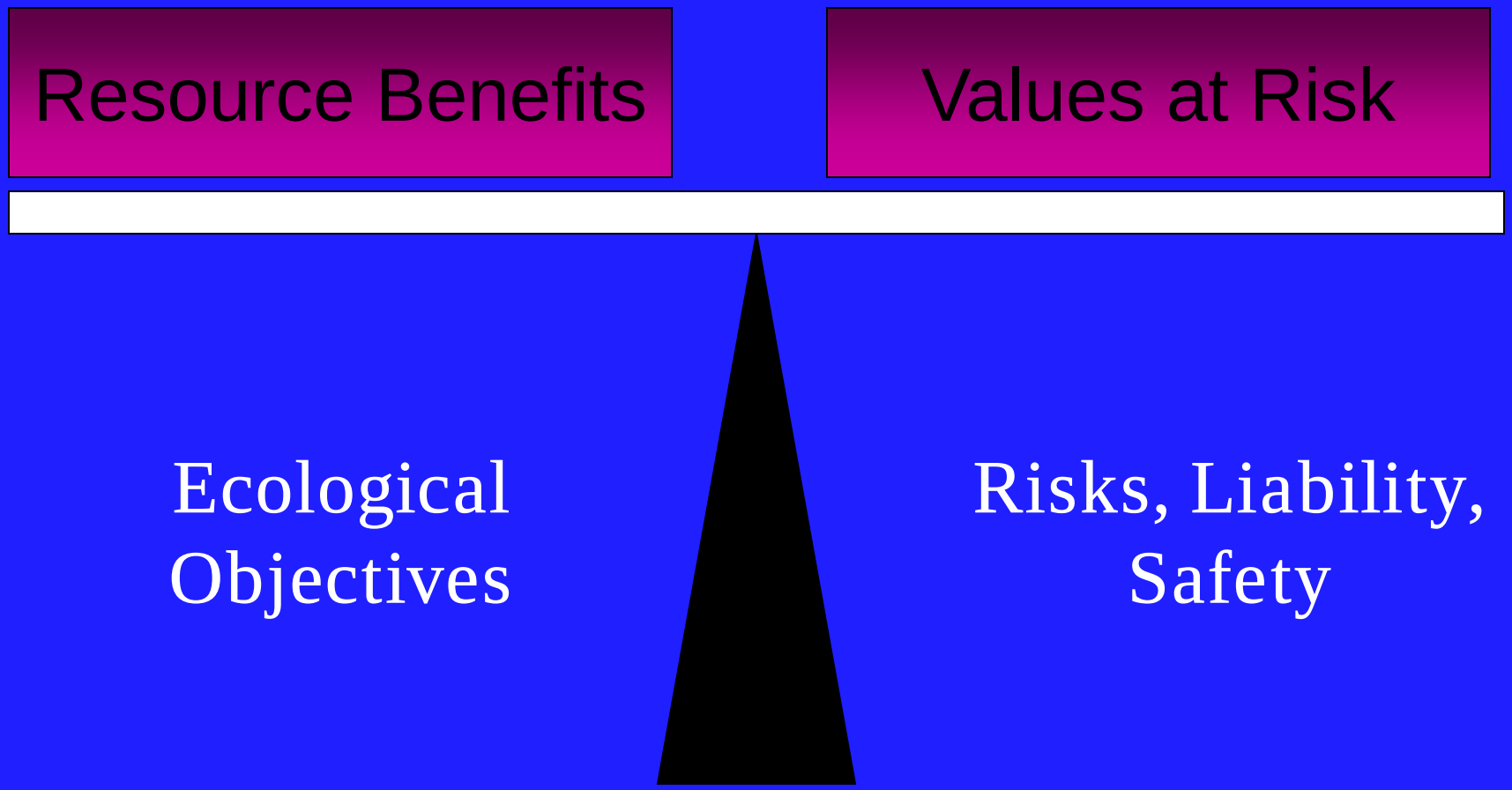
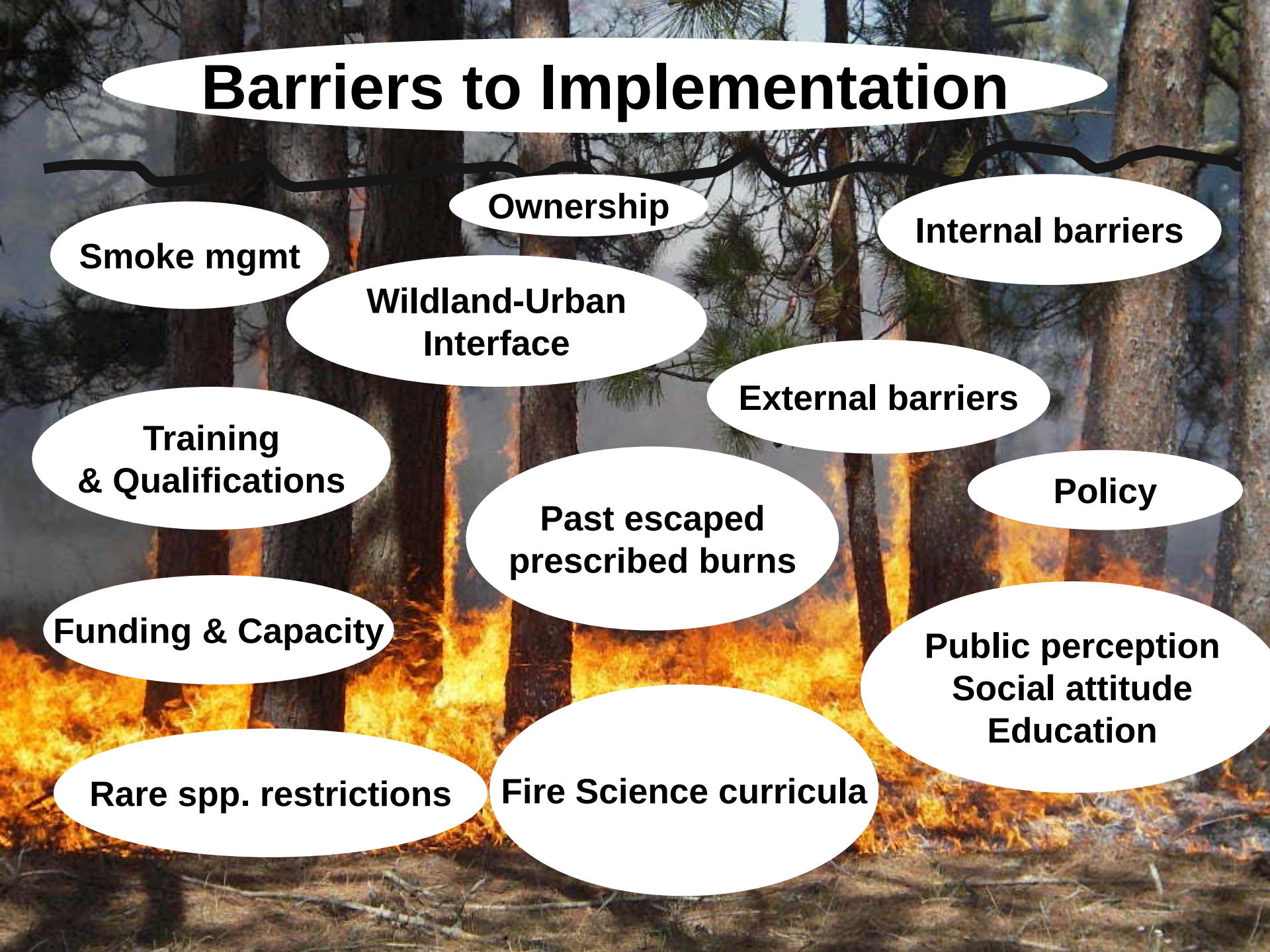
BURNING ISSUES:
Blending Fire Ecology with Operational Considerations

Jack McGowan-Stinski **Craig Maier** **Michele Richards**


Wildland Fire is:
An Ecological Process
A Management Tool
A High Risk Activity


Resource Benefits
Values at Risk
Ecological Objectives
Risks, Liability, Safety


Barriers to Implementation
Ownership
Internal barriers
Smoke mgmt
Wildland-Urban Interface
External barriers
Training & Qualifications
Policy
Past escaped prescribed burns
Funding & Capacity
Public perception
Social attitude
Education
Rare spp. restrictions
Fire Science curricula

That fire up in them hills?

That's a good fire my friend, a good fire....

"Good Fire"
versus
"Bad Fire"

…fire can have both negative and positive consequences, as can any management tool, depending upon the way it is applied…

…it can be really hard to present only the best [scientific] information, and to distinguish between facts, assumptions, and opinions…

…At the same time, we all do have an agenda – for the Symposium we felt strongly that factors such as biodiversity, habitat heterogeneity, and ecological resilience are critically important.

…it can be really hard to present only the best

habitat heterogeneity, and ecological resilience are critically important.

Tried to avoid presenting a very one-sided perspective on topics

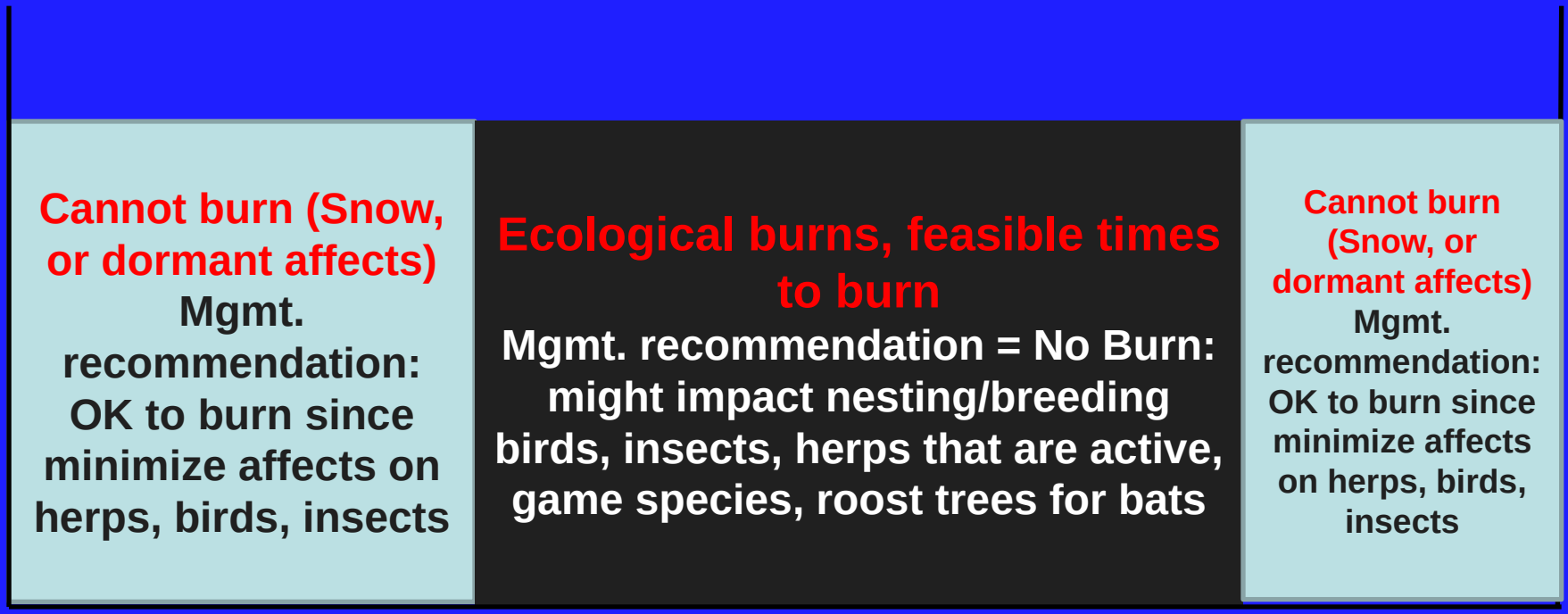
What is your Management Goal? (Agenda...)

