Good Forest Management = Good Forest Health

Matthew E. Jones

Tree Farm Webinar Series

August 29, 2012

AGENDA

- Define forest health
- Discuss IPM (Integrated Pest Management)
- Look at management examples

FOREST HEALTH

- The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.
- Perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that comprise the forest, and the appearance of the forest at a point in time.

Online Dictionary of Forestry, SAF website 1998

Forest health, like beauty, is in the eye of the beholder.

Measuring Forest Health

- "If the land mechanism as a whole is good then every part is good, whether we understand it or not…To keep every cog and wheel is the first precaution of intelligent tinkering." *Aldo Leopold, Essays On Conservation From Round River, 1938.*

mountain pine beetle (*Dendroctonus ponderosae*)

Jerald E. Dewey, USDA Forest Service, Bugwood.org

fire () on lodgepole pine (*Pinus contorta*)

Billy Humphries, Forest Resource Consultants, Inc., Bugwood.org


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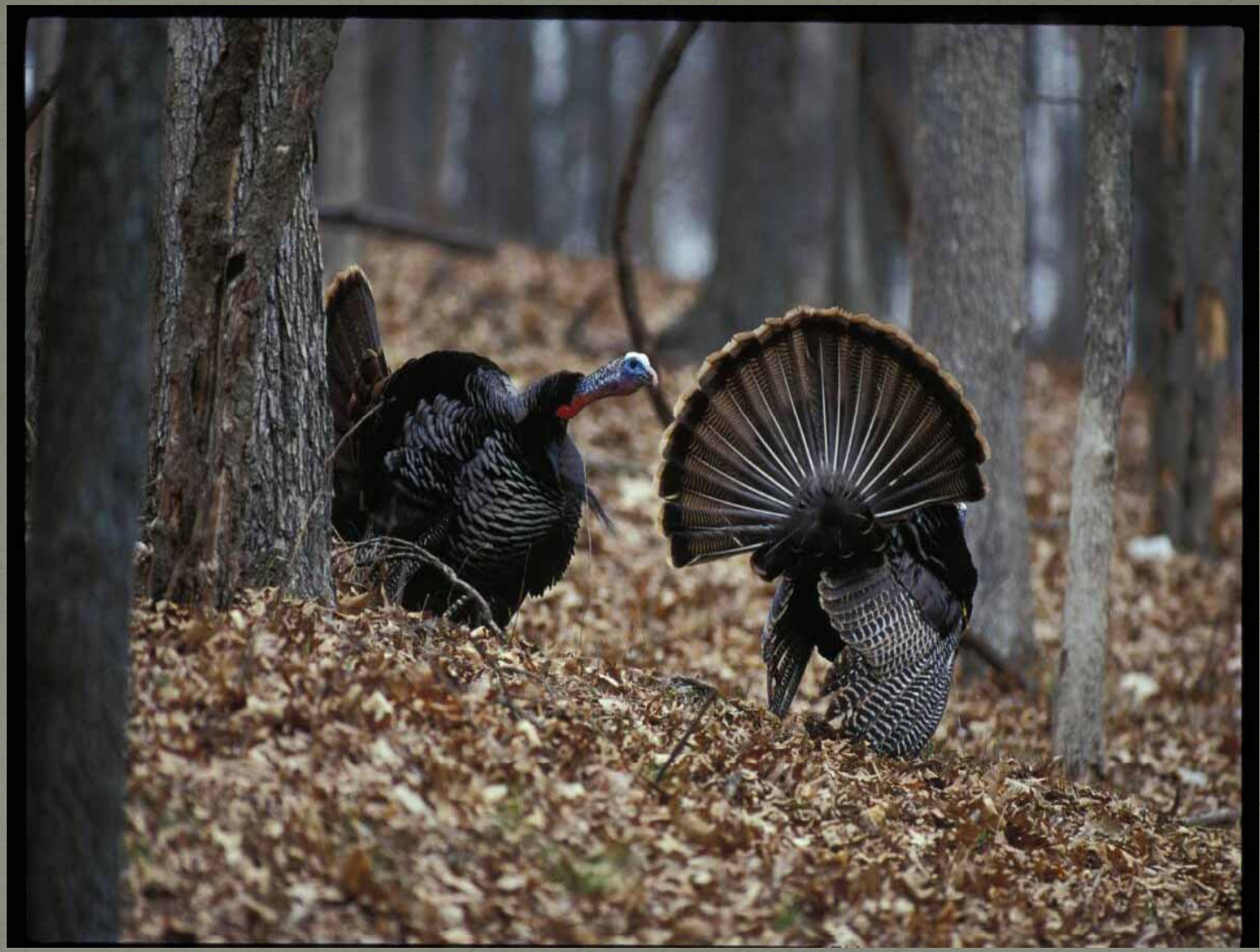
yellow-throated warbler (*Dendroica dominica*)

Vern Wilkins, Self employed, Bugwood.org



red-shouldered hawk (*Buteo lineatus*)

Jim Occi, BugPics, Bugwood.org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INTEGRATED PEST MANAGEMENT

- Most economically and ecologically sensible way to reduce the affect of known pests.
- Pick your battle: determine the best weapon to fight the battle.

