected in a holding tank on the trailer, nothing is left onsite.

S-K-E knows this system is a tool in our toolbox, our goal has always been to push to make this system exceed expectations. Now our goal is taking this concept and pushing it to the next level in performance, effectiveness and efficiency, which we are advancing to that level now!

S-K-E is introducing the Sure-Koat® a registered Trademark of S-K Environmental. We are introducing a chemical rinse agent to seeds of invasive species/noxious weed **seeds** when they are in a non-natural environment, attached to vehicles and/or equipment, prior to them being dislodged in non-contaminated areas. Sure-Koat® is electrostatic spray system delivering ultra-low volume of herbicide product that decreases seed viability by 95% to 100%, depending on noxious weed seed species. The electrostatic spray gives the Cidal Rinse ™ spray droplets a like electrical charge to the Sure-Koat® product **forcing** it to attract upwards to the metal undercarriage frame of the vehicle or equipment, getting to any organic matter lodged in hard-to-reach areas. The result of the like charged particles repelling each other causes the spray to wrap around areas typically shadowed from a standard spray application. This ultra-low, fog/mist type application electrostatically charged is forced upward toward the metal frame eliminates drift and off-target possibilities. This new charged technology type system could be

an innovative tool to meet invasive species challenges. **NOTE:** more work is needed with EPA and Chemical Company, please contact S-K Environmental.

Speaker Biography

Sheilah has been involved with all aspects of invasive species. 15 Years as Noxious Weed Control Coordinator for Okanogan County, Washington State. Developing integrated invasive species programs and projects between private landowners, State, Federal and Tribe. Past President and previous Board Member for North American Weed Management Association (when it was NAWMA). Coordinated the first Weeds Across Borders established successful working projects between Okanogan County and two Weed Districts in Canada. Working to educate State and Federal Legislators is always a top priority, testifying several times before Congressional Committees in WA DC as well as State Legislative work sessions and Committees. Utilizing the experience gained over the years, I shifted towards research, development, providing effective, efficient and quality prevention equipment to prevention the introduction of invasive species.

Please visit my webpage https://s-k-enviro.com to review the various projects, work and scientific decontamination testing projects with Dr. Craig Ramsay, APHIS and Colorado State University.

Presenter: **Sam King**
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Presentation Title
"A Case Study: Removal of Invasive Vegetation in the Presence of Endangered Invertebrates"

Abstract
Sequatchie Cave in Marion Co. Tennessee is a designated natural area and the type locality of four aquatic invertebrates of special concern, one of them is federally endangered. Site managers have endeavored to remove non-native invaders from the site, but have faced hurdles related to the preservation of these native aquatic animals in sensitive habitats. This presentation looks at how managers have adapted removal strategies, timelines, biomass removal, and non-chemical treatments to achieve success and manage the site for both native plant communities and rare invertebrates.

Speaker Biography
Sam King works as a stewardship ecologist for the Tennessee Department of Environment and Conservation. His main duties are with the Division of Natural Areas revolve around protecting imperiled species on public lands in Middle Tennessee. He has worked with TDEC since 2013 serving as a seasonal interpreter, park ranger, and ecologist. He also serves on the board of the Tennessee Invasive Plant Council and the Tennessee Prescribed Fire Council. He lives in Nashville with his wife, son, and retired racing greyhounds.

Presenter: Jeanine Neskey
Title: Biologist-Extension Specialist
Affiliation: National Feral Swine Damage Management Program, USDA Wildlife Services

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Presentation Title: Transboundary Collaboration to Squeal on Pigs!