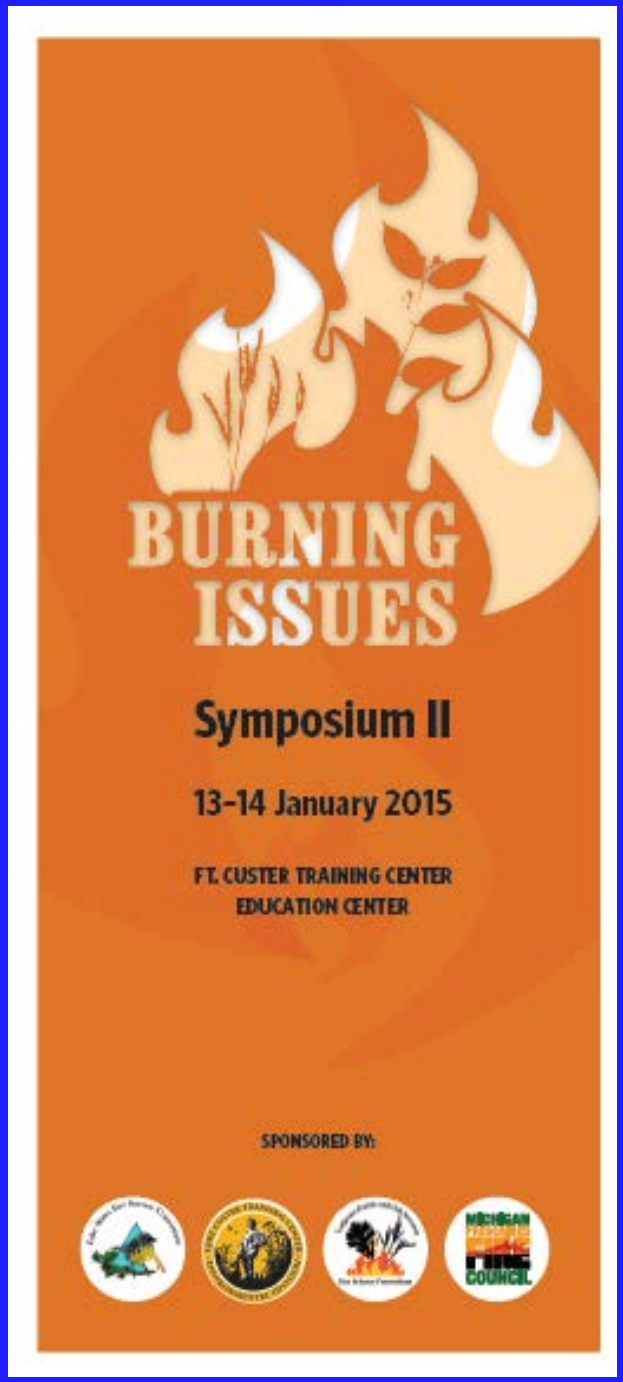
- To make it black?
- Reduce shrubs?
- Thin canopy?
- Enhance grasses?
- Enhance forbs?
- Enhance habitat for a certain animal species?
- Achieve full range of variability in the fire-dependent community?

Management recommendations

- Bird nesting seasons – eggs, fledglings
- Specific bird requirements
- Herp hibernation, surfacing, active phase
- Insects – overwintering phase, larvae, pupa, adults (flying or other)
- Bats – roosting trees
- Game species

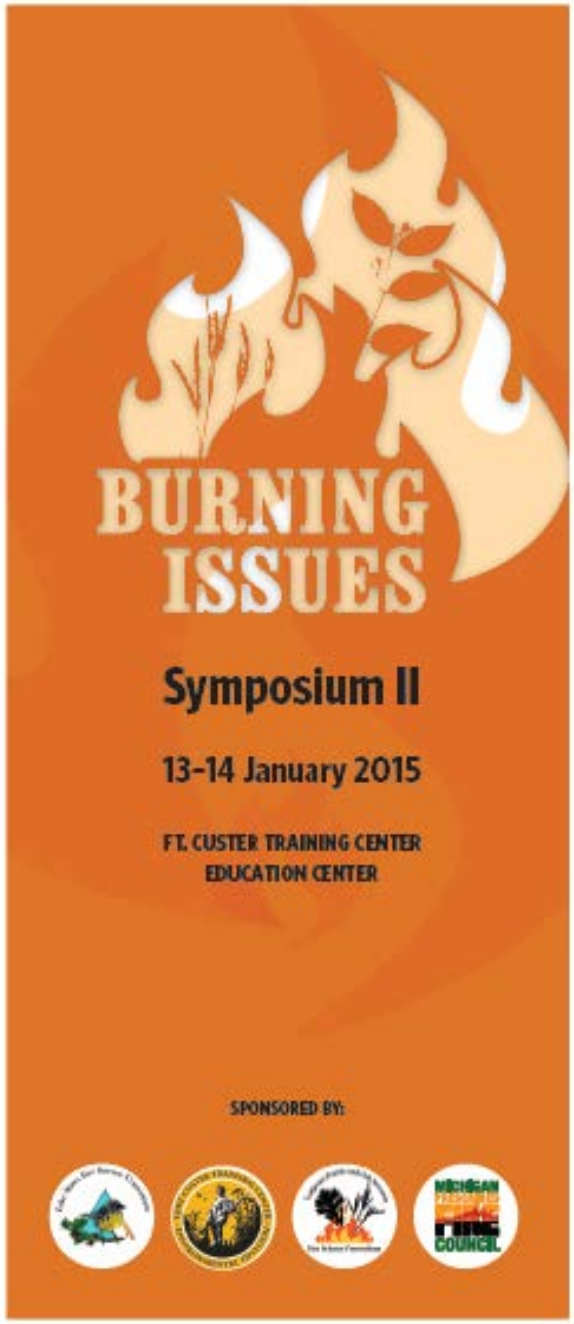
Management recommendations…good versus useless, or feasible versus useless



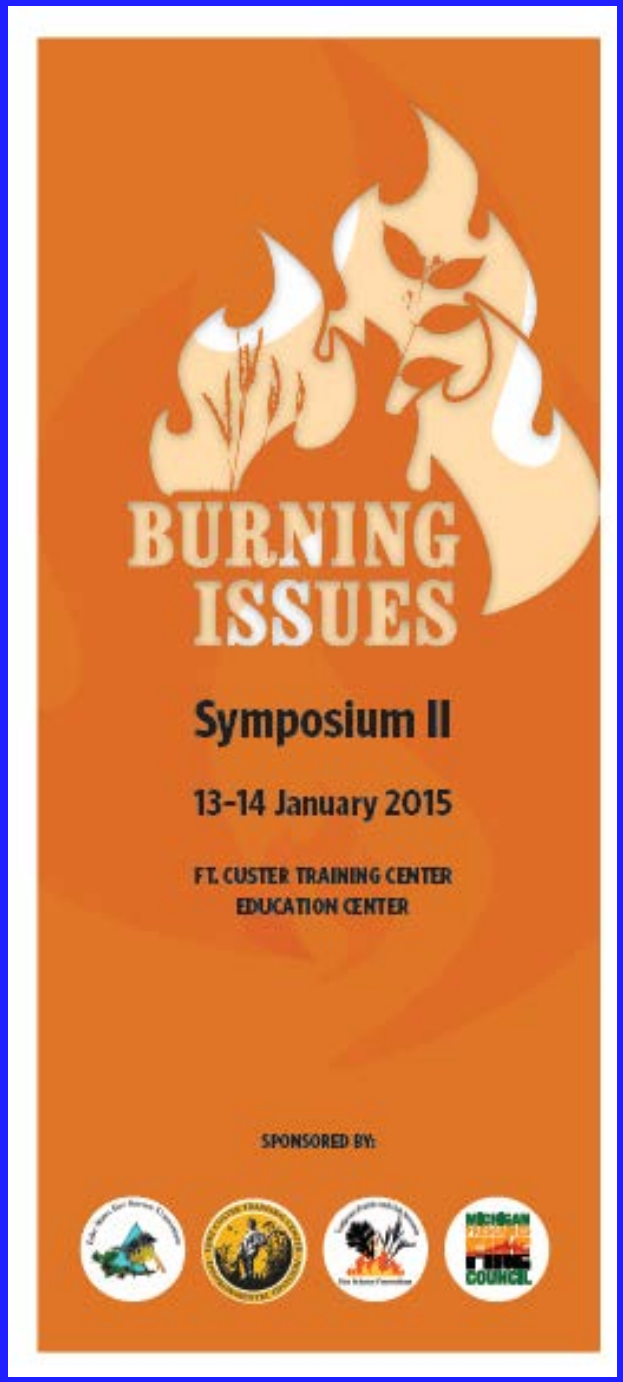


So what does Marriage Counseling have to do with Competing Fire Objectives....

Same End Goal, different Objectives that can compete...

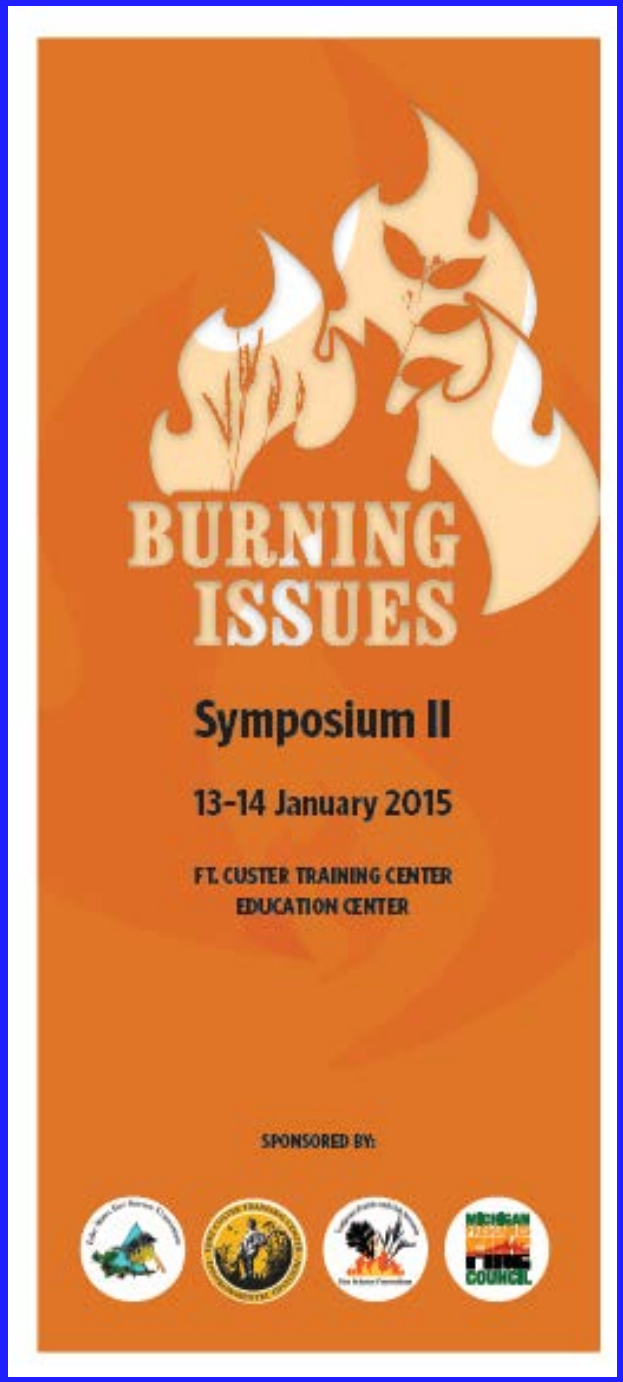


"When seeking information, researchers preferred communicating via published literature, but managers and administrators reported a preference for in-person communication."



Our Burning Issues Marriage Counseling….

The intent of the symposium was to give land managers, researchers, and fire practitioners an opportunity to hear from different areas of expertise in a format to help us find solutions to issues that complicate our fire work, such as competing objectives.