2010-2015 AFF Standards of Sustainability, Standard 4

IPM Techniques

- Silvicultural – Avoid overstocking, prevent logging damage, right species right site, slash management.
- Mechanical – Removal of weeds or trapping of pests, installing mechanical barriers, removing affected trees.
- Biological – Introducing pest enemies.
- Chemical – Pheromones, repellents, herbicides, pesticides.

Gypsy moth

Main page

Gypsy moth identification

Gypsy moth impacts

Gypsy moths in the U.S.

Gypsy Moth in Minnesota

Gypsy Moth management

Terrestrial invasive species

Main page

Invasive species FAQ

Invasive species ID and management

Make a difference

Prevent the spread

Firewood can move pests

DNR programs

Other terrestrial invasives information

Funding

Gypsy Moth Management

What is being done to control the gypsy moth?

To protect natural resources, state and federal agencies have been involved in gypsy moth management for many years using a wide range of integrated pest management tools. Some of the tools implemented to reduce impacts caused by gypsy moth include natural (biological) and chemical control, mating disruption and selected forest management practices.

USFS: Gypsy Moth Management EXT
NPS: Integrated Pest Management Manual PDF

White footed mouse.

Natural Controls

Predators: White footed mice feed on gypsy moth pupae and are probably the most reliable predator in the region. However, the mice do not occur everywhere the moth is found and there are not enough mice to effectively control gypsy moth populations. Sapsuckers are one of the few bird species that will eat the hairy gypsy moth caterpillars, but again not enough of them to control the population.

Entomophaga maimaiga: In years of wet spring weather, a fungal pathogen, Entomophaga maimaiga, has dramatically

Forest Management

Urban tree Care: Preferred host trees under stress are the most at risk of mortality following severe defoliation. Proper site selection, planting, and tree care are essential to optimize the trees' own natural defense mechanisms. A vigorously growing tree can withstand some defoliation and most weather extremes. Root disturbance or trunk injuries can lead to stress that may leave a tree prone to additional damage or death.

To keep trees healthy:

- Protect the critical root zone.
- Avoid all work that may result in wounding of oaks during April - October.
- Maintain proper watering and tree care.
- Consult an arborist as needed.

Minnesota Tree Care EXT

Forest management: There are two broad strategies to consider in forest stand management. When and where you apply these strategies depends on your land use objectives, stand composition, and site-specific conditions. The combination will determine which practices are feasible for your stand. When in doubt on the appropriate strategy, be sure to consult a professional forester.

Managing for stand diversity is the best means of limiting any insect defoliation. Encourage a mix of tree species, forest types, ages, and sizes. Managing for tree health and vitality is the best means of limiting tree mortality associated with defoliation (no matter how diverse your stand, some defoliation still may occur). Thin overly dense stands to reduce competition. Where consistent with management objectives, harvest and regenerate oak and aspen stands growing beyond their normal rotation age. Remove suppressed trees likely to die anyway and create growing space for seed and crop trees. Maintain oak as an important component of the stand, but encourage other species where possible.

Gypsy moth sivicultural considerations for Minnesota PDF

GYPSY MOTH SILVICULTURAL CONSIDERATIONS FOR MINNESOTA

Prepared by
Minnesota Department of Natural Resources
United State Department of Agriculture, Forest Service
University of Minnesota

Site-Level Silvicultural Considerations – Keep in mind what the risk of damage warrants and what site conditions allow. See the Tatum Guide, page 27.

To diversify stand composition:

- Where site conditions allow, use thinning or regeneration systems to increase the proportion of less-preferred and avoided tree species to 50% or more of stand stocking. (However, avoid favoring ash in stands already dominated by ash due to their high susceptibility to EAB).
- When regenerating a stand using shelterwood systems, special protection of the understory may be warranted through the use of biopesticides. The overstory may support high gypsy moth populations and the resulting defoliation can kill young seedlings.
- When managing stands on severe sites, such as sandy outwash plains or dry ridges, focus on regeneration of more suitable species based on the native plant community present or consider a shift in cover type based on the appropriate Subsection Forest Resource Management Plan (SFRMP).
- Where underplanting is needed to maintain oak in the stand, plant a mix of 50% oak and 50% avoided tree species. Always plant species appropriate for the site.

Intermediate timber stand improvement techniques to improve health and vigor of existing stands:

- Thin the stand to increase the size and vigor of residual crowns, i.e., the best trees in the dominant and codominant crown classes.
- Reduce stocking to an appropriate level.
- Early in the rotation, thin stump sprouts of gypsy moth preferred tree species, such as oak, or birch, to one stem per stump.
- In order to ensure adequate advanced regeneration, harvest stands prior to the time at which sprout capabilities are likely to decline, based on the disturbance regime and the conditions found on that specific site.
- If there is insufficient advanced regeneration present, use a shelterwood harvest. Competing vegetation may need to be controlled and desirable seedlings may need to be protected to ensure regeneration of the stand.