Abstract
Feral swine are a damaging invasive species throughout much of the United States and parts of Canada. These animals cause significant damage to agriculture and livestock, ecosystems and native wildlife, human health, and safety. Feral swine are also tricky to manage once a population has become established. Given the risk of migration from established populations and, more prominently, the risk of human-assisted translocation of feral swine, wildlife managers throughout North America must consider this invasive species. Since feral swine do not acknowledge our human-defined borders, it is vital there be cooperation and collaboration in feral swine management across state and national borders. In response to this need, the Western Governors'' Association convened a transboundary feral swine working group starting in 2020 to improve communication and build relationships across borders. An exciting outcome of this collaboration is the Squeal on Pigs outreach campaign. This project aims to develop a standard branding for Squeal on Pigs. This digital media toolkit will allow wildlife managers anywhere to easily incorporate the Squeal on Pigs messaging into their outreach efforts surrounding feral swine. The project also aims to create an app and web-based reporting system that will allow the public to report sightings of feral swine and automatically populate a report to the affiliated agencies. This talk will provide a summary of the challenges invasive feral swine pose, the efforts of the USDA National Feral swine Damage Management Program and partners to address these issues, and a preview of what is to come with the new Squeal on Pigs campaign.

Speaker Biography
Jeanine Neskey is a Biologist and Extension Specialist with the USDA APHIS National Feral Swine Damage Management Program. She earned her B.S. degree in Animal Sciences from the University of Vermont and her M.S. degree in Agricultural Extension from Colorado State University. Early in her career, she worked to support small-scale market farmers in Northern Colorado through technical training and education. Currently, with APHIS Wildlife Services, she has worked for the past seven years to create impactful outreach products and advance communication and education surrounding invasive feral swine and wildlife damage management issues.

Presenter: Iain Patterson

Title: Professor

Affiliation: Centre for Biological Control (CBC), Rhodes University, South Africa

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Presentation Title

"Biological control of weeds: opportunities to control invasive alien plants through North American-African collaborations"

Abstract

Invasive alien plants reduce indigenous biodiversity and agricultural productivity globally. Biological control is the only permanent and sustainable control method that could be successful in reducing the negative impacts of invasive alien plants on such a large-scale, and should therefore be considered an essential part of any large-scale management programme. Despite criticisms of the safety and efficacy of biological control, there is compelling evidence that the method is safe and effective. The innate risks of implementing biocontrol must also be weighed against the risk of doing nothing. In this talk I will discuss the role that biological control can play in large-scale management programmes and give examples of opportunities where African plants that are problematic in North America could be controlled by biocontrol agents from Africa, and where North American plants that are problematic in Africa can be controlled by biocontrol agents from North America.

Speaker Biography

Iain Paterson completed his undergraduate and PhD degrees at Rhodes University, in the small town of Makhanda, in the Eastern Cape of South Africa. South Africa has a long history of research into the biological control of invasive alien plants spanning over 100 years, and many of the key researchers in the field are Rhodes University alumni. Inspired by this strong history and the active community of biological control researchers around him, Iain has dedicated his career to the science and practice of biological control of invasive alien plant species. His work has produced novel biocontrol agents that have been released in South Africa and abroad, has assessed the safety and positive impacts of biocontrol, and has aimed to improve scientific techniques to make the practice safer and more effective. Ultimately, Iain's aim is to reduce the negative impacts of invasive alien plants in an environmentally friendly and sustainable way for the protection of natural and agricultural ecosystems and the societies who depend on them.

Presenter: Giovanni Polverino

Title: Research Fellow

Affiliation: University of Tuscia (Italy) and Monash University (Australia)

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Title of Presentation

"Fishes and Robots"

Abstract

I designed the biological components of bioinspired robots to mimic specific characteristics of fishes, enter their social groups, and interact with live fishes in real time, offering a precise, customizable, and consistent approach to study animal behaviour that cannot be emulated with traditional methods. I have achieved proof of concept for the first bioinspired robot that selectively repels invasive mosquitofish (*Gambusia holbrooki*) and simultaneously attracts a non-invasive fish species, providing unambiguous evidence that robots can be designed to induce diverse reactions across species. I recently led an international team of biologists and engineers to use for the first time a biologically inspired robot for unravelling the ecological and evolutionary vulnerabilities of mosquitofish—impairing health, reproduction, and ecological success of the pest. Our multidisciplinary approach offers conceptual and technical advances that fill critical gaps in experimental biology and ethorobotics, opens the door to new opportunities for targeted experimental analyses at a larger scale, and provides the scientific foundations for informing and refining biocontrol practices.