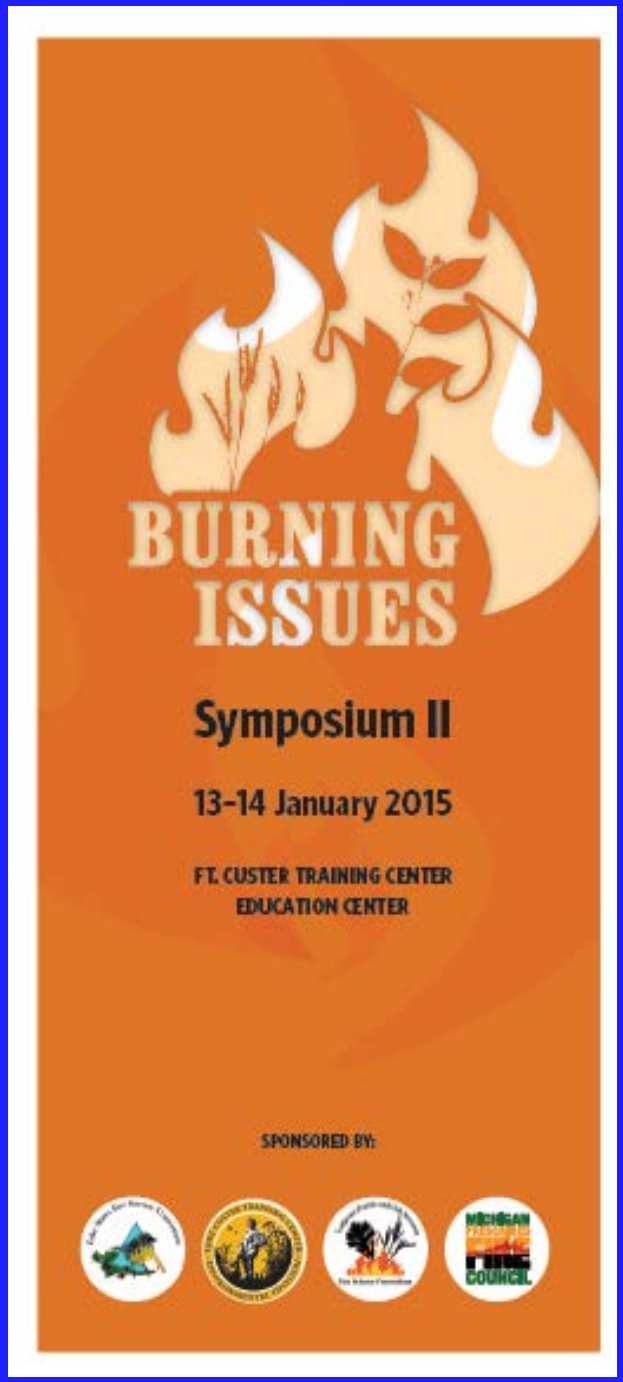


We were NOT trying to spoon-feed the answers....

we were trying to determine the current level of *collective knowledge* and social acceptance....

to determine the needs and questions....

in order to start working towards answers....

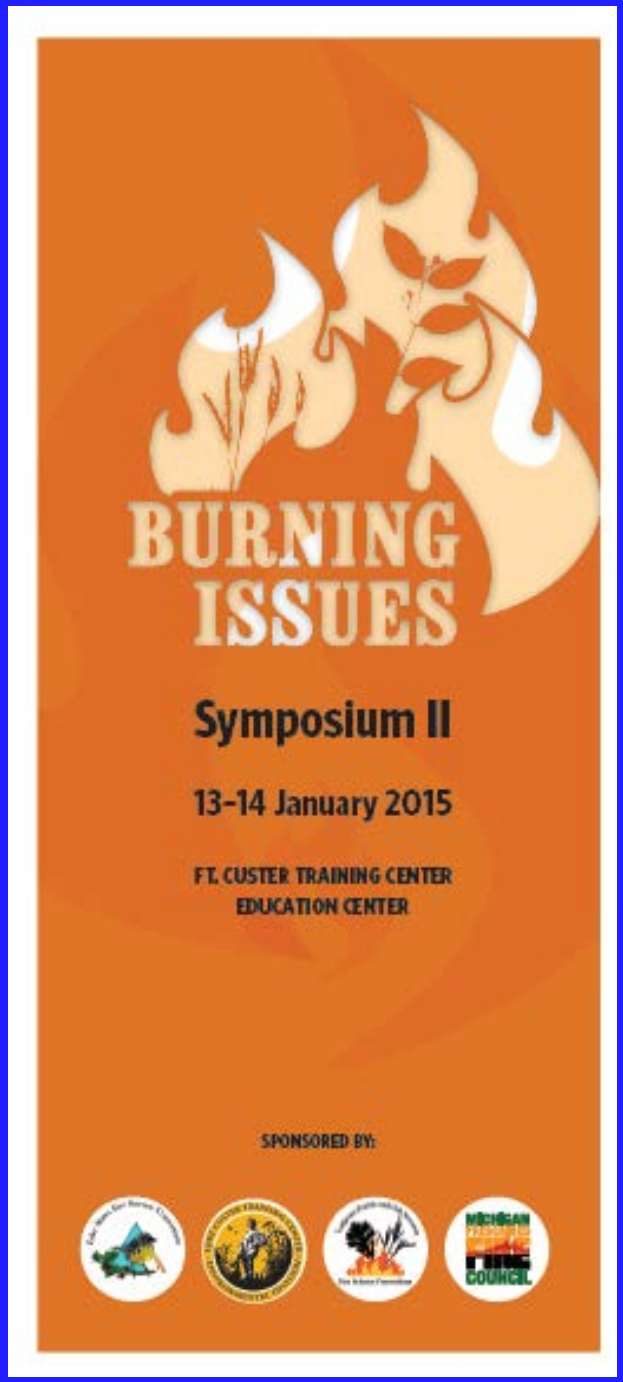


Attendees

95 people

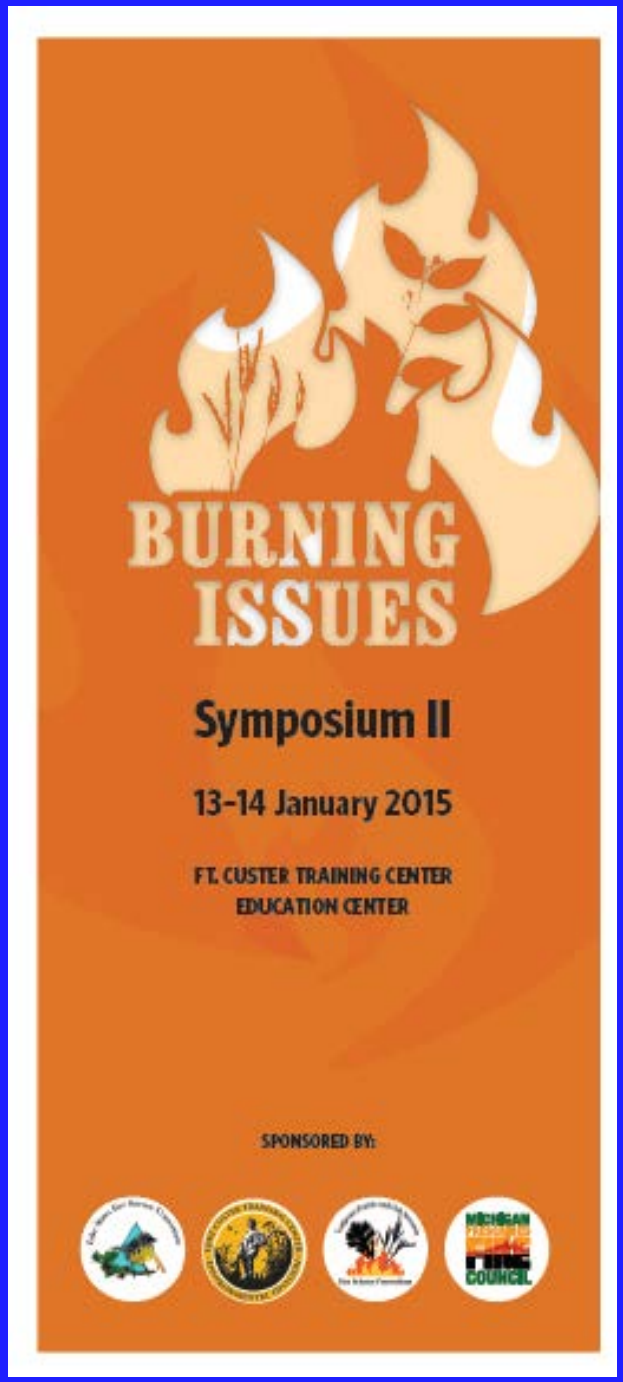
19 different organizational categories

40 different groups



Attendees

- **Bureau of Indian Affairs**
- **Conservation Districts**
- **Consultants and Contractors**
- **County Parks**
- **Environmental Private Foundations**
- **Fire Science Consortia**
- **Land Conservancy's**
- **Municipalities**
- **Michigan Department of Natural Resources**
- **Michigan Department of Environmental Quality**
- **Michigan National Guard**
- **Natural Resource Conservation Services**
- **Nature Centers**
- **The Stewardship Network**
- **Tribes and/or Bands**
- **Universities and Colleges**
- **USDI Fish and Wildlife Service**
- **USDA Forest Service**
- **Zoo's**