To maintain stand structure and composition for multiple benefits:

MAJOR BARK BEETLES OF THE INTERMOUNTAIN WEST

Louis Halloin
Forest Health Silviculturist
Washington Dept. of Natural Resources
March 18, 2003

Forest conditions are declining throughout much of the Intermountain West. Decades of fire exclusion have caused forest overstocking, layering, and encroachment by shade tolerant climax tree species. During drought, forests in decline are especially attractive to bark beetles along with other insect pests.

Bark beetles once served a natural beneficial role. Now, in the Intermountain West, bark beetles are thought of as a pest killing trees across millions of acres of fire-excluded forests no longer in balance with climate and soil conditions. More forests will become susceptible to bark beetles without dedicated efforts to alter and improve forest condition. Forest condition is the problem, not bark beetles.

Historically, slow moving ground fires periodically thinned forests and crown fires consumed patches of old dense timber. These natural fires renewed the forest creating a diverse mosaic-like forest landscape of mixed size and age classes less vulnerable to bark beetles. Beetle killed trees now contribute to an abundance of both ground fuel and ladder fuel increasing the risk of dangerous, costly to control wildfires in already fire-vulnerable forests. This process is natural, but unacceptably out-of-balance with historic conditions.

Bark beetle populations fluctuate year-to-year depending on the prevalence of stress-causing conditions in the forest. During "normal" years, beetle populations tend to decline because reasonably healthy trees are better able to resist beetle attacks. During

Basic Forest Management to Improve Resistance to Bark Beetles

Fire is Nature's way of fixing unacceptable forest conditions. Overstocked, beetle vulnerable forests will eventually be replaced by fire. Alternatively, out-of-balance forests can be thinned to renew tree and stand vigor or harvested, with consideration for watershed issues and wildlife habitat needs, to reduce fuel loading.

Carefully planned forest thinning and harvesting will yield long-term improvement of forest health. Vigorous stands across diverse forest landscapes are less susceptible to insect attack and destructive wildfire. Also, properly stocked forests are much more suitable for the re-introduction of safer, controlled prescribed fires that mimic natural fires. Prescribed fires can help control fuel loading, forest stocking, composition, and diseases thereby reducing susceptibility to bark beetles.

Basic strategies to minimize losses to bark beetles include:

- Maintain healthy, vigorous, fast growing trees by thinning overstocked stands. Thinning allocates available moisture and nutrients to fewer trees thereby improving overall tree and stand vigor. Thinning reduces fire hazard, too. Preferentially remove slow growing, damaged, or diseased trees saving the most vigorous trees appropriately spaced for site conditions.

- Avoid creating logging and thinning slash from early winter through mid-summer. Fresh slash is breeding habitat for several bark beetle species.

- Encourage a diversity of site-adapted species where possible. Mixed species stands are much more resistant to insect pests and diseases than single species stands. Patches of different age trees further diversify forest landscapes improving beetle resistance.

mountain pine beetle (*Dendroctonus ponderosae*)

USDA Forest Service - Region 2 - Rocky Mountain Region Archive, USDA Forest Service, Bugwood.org

mountain pine beetle (*Dendroctonus ponderosae*)

Mark McGregor, USDA Forest Service, Bugwood.org

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Entomophaga maimaiga: In years of wet spring weather, a fungal pathogen, Entomophaga maimaiga, has dramatically reduced the number of gypsy moths in the eastern states. The fungus was introduced into the northeastern US in the early 1900's to help control gypsy moth but it was not found in moth populations until the late 1990's. Since then it has spread naturally, following gypsy moth populations as they move west. However, the fungus requires high rainfall and humidity to germinate and infect gypsy moth larvae, making its effectiveness in a given year subject to local weather conditions.

Nucleopolyhedrosis virus (NPV): NPV is a naturally occurring virus specific to gypsy moths. It spreads like the common cold and is very effective at reducing high-density gypsy moth populations. In generally infested areas, it is the organism that is most likely to cause a major outbreak of gypsy moths to crash, creating cyclic outbreaks every 8-12 years. The cycle is similar to outbreaks of native defoliators, such as forest tent caterpillar. However, NPV is not effective in low-density populations and is not likely to be seen in Minnesota


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Jerald E. Dewey, USDA Forest Service, Bugwood.org

Management Examples


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Missouri Department of Conservation

Inventory Summary Report

Evenaged Management

Information Based on All Surveys Completed
For Tract 047 015

lay 11, 2012

Stand	Mature BA/AC	Immature AGS	Immature UGS	Pole Timber AGS	Pole Timber UGS	Small Trees AGS	Small Trees UGS	Culls	Trees /Acre	Gingrich Presc
1	3	20	10	20	20	0	3	3	309	D
2	2	8	20	2	22	0	4	4	492	D
3	0	27	20	3	33	0	7	0	353	D
4	0	10	22	5	30	0	12	2	503	D