Speaker Biography

My expertise lies in behavioural ecology, evolutionary biology, and ethorobotics (using bioinspired robots to study animal behaviour). I gained my PhD in life sciences from the Humboldt University of Berlin (Germany) for my advances on the causes and consequences of behavioural diversity/plasticity in animals, especially highly invasive species. I have worked in Italy, the US, Germany, and Australia, and most of my results have appeared in high-impact international journals and have been reported widely in the popular press. My most significant contributions to behavioural ecology and evolutionary biology have leveraged my expertise in these fields and, by collaboration, the use of bioinspired robots to uncover causes and consequences of behavioural variation in fishes.

Presenter: Nick Rice

Title: Environmental Biologist II

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Presentation Title

"Las Vegas goes "all in" on tamarisk removal"

Abstract

The Las Vegas Wash is the primary drainage channel for the 1600 square mile Las Vegas Valley. Historically, stormwater made up the vast majority of flows in the Las Vegas Wash. Today, the base flow of approximately 200 million gallons per day comes from a combination of highly treated wastewater, urban runoff, and groundwater seepage. This increased flow altered the system in such a way as to increase erosion and provide additional opportunity for non-native species such as tamarisk (*Tamarix ramosissima*) to establish. To reduce the tamarisk, erosion control and restoration activities have been conducted by the Las Vegas Wash Coordination Committee along the Las Vegas Wash and nearby urban areas. These activities involve clearing the existing tamarisk, building weirs and bank protection, revegetating with native plants, maintaining the site for a minimum of two years, and monitoring the site annually to determine if revegetation efforts are successful. This "all in" approach of controlling erosion, removing non-native species and revegetating with native plants has proven to be a very successful approach to restoring this important waterway in southern Nevada.

Speaker Biography

Nick Rice works as an Environmental Biologist II with the Southern Nevada Water Authority (SNWA) in Las Vegs, NV. He grew up in Eugene, Oregon and graduated from University of Oregon with a B.A. in Geography with a focus in Biogeography with a minor in Business Administration. He moved to Las Vegas, NV in 2002 to work with the AmeriCorps focusing on the Las Vegas Wash project. In 2003, he was hired on with SNWA as a Graduate Intern working on the Las Vegas Wash project while attending the University of Nevada Las Vegas. Nick was hired on full time shortly after and has since been managing restoration activities and invasive weeds on SNWA owned and managed lands in Clark County, NV. He also conducts biological studies including threatened and endangered birds, reptiles, fish, bats, and mammals. When Nick is not working, he enjoys getting outdoors and spending time with his wife and two boys.

Presenters: Dawn Slack,. [1]Dugan Julian, [2]Mandi Glanz, [3]Heather Shireman, [4]Jennifer Whiteside, [5]Blair Beaver, [6]Ryan Goetz

Presentation Title
"Indiana's CISMAs tackle invasive species on over 32,000 acres head on and statewide through collaborations and partnerships"

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Abstract
Effective land management requires collaboration that will inspire accountability, responsibility and action from landowners, as well as professionals. It requires that we count on local solutions and resources all while collaborating locally and regionally. It requires that we educate, engage and empower the often-forgotten component of our ecosystems – our citizens, especially since research indicates about 85% of the woody invasives in our natural areas come from our landscaped areas. Our job is to bring together experts and novice. In order to team up these inorganic partnerships, we develop county level CISMAs and use three main tools; Weed Wrangles®, free landowner surveys, and outreach (fun events, training, conferences, etc.). We engage in a dialogue with our citizens, share information and provide tools so they can be part of the solution for healthy lands, waters and wildlife. During our presentation, we will share some of the tools (free landowner surveys, utilizing local employers, finding local funding for plant swap programs) and collaborations (pairing citizens with state biologists, working with SWCDs and farmers) we use to inspire ownership and action that together are fostering landscape level conservation in Indiana. Over five years we have written management plans or

provided assistance for over 32,000 acres and met with over 700 landowners. We have conducted over 1,000 outreach events and average 160 Weed Wrangles a year.