Day One

5 Topic Sessions:

Invasive's and Fire

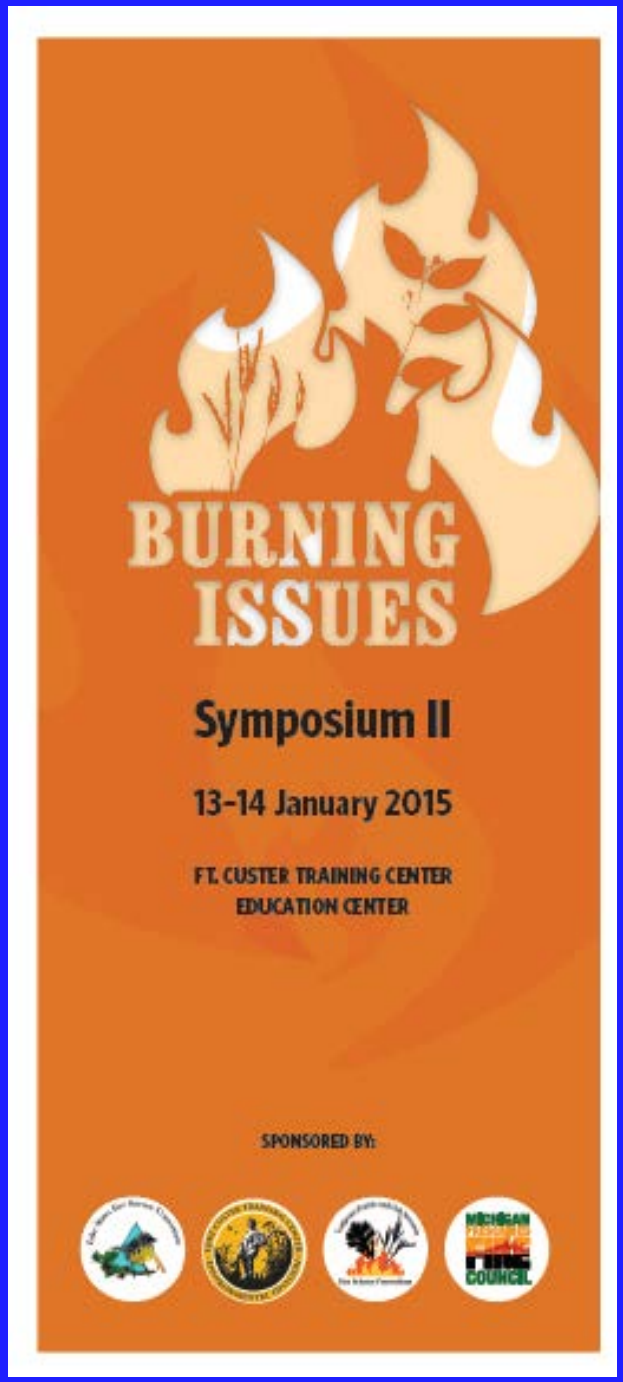
Herp's and Fire

Insect's and Fire

Oak Restoration

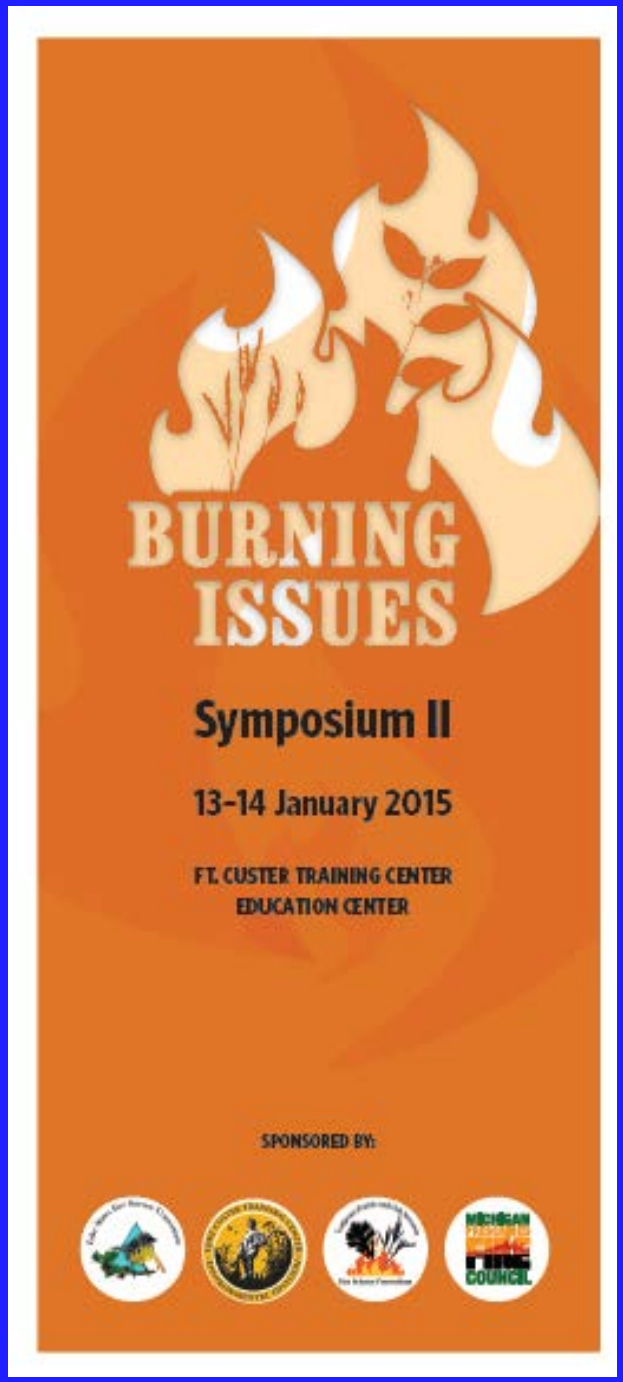
Fire Management

Each session was cooperative



Other Proposed Topics:

- Birds
- Bats
- Climate Change
- Timber Resource
- Aquatic systems affected by Fire



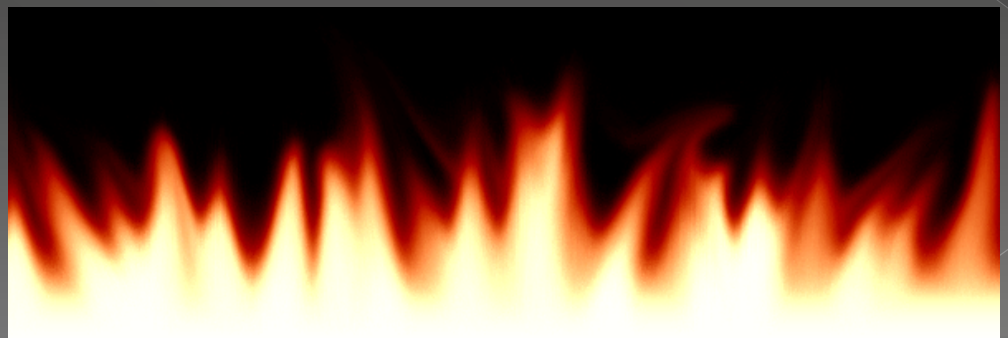
Day One

For each Session:

- Had a lead speaker and 2 to 3 more speakers/panel members
- 30 minutes, 10 minutes each, 20 minutes questions

Fire and Invasive Plants

Ellen M. Jacquart
The Nature Conservancy of Indiana



Fire and Invasive Plants Interactions

1. Effects of fire on invasive plants
2. Effects of invasive plants on fire
3. Spread of invasive plants through fire operations.

Summary

- It all depends.
- Fire can sometimes help reduce invasive plant cover if timed appropriately and repeated frequently (Asian bush honeysuckle).
- For some invasive plants, fire of any kind appears to greatly increase cover (Japanese stiltgrass, tree of heaven). For these, control should take place before managing with fire.

Spotted Knapweed Responses to Fire: Experimental Evidence from Greenhouse and Field Studies

Burning Issues Symposium II

Invasives and Fire

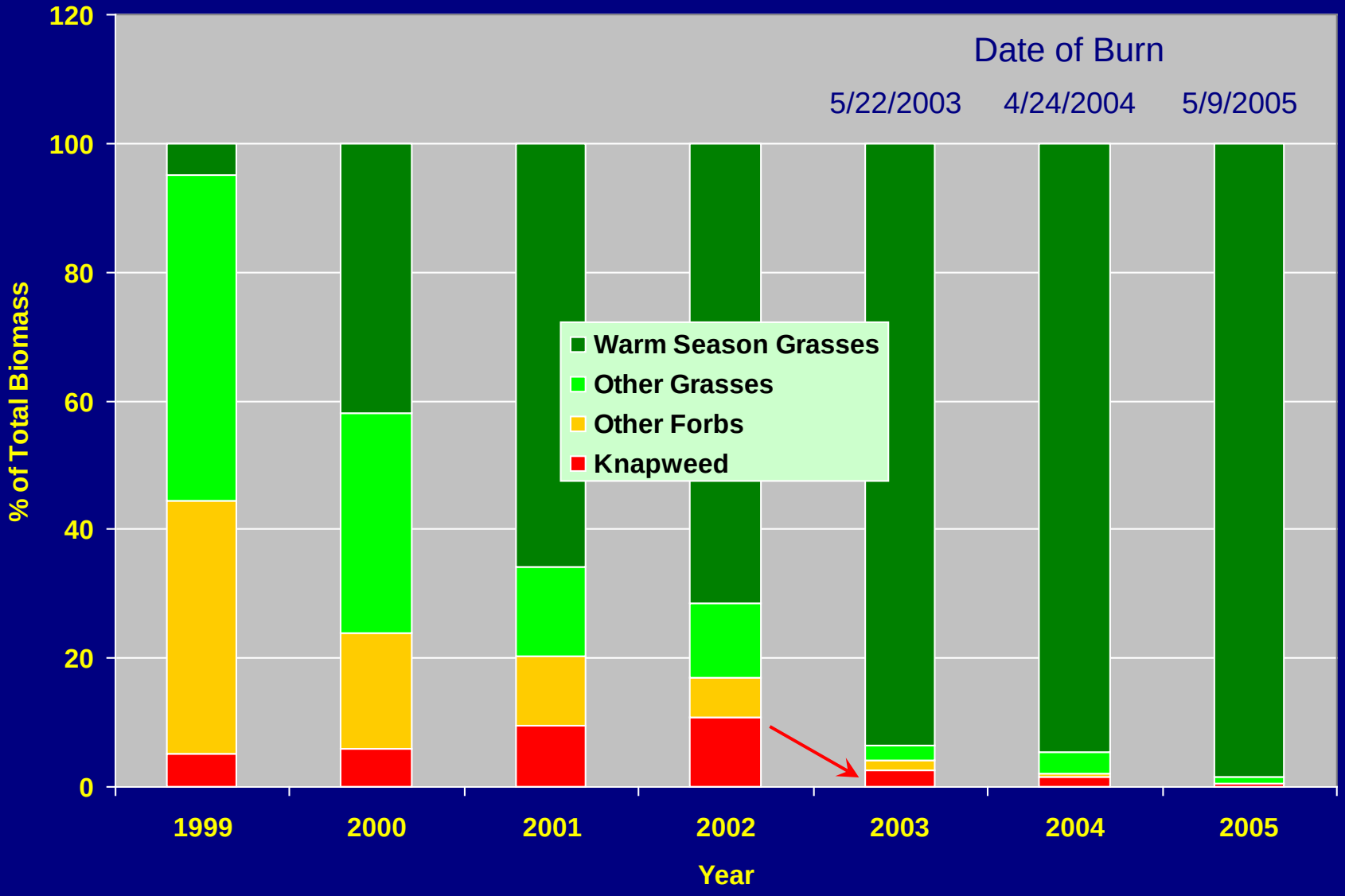
January 13, 2015

Neil MacDonald

Natural Resources Management Program

Grand Valley State University

Progression of Species Dominance, Burning Beginning in 2003



MacDonald et al., 2007. Restoration Ecology 15(1):118-128

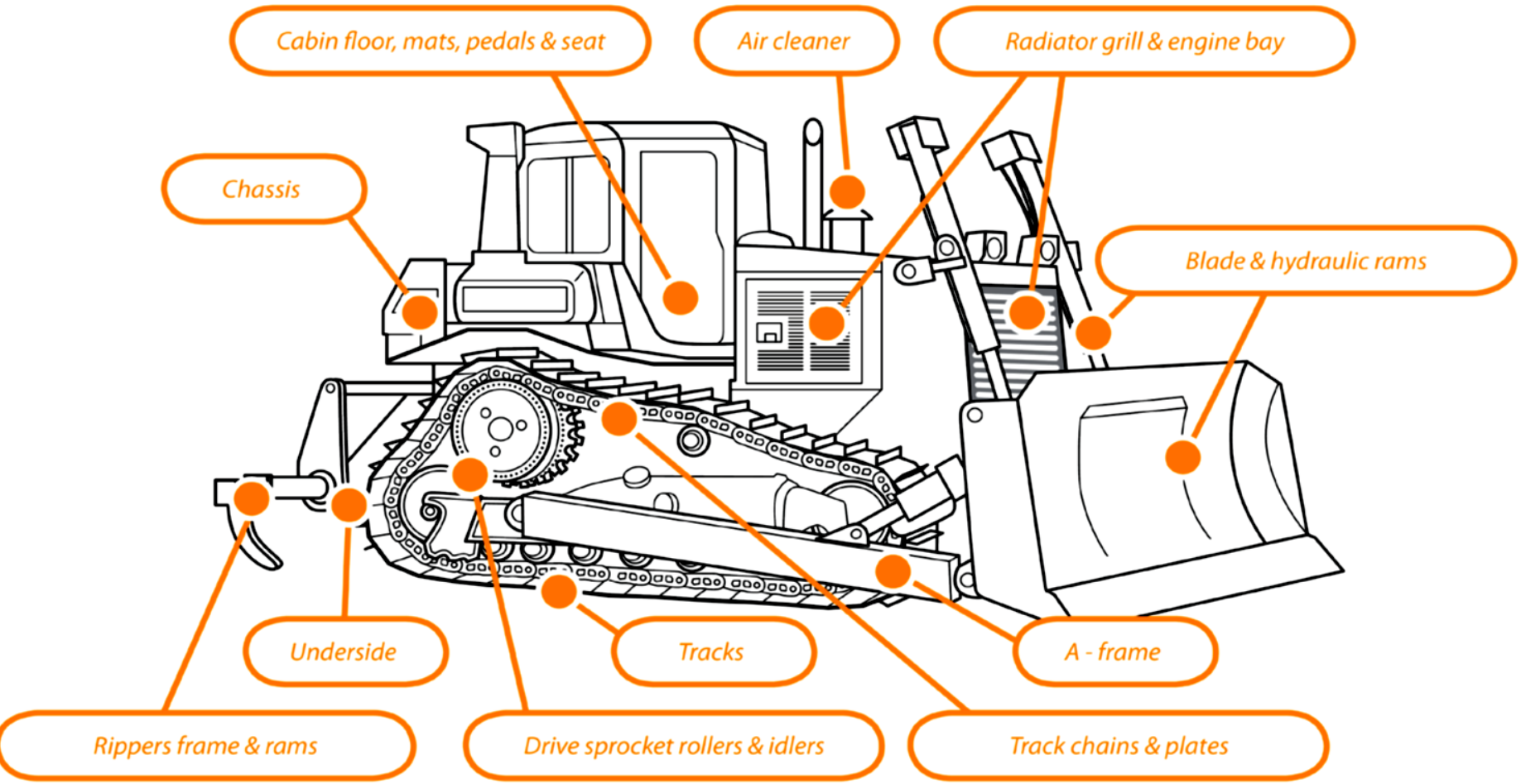
Best Management Practices for Prescribed Burning and Reporting Priority Species Using the MISIN

Phyllis Higman
Michigan Natural Features Inventory

In the context of overall management goals:

1. Define area of interest
2. Inventory (what, where)
3. Identify mgmt goals (values)
4. Identify threats to mgmt goals
   - ➢ invasive species inventory
5. Implement mgmt actions
6. Monitor and adapt

BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



Clean yourself too; skin, hair, clothing, boots, etc.