Missouri Department of Conservation

Stand Information Summary

Information Based on All Surveys Completed
For Tract 047 015

Friday, May 11, 2012

Stand	# Plots	Total BA	Total Merch BA	Total AGS BA	B Level BA	C Level BA	BA To Rem	% Stock	MBF Acre	Avg Dia	Trees Per Acre	< 9" Cav	10-18" Cav	19-25" Cav
1	3.0	80.0	33.3	40.0	58.0	45.0	22.0	80.0	4.9	6.9	309	0	0	2
Species:		802	400	318	806									
2	5.0	62.0	30.0	10.0	51.0	39.0	11.0	71.0	3.6	4.8	492	0	0	1
Species:		802	837	318	400	806								
3	3.0	90.0	46.7	30.0	58.0	45.0	32.0	90.0	5.7	6.8	353	0	0	0
Species:		802	400	970	318	544								
4	4.0	82.5	32.5	15.0	53.0	41.0	29.5	90.0	3.3	5.5	503	0	0	0
Species:		802	400	806	318	694								

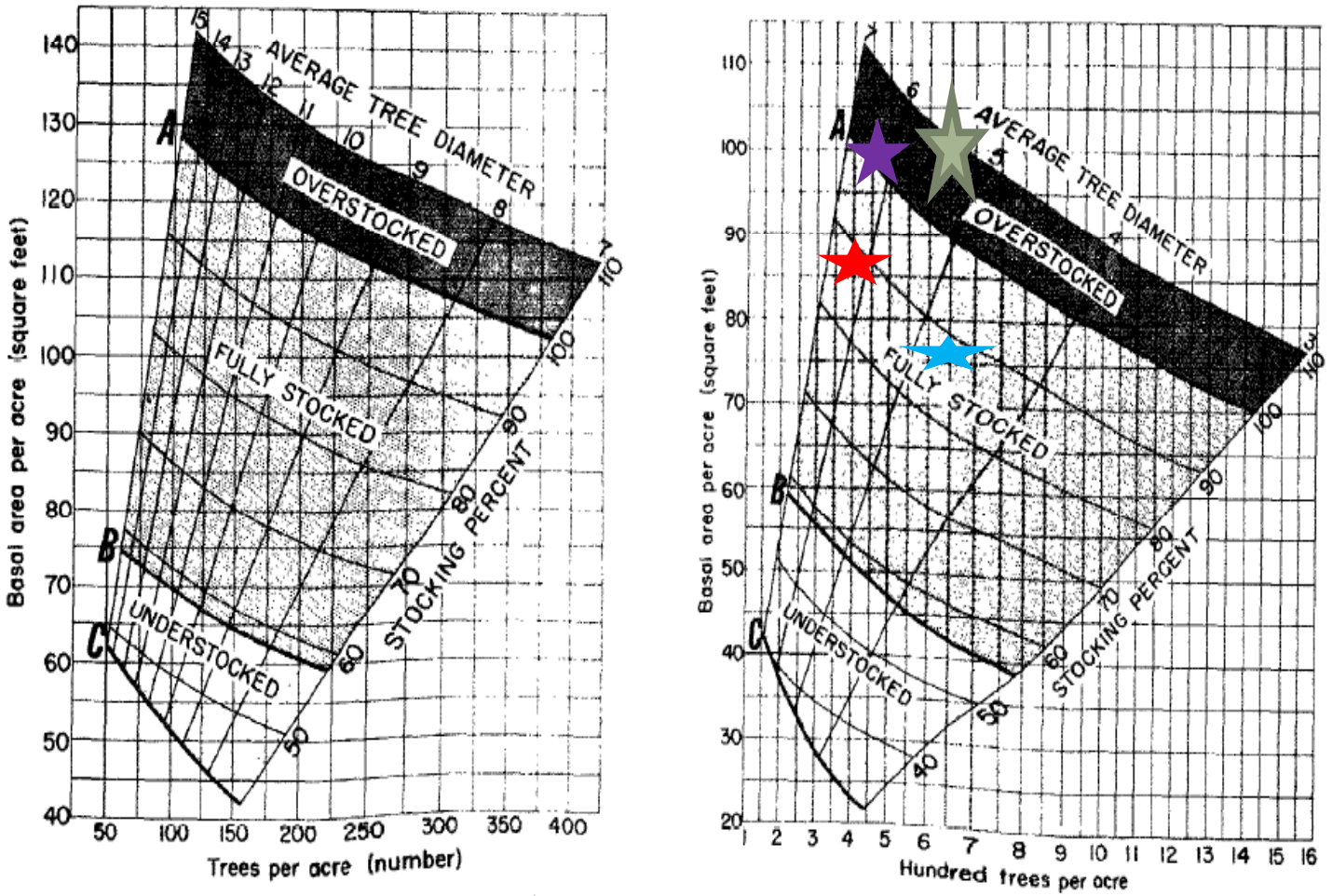

FIGURE 18.—Relation of basal area, number of trees, and average tree diameter to stocking percentage for upland central hardwoods. Tree-diameter range is 7–15 inches in chart at left; 3–7 inches in chart at right. The area between curves *A* and *B* on both charts indicates the range of stocking where trees can fully utilize the growing space. Curve *C* shows the lower limit of stocking necessary to reach the *B* level in 10 years on average sites. (Average tree diameter is the diameter of the tree of average basal area.)