Speaker Biographies

Dugan Julian began working as a Regional Specialists for the Statewide CISMA, SICIM (State of Indiana Cooperatives Invasives Management) in 2020. He is also a member of the Kosciusko Water & Woodlands Invasive Partnership (KWWIP) CISMA. He served in the military prior to coming on board as a Regional Specialists. He thoroughly enjoys learning and sharing knowledge about invasive species and our Indiana native species via events that engage a wide range of people in a setting that inspires action.

Mandi Glanz started working as a SICIM regional Specialist in 2020. Mandi is a nature enthusiast who grew up gardening, fishing, and exploring the outdoors in northern Indiana. She received her Bachelor of Science degree in Wildlife Biology from Purdue University, West Lafayette. Past experiences include environmental positions with the Indiana Department of Natural Resources, Indiana Dunes National Park, and local agencies. Mandi views her position with SICIM as the perfect job because she gets to work in the field one-on-one with landowners to help them be part of the larger efforts to connect habitat across the state.

Heather Shireman began working with the Bartholomew County Soil and Water Conservation District Office in April 2011 and is a member of the Blazing Stars CISMA. She grew up in Hendricks County, Indiana and attended Franklin College where she received a B.A. in Biology and Chemistry in 2009. She now resides in Columbus with her husband and their son. Heather is a big supporter of backyard conservation where she engages with not only individual landowners but also businesses to ensure collaboration occurs for effective conservation. Heather also enjoys hunting, fishing and Green Bay Packer's football.

Jenny Whiteside is the Assistant District Coordinator for Bartholomew County, Indiana and a member of the Blazing Stars CISMA. She and her husband raise sheep and use many conservation practices on their grain operation where they raise their four children. Jenny is excited to help others in her community be part of the solution for effective conservation for healthy soil, waters and wildlife. She especially relishes working with the county youth to empower them to take leadership roles for conservation of working lands.

Blair Beavers is the lead for the Johnson County CISMA (JC Native Plant Partnership) and enjoys engaging through a variety of mechanisms such as Weed Wrangles®, Landowner surveys, native seed swaps and more with the public, landowners, educational institutions, etc. to foster a strong land stewardship for her county residents.

Ryan Goetz has been a land manager for The Nature Conservancy for six years. He currently manages about 4,000 acres in Southern Indiana that includes properties with glade and barren complexes. Prior to practicing land restoration, he taught elementary students in South Korea. Ryan has witnessed first-hand the fruits of effective land management. He understands the effects neighbors can have on ecosystem restoration efforts and works with his local CISMA (Cooperative Invasives Species Management Area – Harrison County Native Plant Partnership) to teach landowners how to manage their land in a manner that benefits our natural systems.

Presenter: Tanja Strive

Title: Senior Principal Research Scientist
Affiliation: Commonwealth Sceintific and Industrial research

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Presentation Titles

"Biological control of rabbits in Australia – 70 years of landscape-scale management of a vertebrate pest"

"Prospects for genetic biocontrol of vertebrate pests in Australia"

Speaker Biography

Tanja is a Senior Principal Research Scientist within CSIRO Health and Biosecurity, based in Canberra, Australia. A molecular virologist by training, she joined CSIRO in 2002 following the completion of the PhD at the Philipps University in Marburg, Germany. She has since worked on a series of projects investigating lethal and non-lethal, and both GM and non-GM, biocontrol options for a range of feral animal species, including European foxes, mice, cane toads and rabbits. During the past ten years Tanja has led a project portfolio of both applied science and fundamental research projects on classical viral biocontrol of rabbits. Her group's work focusses on improving our understanding of the biology, evolution, epidemiology and interactions of different caliciviruses in Australian wild rabbits, and the implications and possible applications for biological control and landscape scale management of rabbit impacts.