How/where do you dispose of fragments, seeds, etc.?

Presentation will be available soon on
Consortia Websites

Challenges of using prescribed fire in EBT habitat

Natural History Conflicts:

- Active season overlaps with typical burning season
  - Spring & Fall
- Slow-moving & cold-blooded; cannot outrun fire

Behavioral Conflicts:

- Drawn to higher fuel loads (leaf litter, woody debris, etc.)
- Movement patterns variable and uncoordinated

The biggest challenge will be keeping an open mind about putting fire on the ground during non-traditional times…

Some things we do know:

- Burning during inactive season is best for EBT, BUT may NOT be BEST for it's Habitat
- Emergence burns are likely the worst
  - Early spring burns (end March-mid April = 11% mortality)
- Annual burns are bad
- Recruitment is vulnerable to spring and fall grassland management activities
- EBT can survive fire and live to reproduce

How to reduce the negative effects:

No sustainable "one burn fits all"

Mix it up

- Burning season (spring, summer, fall)
- Frequency (5+ years ideal)
- Ignition pattern

Side notes

- Smaller burn units or refugia
- Patchy is good
- Watch the edges

Re-evaluate your definition of a "successful burn"

Matt Cross
mcross@bgsu.edu

Recorded Webinar from last year on Lake States Website

Threats

- Habitat loss
- Fragmentation
- Road mortality
- Persecution
- Collection
- Disease
- Management


Photo courtesy of J. McGowan-Stinski


Photo by K. Kucher


Photo by R. Seigel

Future research: How to minimize impacts?

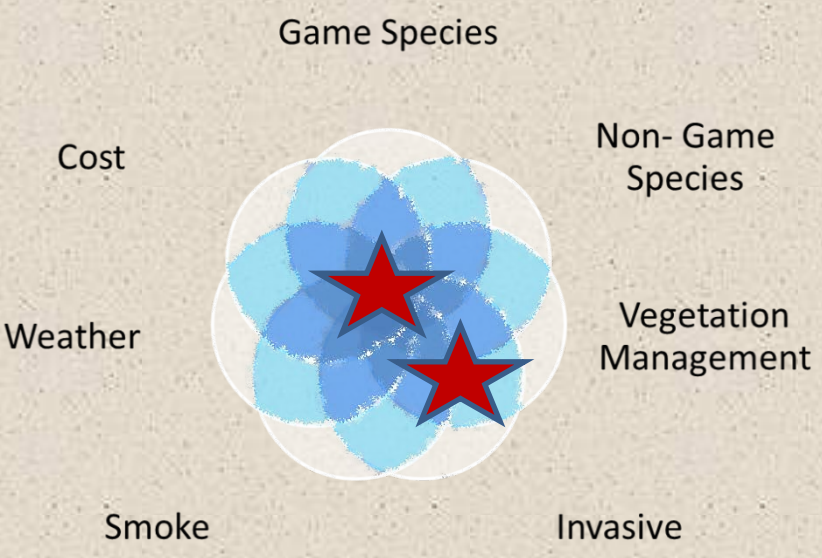
- Fire:
  - Timing
  - Frequency
- Detailed understanding of requirements & responses to disturbance.
- Ability to repatriate restored habitats
- Changes in prey density
- “Varies Geographically” – more studies
- Manager surveys

- Species

- Ecosystem

Mark Sargent – MI DNR Wildlife

Decision Making and Impact



Economics of Burning

Burn Size (Acres)	Average Cost Per Acre
0 – 9	109.14
10 – 39	67.25
40 – 79	36.80
80 – 149	20.63
150 +	15.44

Economic Considerations

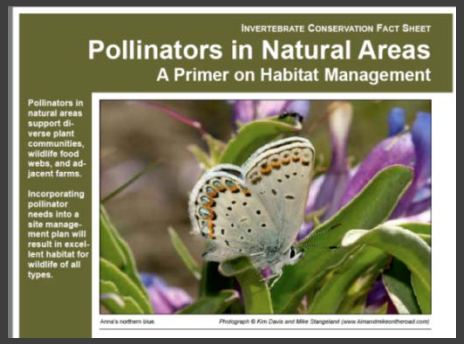
Management Activity	$/acre
Conventional Plant (plow, disk, plant)	$56
No-till Plant (mow, spray, herbicide, plant)	$70
Mow and spray	$36
Mow and bale	$100-150
Brushhog	$22
Hydra-axe	$175-250

o

The effects of wildland fire on conservative insects in prairie and savanna remnant habitats

Karl Gnaedinger
Manager–
Indian Boundary Prairies
The Nature Conservancy
in IL

FIRE ADVERSE ENTOMOLOGISTS



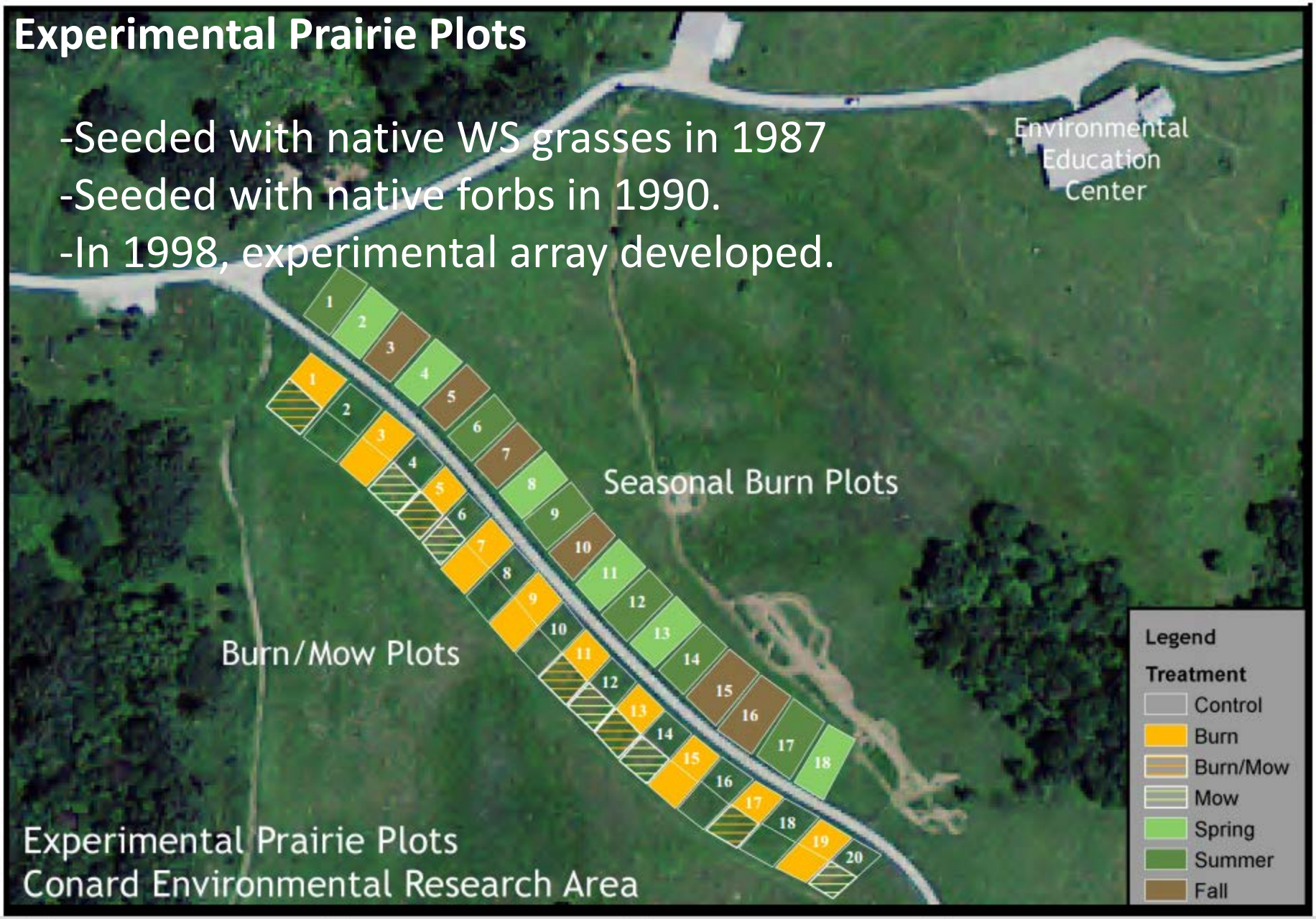
FIRE LOVING BOTANISTS

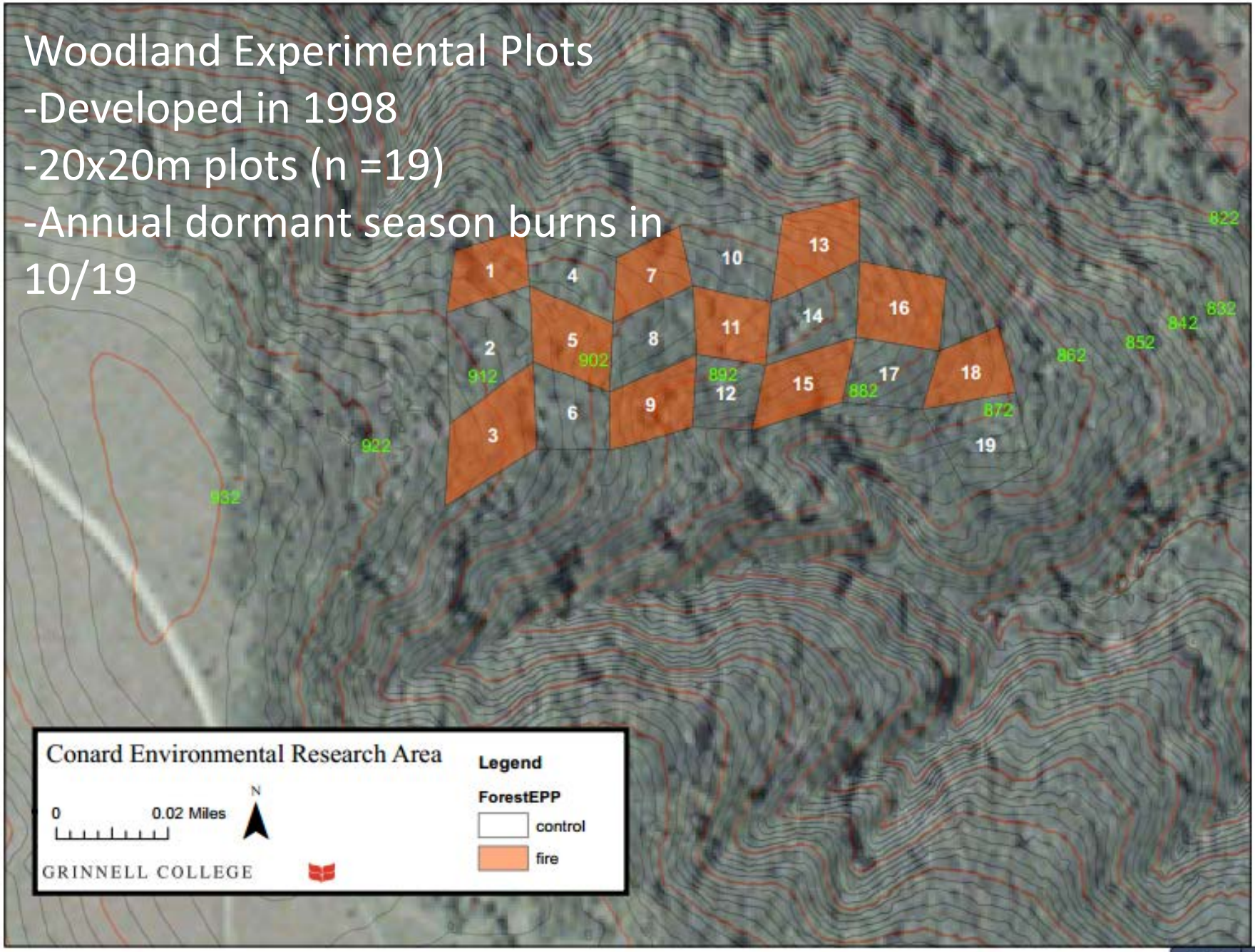
Summary

- Hundreds of conservative insect species persist solely on remnants.
- Roughly half are fire sensitive (FS).
- Species that inhabit dry and mesic habitats, and those with single generations are especially vulnerable.
- Most FS species require 1 or 2 years to recover (with refugia present).
- Unburned refugia and skips play essential roles in the recovery of small populations.
- Complete burns should be avoided .
- Use rotational burning

Experimental Prairie Plots

-Seeded with native WS grasses in 1987
-Seeded with native forbs in 1990.
-In 1998, experimental array developed.