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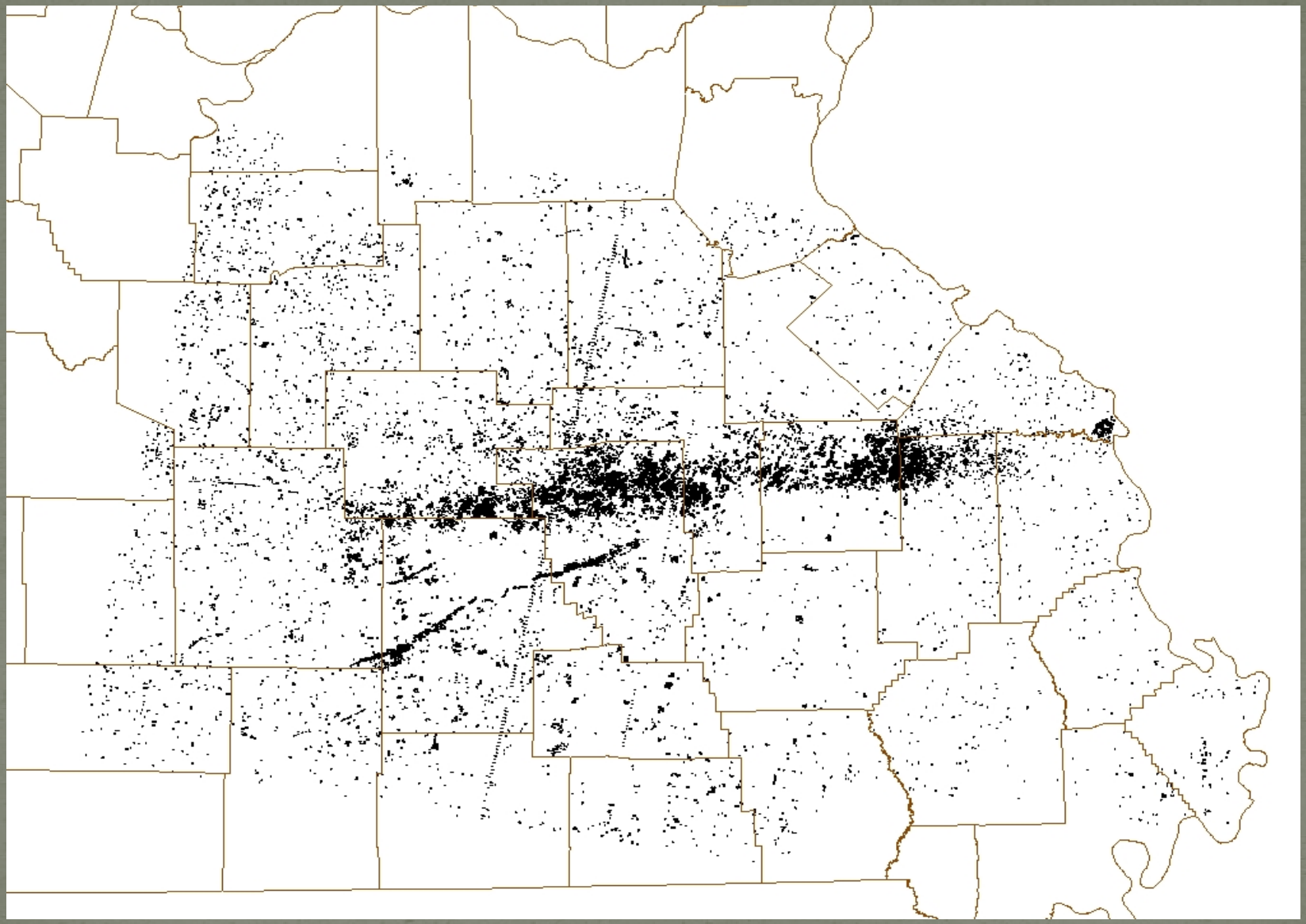
The Big Monkey Wrench

- We wrote you the perfect Stewardship Plan.
- You implemented the prescriptions perfectly.
- The forest looked beautiful and healthy.
- You sat back to relax and enjoy your forest until the next cutting cycle.
- But Mother Nature had a different idea.