https://people-my.csiro.au/s/t/tanja-strive

https://research.csiro.au/rhdv/

Presentation 1

"Biological control of rabbits in Australia – 70 years of landscape-scale management of a vertebrate pest"

Abstract

European rabbits remain one of the most damaging environmental and agricultural pests in Australia. Self-disseminating viral biocontrol agents have proven to be the only effective means of continental-scale rabbit control. The two rabbit specific pathogens myxoma virus (MYXV) and the calicivirus rabbit haemorrhagic disease virus (RHDV) were deployed as biological control tools in the 1950s and 1990s, respectively, resulting in savings exceeding $70 billion AUD to the agricultural industries over 70 years. In addition, the sustained landscape-scale reduction of rabbit numbers and impacts has allowed many fragile ecosystems to partially recover from the devastating impact of rabbits. Despite these successes, biological control is never a silver bullet, as building population immunity and ongoing host-pathogen co-evolution will eventually reduce their effectiveness. Current research aims at increasing our understanding of the biology, epidemiology, interaction and impacts of the various Australian rabbit caliciviruses, and the implications for long term rabbit management. Longer term, alternative strategies are being considered to maintain a pipeline of biocontrol tools, ranging from searches for or selection of new pathogens to novel approaches of genetic biocontrol.

Presentation 2

"Prospects for genetic biocontrol of vertebrate pests in Australia"

Abstract

Deliberately or accidentally introduced invasive species have cost the Australian economy AUD$390 billion during the past 60 years, with vertebrate pests such as feral cats and rabbits amongst the costliest, and more effective landscape-scale management tools are needed. Novel revolutionary genetic technologies have recently been developed that can force modified genetic traits into an animal population, defying the constraints of normal Mendelian inheritance. Combined with a highly specific gene editing system, this technology has the potential for population control of pests, for example by creating all-male or female infertile offspring which would ultimately lead to the collapse of the target population. Delivered and spread through sexual reproduction the potential of this powerful new technology is unprecedented, making pest eradication theoretically feasible. Proof of concept in a mammalian model system (mice) has recently been achieved, raising the possibility of exploring these technologies for some of Australia's most intractable and damaging vertebrate pests.

In line with the *Guiding Principles for Sponsors and Supporters of Gene Drive Research*, in addition to technical developments, extensive consultations are currently underway in Australia with key stakeholders including scientists, government regulators, policy makers and public representatives. Moving forward it will be essential to ensure a transparent and informed debate, responsible conduct of science, provide a robust regulatory framework, and to identify key pathways and barriers to adoption of any putative genetic control tools.

Presenter: Dan Tompkins

Title: Science Director

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Presentation Titles

"The research and tool development driving New Zealand's Predator Free 2050 mission"

"Predator Free 2050 – New Zealand's mission to eradicate key threats to biodiversity"

Presentation 1

"The research and tool development driving New Zealand's Predator Free 2050 mission"

Abstract

Predator Free 2050 is aspirational - it was launched knowing that we do not yet have all of the tools and approaches to get the job done. Here I present how we are (i) identifying and supporting priority longer-term research, and (ii) driving development of tools needed by eradication projects now.

First Research Strategy (2017-2020) highlights include an approach achieving eradication at scale, up to 50x detection sensitivity increases, a Data Standard to ensure all data collected by all parties for the mission can easily be combined, and high quality full genomes for the ship rat and the stoat providing essential underpinning information for new control approaches.

Our second Research Strategy (2020-2024) is building on these advances, prioritising where science breakthroughs are most needed for mission success.

On the tool development front our investment programme spans innovative traps, lures, detection devices, remote communications, and better toxin approaches. I will present the seven new tools already available and the further 19 tools and 4 best practice guides expected by 2024.