Woodland Experimental Plots
-Developed in 1998
-20x20m plots (n =19)
-Annual dormant season burns in 10/19
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
822
832
842
852
862
872
882
892
902
912
922
932
Conard Environmental Research Area
0
0.02 Miles
N
GRINNELL COLLEGE
Legend
ForestEPP
control
fire

Real people
Real data
Real science

A citizen science model for monitoring Michigan's common and imperiled butterflies

Ashley Anne Wick

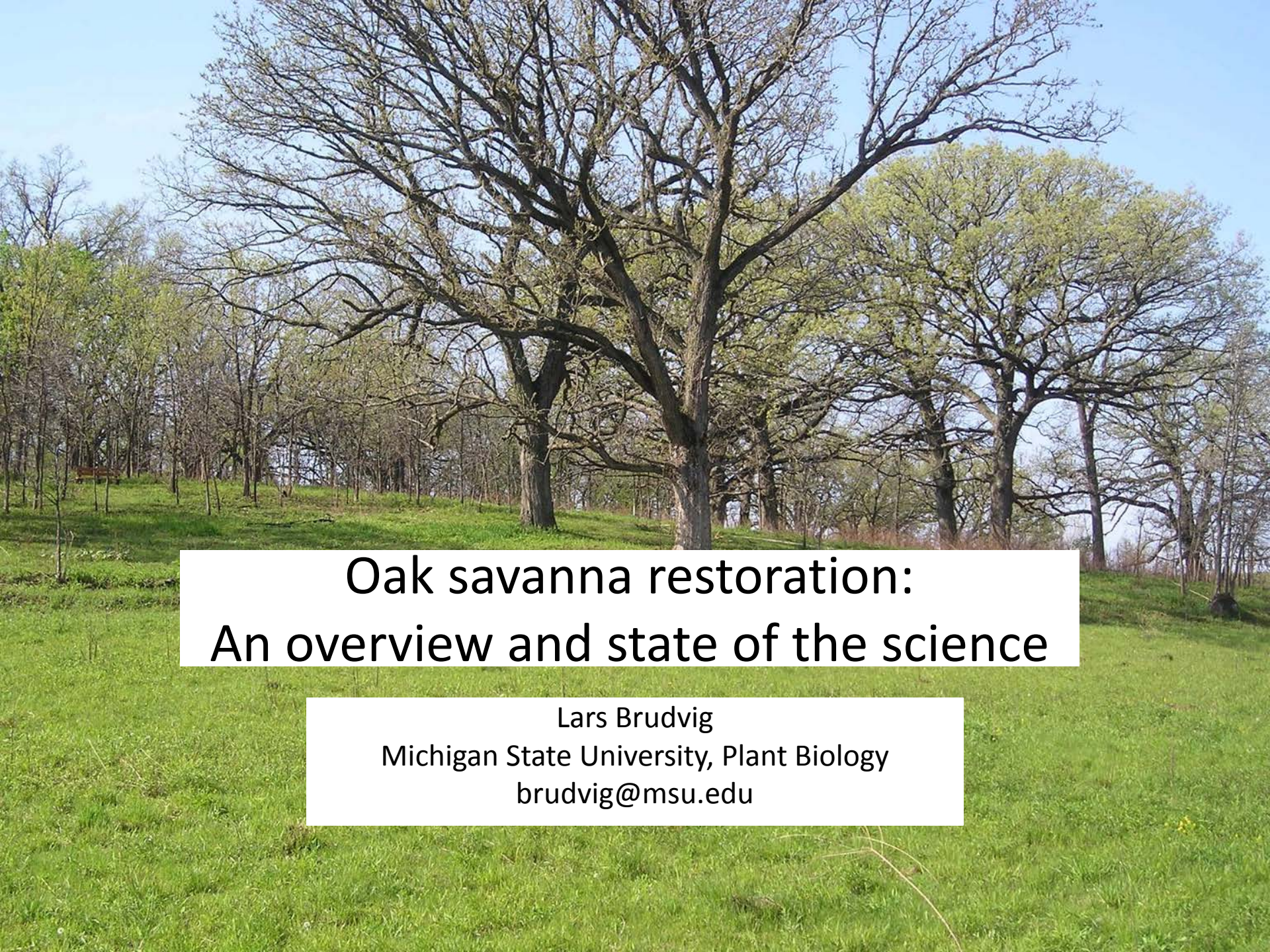
Michigan Butterfly Network, Director

Kalamazoo Nature Center, Biological Research Director

awick@naturecenter.org

What can we do with our results?

- Improve our understanding of species' distributions
- Are restoration activities working?
- Is prescribed fire affecting populations?
- How long does it take for habitat enhancements to affect butterfly populations?
- Are invasive species affecting butterfly populations?
- Is ecosystem functioning in decline?



Oak savanna restoration: An overview and state of the science

Lars Brudvig
Michigan State University, Plant Biology
brudvig@msu.edu

Outline

- An overview of Midwestern oak savannas
  - Ecology, threats, restoration
- Roles of fire and other tools in oak savanna management?
- How do we promote heterogeneity within sites?
- What explains variation in restoration/management outcomes (among sites)?

Roles of fire and other tools in oak savanna management?

Take home: Fire is a central tool, but thinning effects predominate over burning in the short-term

- Ecosystem structure, groundlayer plants, pollinators

Questions:

- When can we expect fire-alone to be effective…and over what time scales?
- Does thinning + burning accelerate trajectory…or set a different trajectory, relative to burning along?
- Fire surrogates?
- Matching tools to site conditions

How do we promote heterogeneity within sites?

Take home: Restoration can promote heterogeneity

Questions:

- Burn spatial/temporal heterogeneity?
  - Patch vs. complete burns
  - Seasonality
  - Return interval

What explains variation in restoration outcomes (among sites)?

Take home: Site-to-site variation and landscape cont

Questions:

- Soil conditions?
- Management decisions?
- Landscape context?
- Native vs. invasive establishment ?

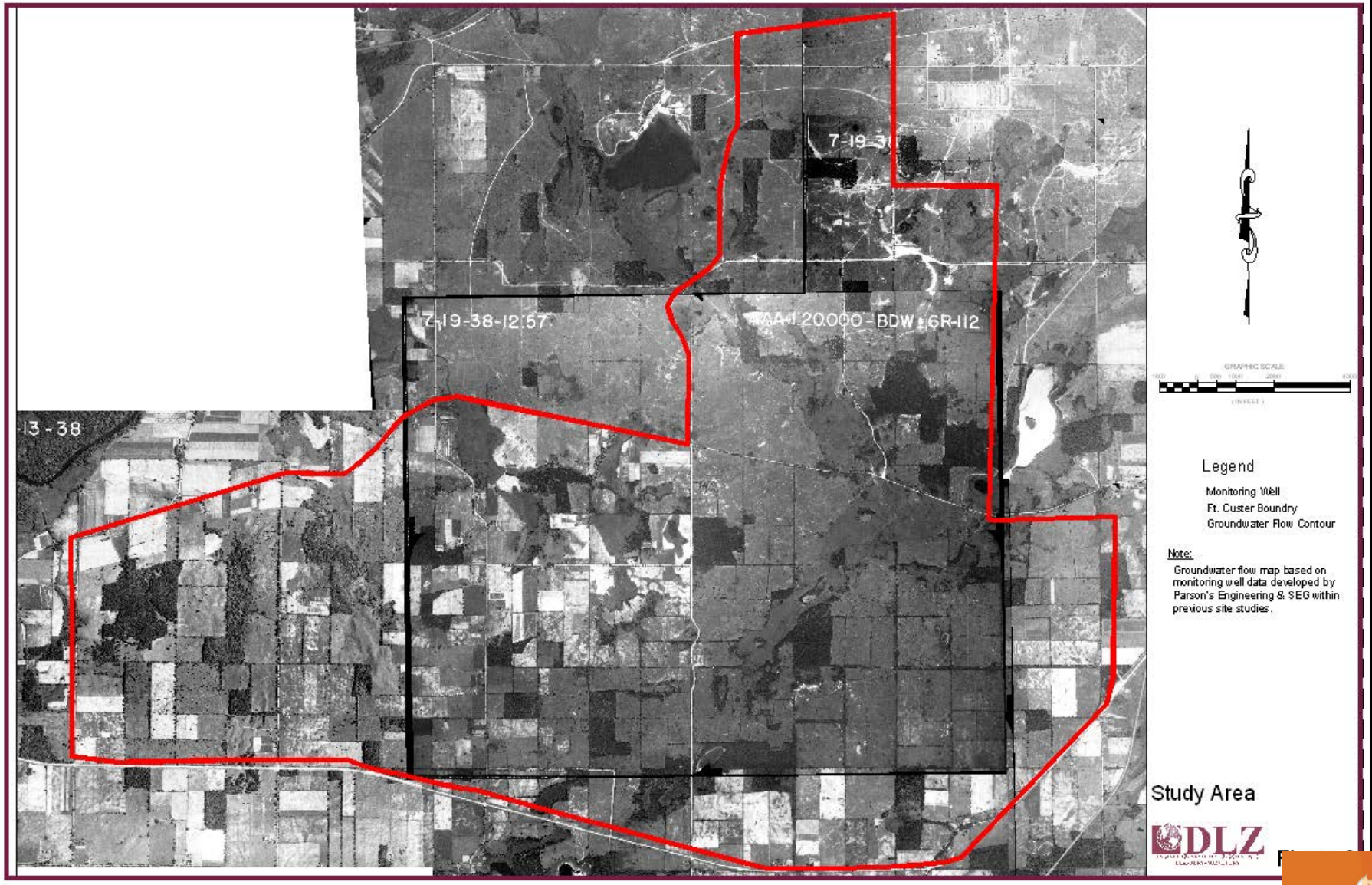
Fire and Savanna Management

in the Lakeplain Oak Openings Region

- Generally speaking Fire in Oak savannas are go
- Diversity is key and comes in many forms
- We are managing systems not species
- In the absence of fire nutrients accumulate in the soil
- Patience is a virtue

Oak Restoration

Dan Zay, State Biologist
NRCS - USDA


7-19-3
7-19-38-12:57
AAA-1 20.000 - BDW - 6R-112
-13 - 38
GRAPHIC SCALE
Legend
Monitoring Well
Ft. Custer Boundry
Groundwater Flow Contour
Note:
Groundwater flow map based on monitoring well data developed by Parson's Engineering & SEG within previous site studies.
Study Area
DLZ

Fire Operations: Constraints/barriers to Implementation

Paul C. Charland

USFWS, East Lansing Field Office

East Lansing, MI

People-based

Place-based

Legal/regulatory-based

*Budget and weather sold separately

People-based

Internal

- Crews
- Organization

External

- Public
- Partners/cooperators

Communication!

Internal

- Crews
  - Training
  - Standards
- Organization
  - Fire Culture
    - Pyrophilic or pyrophobic?