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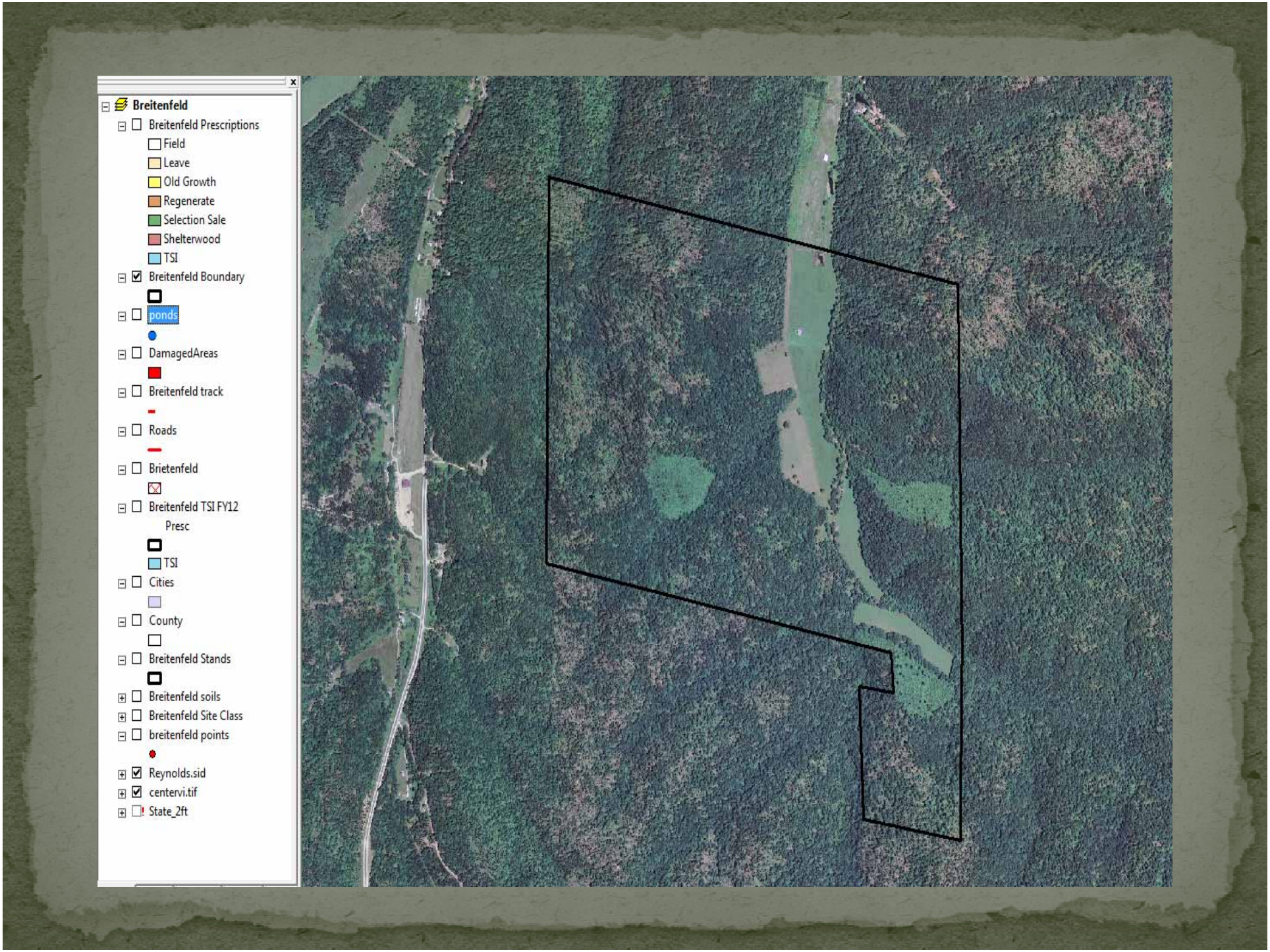
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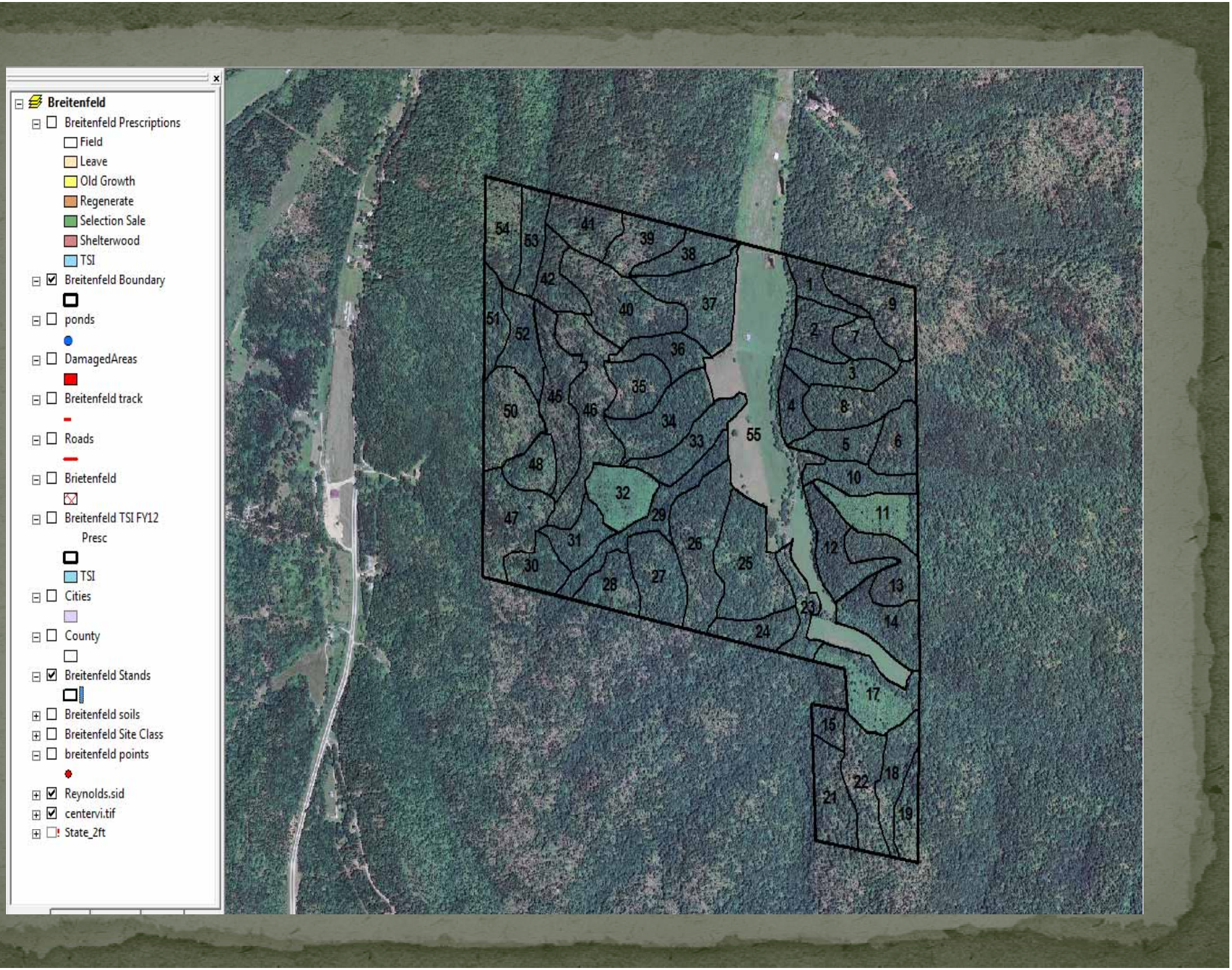
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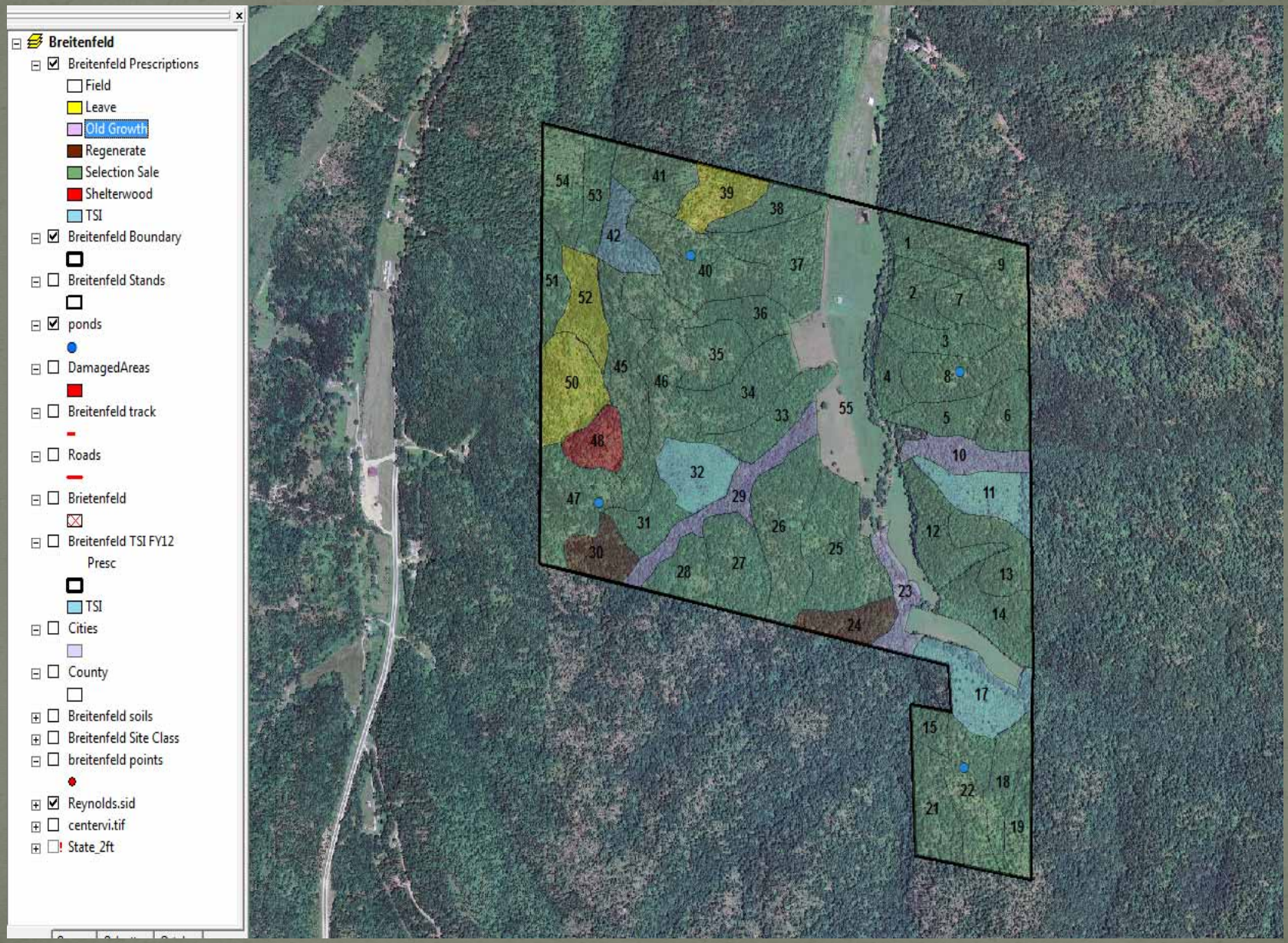