Presentation 2

"Predator Free 2050 – New Zealand's mission to eradicate key threats to biodiversity"

Abstract

In 2016, the New Zealand government announced a national goal of eradicating introduced predatory mammals critically threatening native biodiversity (possums, rats, and mustelids) from the country by 2050.

The need for this 'Predator Free 2050' (PF2050) mission was brought home by the New Zealand Parliamentary Commissioner for the Environment's report 'Taonga of an Island Nation:

Saving New Zealand's Birds'. This report, released in 2017, highlighted that over 80% of naive bird populations are in decline, primarily due to the impacts of introduced predators.

Predator Free 2050 Limited was formed to coordinate partnership approaches to large landscape projects and breakthrough science to drive the PF2050 mission. Here I present the operational activities and advances made to date in this early phase of the PF2050 mission, and an envisaged strategy out to 2050.

Twenty large landscape projects have received support to date and are proving to be both valuable testing grounds for working out how eradication can be achieved, and vehicles for growing public support for and engagement with the mission.

Speaker Biography

Dan is the Science Director at Predator Free 2050 Limited, helping to drive Aotearoa New Zealand's 'Predator Free 2050' mission to eradicate mammal pests severely impacting native biodiversity from the country by 2050. Originally from the United Kingdom, with degrees from Cambridge University and the University of Oxford, he holds an honorary professorship in Zoology at the University of Otago.

Although now focusing on science strategy and conservation outcomes, Dan maintains research interests in wildlife disease ecology, recently co-editing the Cambridge University Press book 'Wildlife Disease Ecology: Linking Theory to Data and Application'. Dan is also a member of the IUCN Task Force on Synthetic Biology and the UN CBD Ad-Hoc Technical Expert Group on Synthetic Biology.

Presenter: Casey Williams *Williams[1], C., Sullivan[1], K.T., Doyle[2] R.D.,

Title: Aquatic Plant Ecologist

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Presentation Title

"Utilizing biological monitoring to guide implementation of an aquatic plant restoration project for the Fountain darter (*Etheostoma fonticola*)"

Abstract

Many restoration projects are implemented with little or no information to provide guidance as to how the project should be carried out. Historical or baseline data are rarely available to provide insight on the structure and function of the site before impairment. This greatly decreases the chance of success, especially at the ecosystem scale of restoration. Additionally, few projects are provided the opportunity and structure to conduct simultaneous monitoring of restoration and how its target species responds, which is needed to evaluate long-term success of the project. In 2013, a large-scale aquatic plant restoration project began in select locations of the Comal River to help improve and increase habitat for the federally endangered Fountain darter *(Etheostoma fonticola*). The ongoing project involves removing an invasive aquatic plant (*Hygrophila polysperma*) by hand followed by propagating and re-introducing native aquatic plants indicated as more suitable habitat for Fountain darters. We used 22 years of biological monitoring data in the Old Channel reach of the Comal River to display long-term changes in the aquatic plant community and examine if restoration efforts have had a positive effect on the Fountain darter population. From 2000-2012, annual coverage of *H. polysperma* increased from 0-1820 m^2 and has effectively been extirpated following restoration efforts. Additionally, coverages of taxa that are more suitable darter habitat (bryophyte and *Cabomba caroliniana*) have increased since restoration began. Annual trends in Fountain darter density and recruitment were negatively associated with *H. polysperma* coverage. Initiation of plant restoration has resulted in an increase in Fountain darter densities and recruitment, supporting that planting and promoting more suitable habitat has had a positive effect on the Fountain darter population in this reach. Our results demonstrate the benefit of monitoring programs to evaluate the effectiveness of restoration efforts and provide quantitative support for the effectiveness of the project and continued financial support.

Speaker Biography

Casey Williams graduated from Texas State University with a B.S. in Aquatic Biology and M.S. in Aquatic Resources. He has been employed as an Aquatic Plant Ecologist with BIO-WEST for

10 years. His love for both aquatic environments and Texas native plants came together to provide a unique career which he exhibits both in profession and in independent research.

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