External

- Public perception or tolerance
  - Smoke
- Partners/cooperators
  - Permits
  - Contingencies

Place-based

Values

Risks to crews

Smoke

Legal/regulatory-based

Internal/Organizational

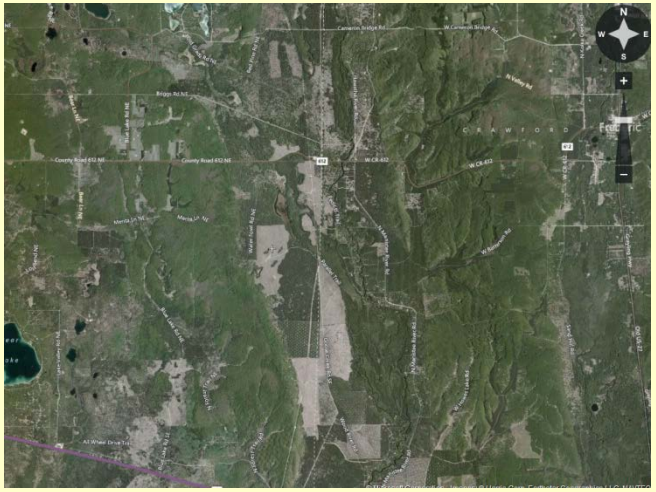
Planning

External

Permitting

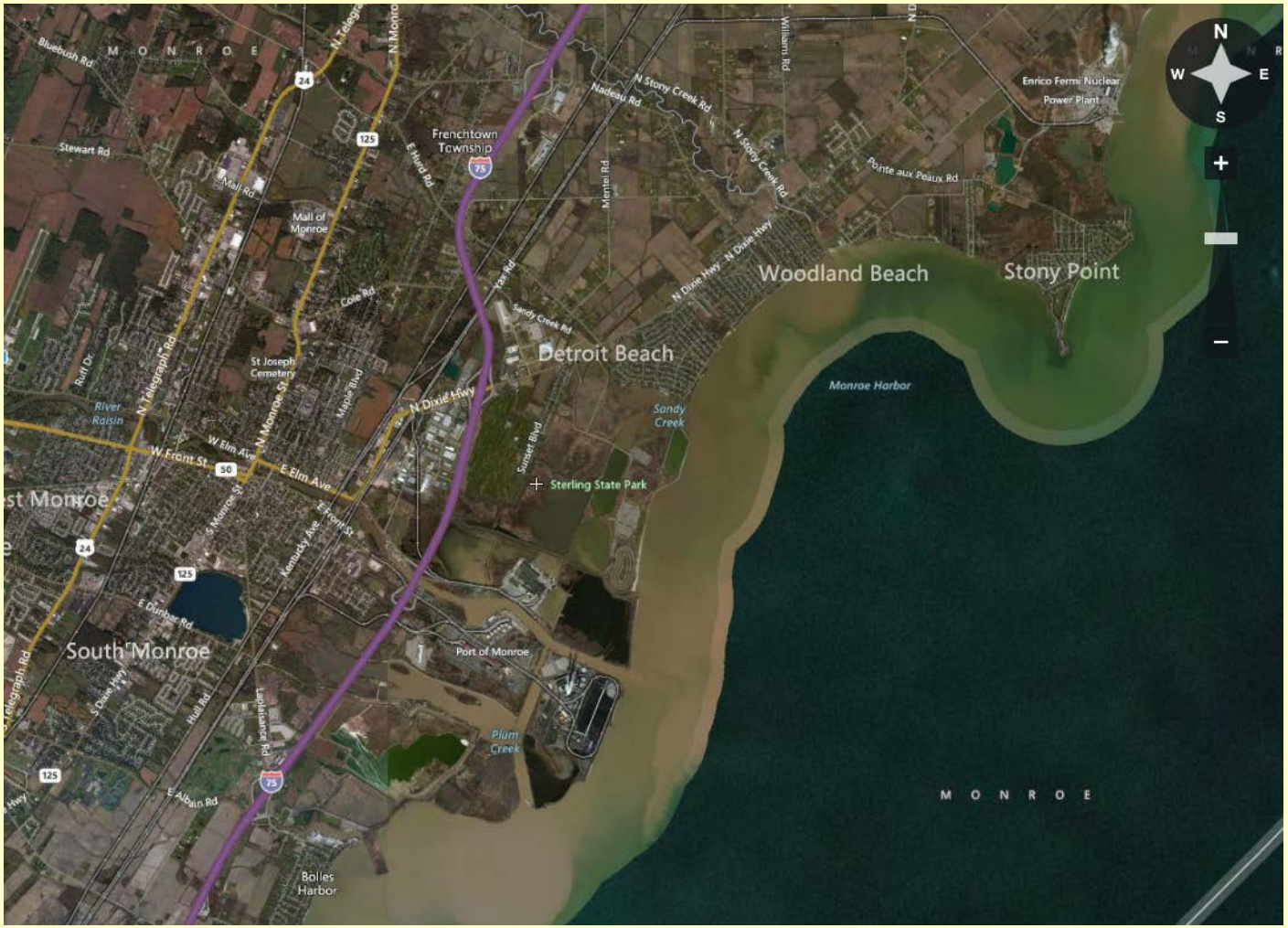
It's not just a simple matter of should we or shouldn't we burn a given parcel…

Communication, Communication, Communication




2014/03/26

Be successful. Reach out and tell your story.



DEPARTMENT OF NATURAL RESOURCES
DNR
MICHIGAN

Maple Ridge RX Burn

MIO RANGER DISTRICT

2014

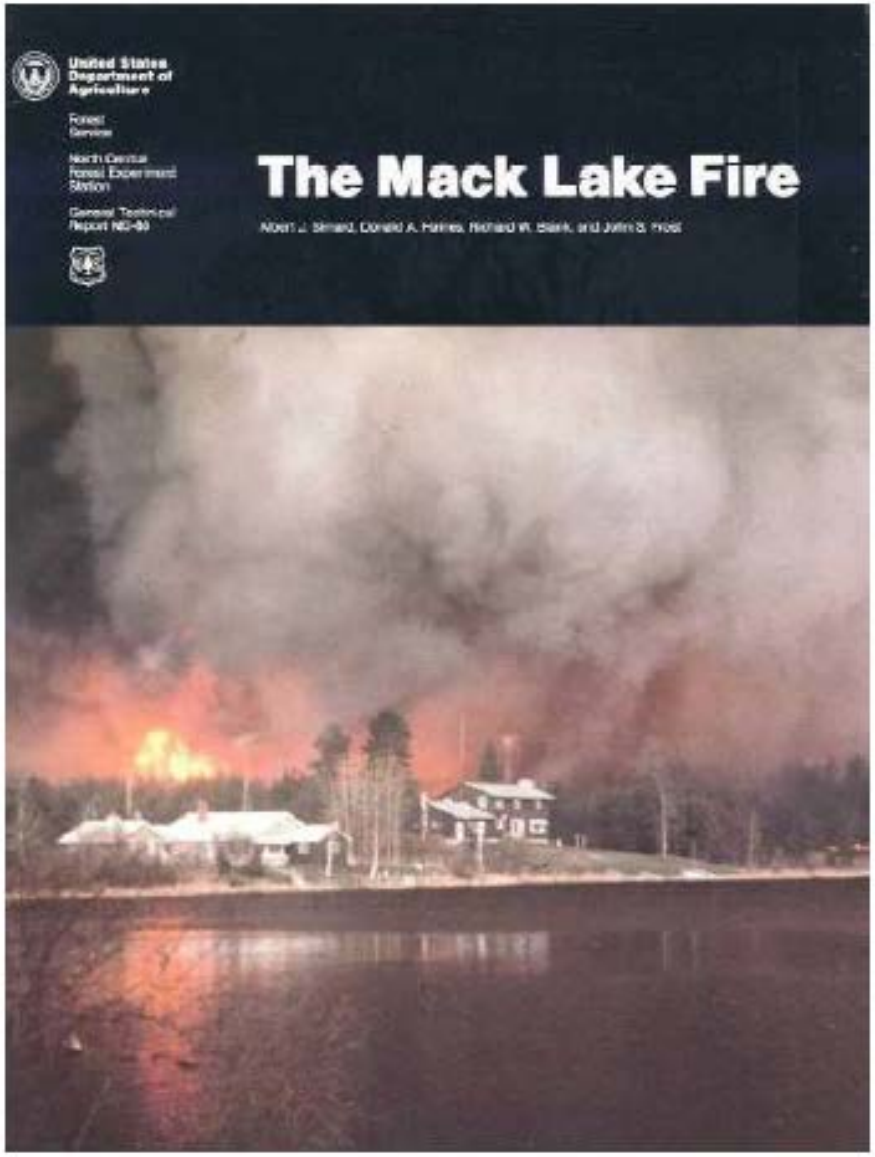
History of the Project Area

Maple Ridge RX within the 1980 Mack Lake Fire Perimeter

The 1980 fire was an escaped prescribed fire

USFS Dozer operator perished, 44 structures lost, 24,000 acres consumed. HMNF reputation destroyed

Maple Ridge RX burn proposed immediately adjacent to the Mack Lake subdivision and near the fatality site



Politics & Human Factors

USFS has a tarnished reputation, but very recent major successes

Some residents lived through the 1980 fire and remember it well

Crown fire has never been used as a management tool, generally viewed as unsafe

1980 Mack Lake Fire naturally creates a lot of fear internally and externally

No control problems other than spotting immediately across north control line

Crews using strip head firing, interior spot ignition with hand fired munitions, and begin a center firing operation.

Picture taken from resident's front yard along the east fuelbreak

Ignition of main crown fire initiated at approx. 2030 with strip head fire after N, E, & W control lines blackened

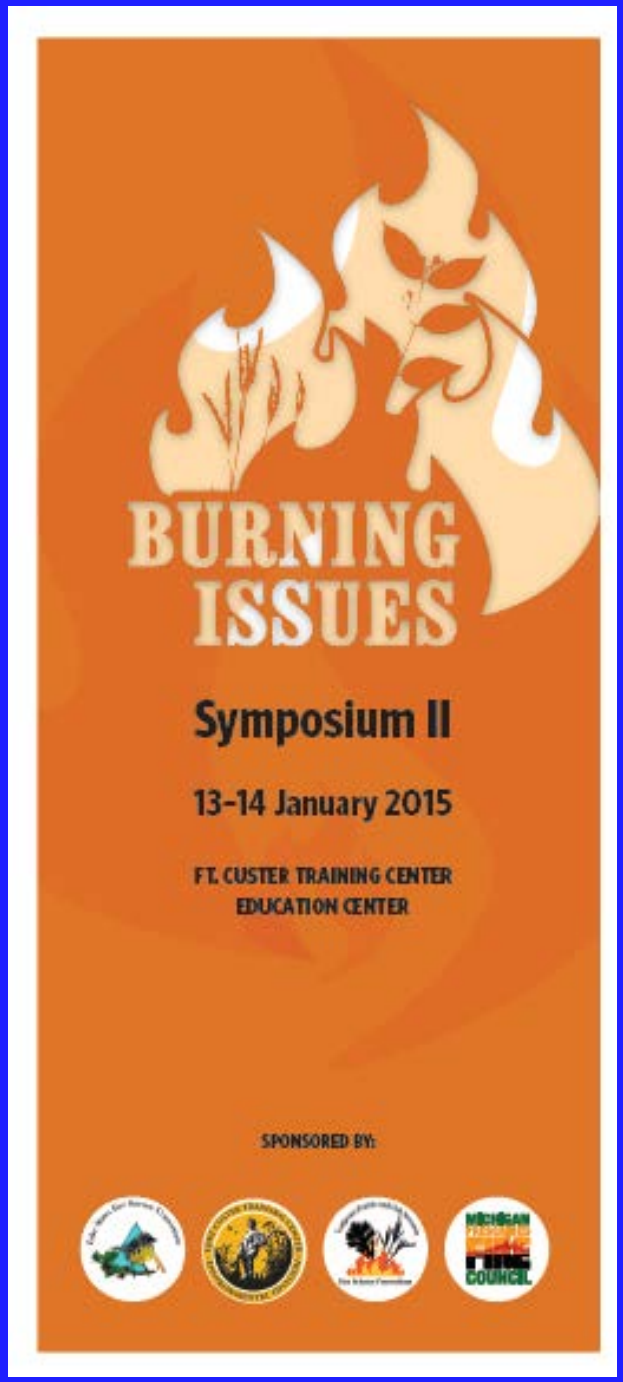
Fire Life in the NGO (not a NOGO!)