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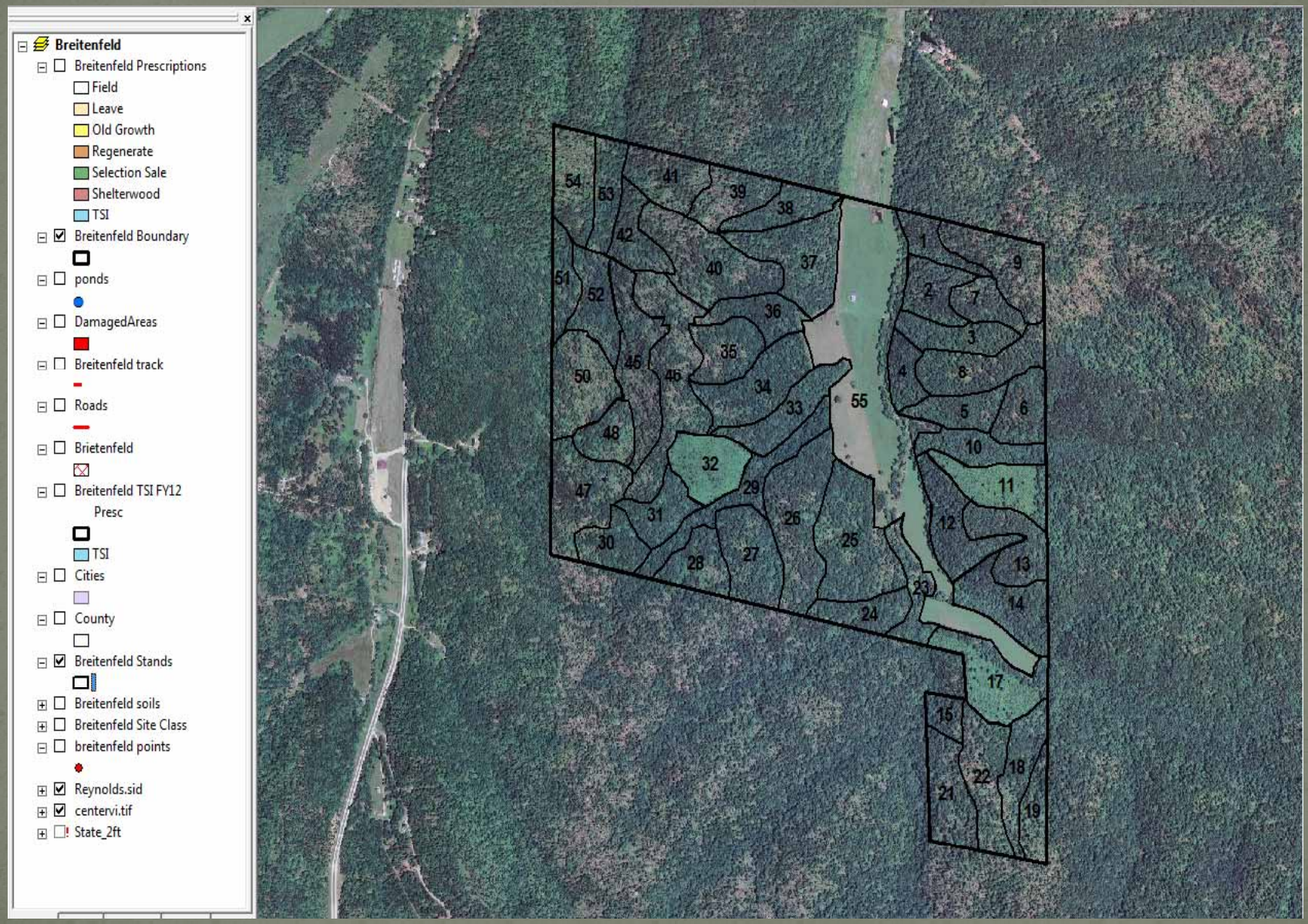
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Conclusions

- Active forest management is the key to improving forest health.
- Good forest management is not just about trees.
- The management that you do is vitally important to our nation's forest health.
- Make some noise.
- Bug your forester.
- matt.jones@mdc.mo.gov


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