Managing and Training Experience for a Non-Profit

Ryan Koziatek

Kalamazoo Nature Center, Stewardship Field Director

MPFC – Vice Chair



Day Two

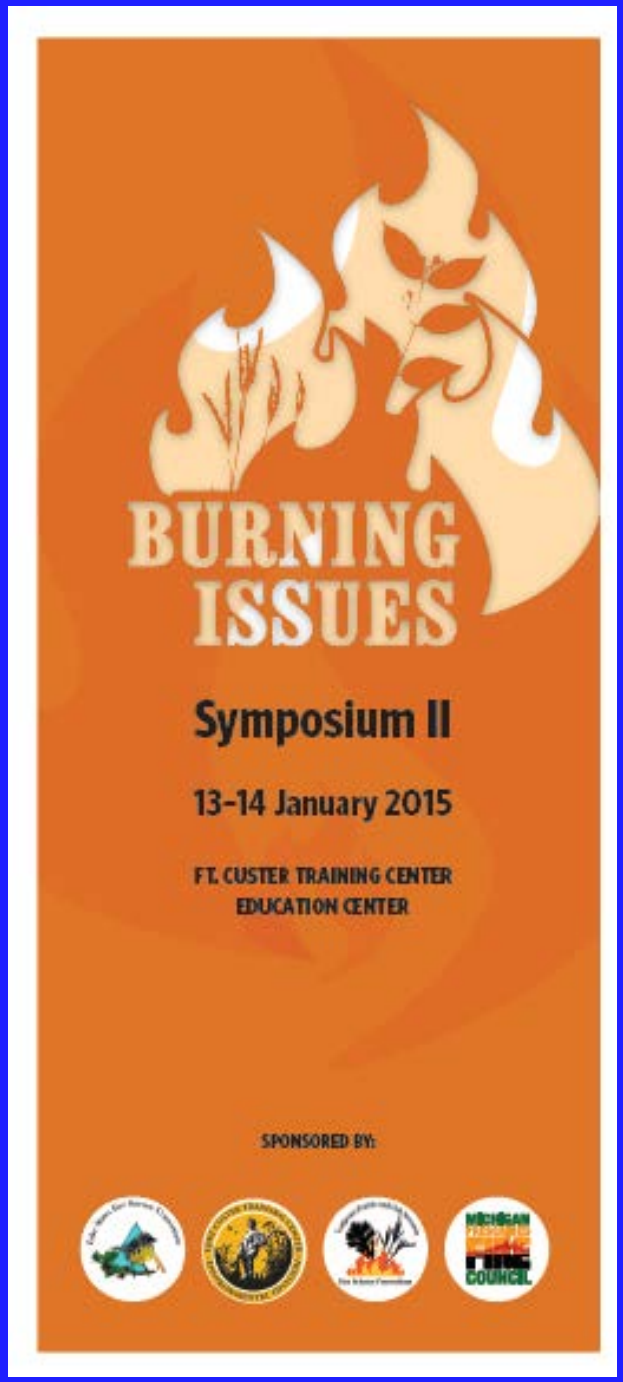
Breakout Sessions:

Invasive's and fire

Rare Species and Fire

Oak Restoration

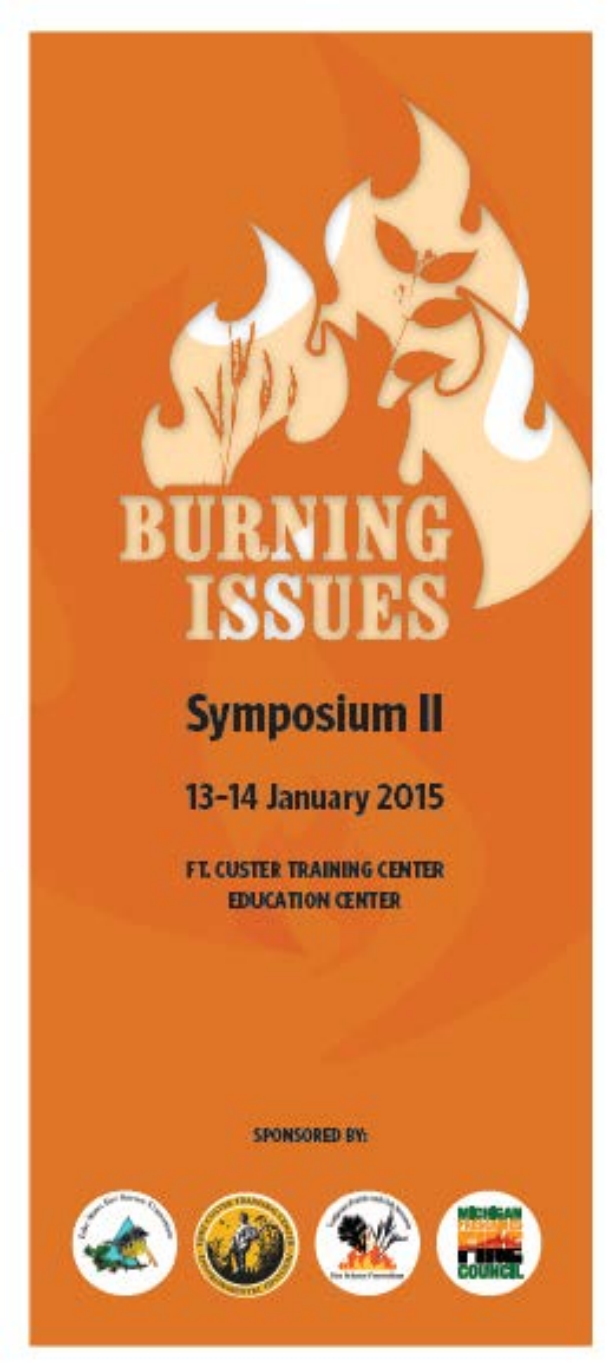
**We intentionally did NOT have a breakout group for Fire Operations*



Day Two

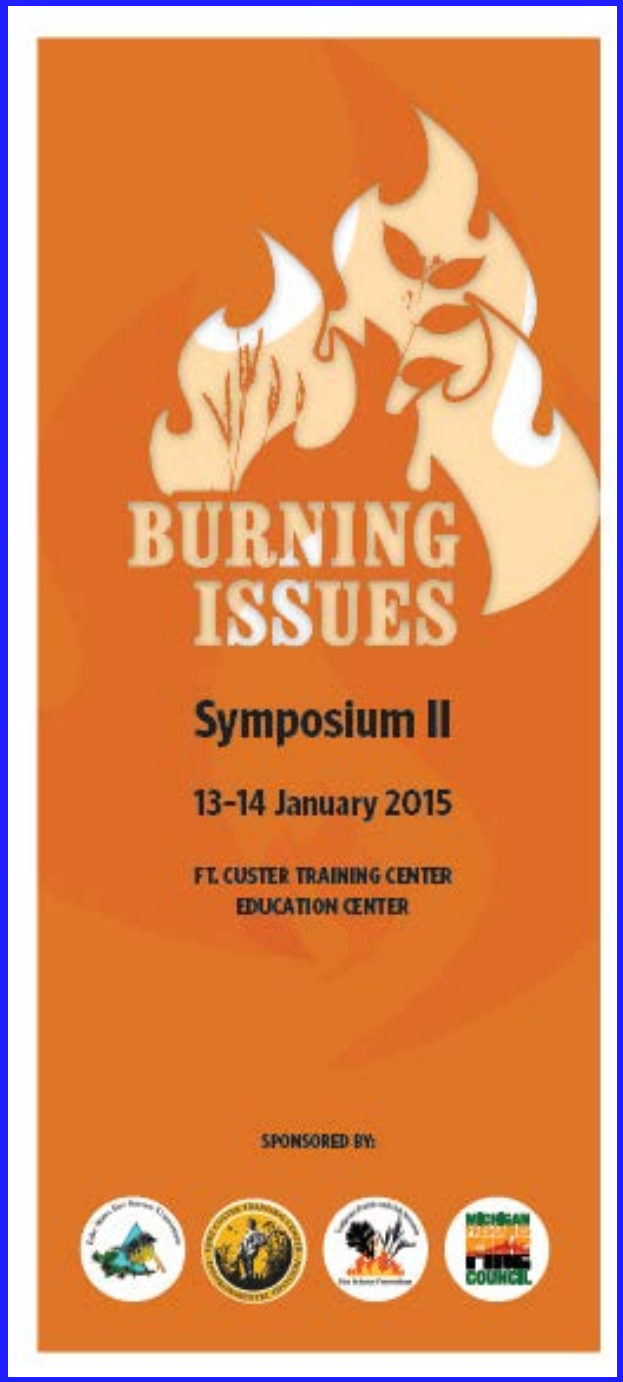
2 hour Breakout Sessions:

1. Guidelines and Intro's
2. Brainstorm and Discussion of Needs and Questions
3. Potential action items and prioritization (and *Gaps in Knowledge*)



Themes through Sessions

1. Fire obviously ran through all the topic sessions – different levels of skills and knowledge, judgement and attitude



Themes through Sessions

2. Underlying theme – Monitoring
3. Come up with Good Recommendations that are useful. Do NOT tie managers hands with competing recommendations, or those that are useless = **same end goal**

Oak Restoration Breakout Group Discussions

- You can restore a house to so it looks exactly the same....
- or the other approach = restore functionality, get it working
- What is the end point of restoration?
- We think in terms of human-time scales - and fire-dependent ecosystems involve human interaction. It's hard to get people to think on ecological time scale
- Which sites have the most potential for achieving goals? = **“Restorability “**

Oak Restoration Breakout Group Discussions

- Landscape scale = then prioritize landscape connectivity
- Focusing on core areas must be balanced with connectivity
- We can make strategic decisions on where to restore based on a landscape approach
- But do we know the landscape approach = A Needs Assessment?

Oak Restoration Breakout Group Discussions

- Baby Oak Emotional Support Group?

- The public needs to know what we are talking about by having reference sites to go and stand in the middle and say *"Oh, this is what a savanna feels like"* to garner interest, educate

Oak Restoration Breakout Group Discussions

- Database of all savannas?= Needs Assessment?
- A database could help researchers give answers based on custom analysis of that data.
- **Land managers hold the key to the disturbance in these ecosystems…tell your story**
- Stewardship is a Journey, the “End Goal” is continued maintenance of the landscape matrix in context of climate change = social acceptance…

Oak Restoration Action Steps / Priorities

1. Database of all oak savannas in region/ Michigan/Consortium and landowner info/land history/demo sites =
   a. *Needs Assessment for savannas*
   b. Prioritizing sites based on site and landscape context
   c. Identify and/or define demo sites
2. Defining end-goal of restoration/management = *What is success?* (**"Restoration ethos")**
3. Best Management Practices
4. What's the deal with oak regeneration/restoration and timber harvest?
5. List of names from all the breakout group = Forum/network/listserv group

Invasive's and Fire Action Steps / Priorities

1. Prefire/postfire monitoring
2. Integrating other techniques with fire
3. Equipment cleaning/spreading of invasive's
4. Writing specific objectives in burn plans for invasive's

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5. Communication and education of landowner and land manager

Invasive's and Fire Monitoring

- How do we ensure effective and realistic pre- and post-monitoring? (of fire, and of invasive's....)
- Documentation that is usable:
  - Efficient form
  - Provide range of levels of monitoring options to measure effectiveness
- How do WE change?
- How to fund the poor step-child of management?

Integrated Techniques with Fire

- Education around value and limitations of fire in combination with other management techniques

- Timing and seasonality of fire and effects of fire: knowledge/charts

Equipment Cleaning

- The “How To” Manual…..
- Education and “enforcement” – outreach
- Staging area for cleanup – consistency in cleaning
- **Our responsibility** to stop the movement of invasive’s on equipment
- Include in burn plan clean-up step
- “Levels of risk”

Writing specific objectives in burn plans

- plant phenology important to include
- creating environment for natives to gain footing
- need more research on fire and invasive's
- How do we collect our knowledge? Cannot wait for research only, need **manager's expertise on adaptive management**
- Be realistic about what fire can do
- Research is missing for seasonality and growing season = most information is on dormant season

Rare Species and Fire

- How to implement fire w/o incidental take of rare species
  - Use indicator species that are not rare?
- What are all the things we have to think about when planning a fire – communication from the fire managers
- Are there minimum standards that should be implemented on all fires
- Questions that should be asked before the GO-NO GO decision

Rare Species and Fire

- Awareness of rare species issues by fire practitioners?
- Communicating current research to help with fire decisions
- Collect anecdotal information (it is “Science”!!)
- Need to compare/contrast all management activities and negative impacts, along with fire as an ecological process
- Plan for all diversity when managing fire-dependent systems

Rare Species and Fire Action Items

- Develop better Guidelines and Standards
- Monitoring (surveys/inventory/research, etc.)
- Communication between researchers, land managers, fire managers
  - Guidelines to all researchers on the fire data to collect and record and make available
  - Language barrier between fire folks and researchers, and between land and fire managers

Next Steps….