Overall Workshop Executive Summary

Primary Take Home Messages: Managing oak long term is challenging, yet possible, if we are strategic. A thriving oak resource is important and beneficial to all divisions' missions (FRD, WLD, PRD) and is possible by incorporating the proven silvicultural guidance provided at this workshop (see Johnson et al. 2009 and Brose et al. 2014 for foundational documents).

1. Dominance and significance of oak in SW MI
    a. Oak is the dominant cover type of SW State Game Areas (SGAs) (Figure 1)
    b. Oak communities provide great habitat for deer, turkey, grouse, squirrel and wood duck, and hundreds of other open land wildlife spp.
    c. Oak economic value
        i. Significant state land revenue, supports FRD and WLD
        ii. Direct impact to local and statewide economies
        iii. Successful and perpetual regeneration of oak will ensure a sustainable supply of oak products to help keep the lumber market diversified
2. The Problem
    a. Historically oak existed in open land conditions maintained by recurrent low-to-moderate surface fire (Abrams 1992).
    b. Under long-term fire suppression, closed-canopied oak forests have developed whereby oak regeneration is sparse due to heavy shading and fierce competition from shade-tolerant trees:
        i. Oak regeneration generally not occurring across SW SGA areas (Figure 2)
        ii. Not occurring within 50% of SW SGA oak stands
        iii. Stand replacement is impossible without advanced regeneration—cutting alone does not work (in most situations) to perpetuate oak
    c. Mesophication (Figure 3): No management and/or unclear/ absent goals and objectives to manage for oak regeneration often leading to red maple domination on dry mesic sites and sugar maple on rich mesic sites (Nowacki and Abrams 2008). Once past the point of no return (Figure 4), oak is difficult (if not impossible) to get back
3. Solution will require:
    a. Recognition of problem
    b. Not being afraid to act, being strategic and deliberate in actions, and active management
    c. Adaptive Management/ Planning/ Monitoring:
        i. Define desired future condition at multiple scales (stand and landscape)
            1. Identify oak 'strong holds' where active management for oak makes the most sense and is a priority
        ii. Define objectives for every stand treated BEFORE developing or implementing treatments
        iii. Create long-term plan at the landscape scale for entire oak resource
        iv. Monitoring of those stands where active management will occur

1. Formal monitoring of every stand prior to treatment to inform next step treatments
2. Formal monitoring of every stand after treatment (including harvest) to inform next step treatments
3. Take an adaptive management approach (Nowacki et al. 2009) by evaluating and learning from our results and adapting to evolving conditions

d. Pre-treatments and post-treatments are just as important as tree removal treatments (timber sales) when managing for oak. Multi-stage/step treatments will likely include some, or all, of the following:
   i. Prescribed fire (low to moderate intensity surface burns emulating historic fire disturbance)
   ii. Herbicide
   iii. Timber stand improvement concentrating on removing non-oak competitors from the understory and promoting oak regeneration and recruitment

e. Invest in future wildlife habitat and timber products. Seek to keep funds on site for oak regeneration and restoration purposes over the long term.

f. A decision support system (e.g. SILVAH [Silviculture of Allegheny Hardwoods] used in PA and many other states) can help guide management and should be considered for MI
   i. SILVAH provide prescriptions on how to manage oak resource given challenges identified above
   ii. SILVAH has increased regeneration success from 50 to 90%
   iii. For Michigan, the SILVAH model would need to be modified to fit our needs and ecological context

References:

Abrams, M.D. 1992. Fire and the development of oak forests. BioScience 42:346-353.

Brose, P.H., Dey, D.C. and Waldrop, T.A. 2014. The fire—oak literature of eastern North America: synthesis and guidelines. USDA Forest Service General Technical Report NRS-135.

Johnson, P.S., Shifley, S.R. and Rogers, R. 2009. The ecology and silviculture of oaks. CABI, Cambridge, MA.

Nowacki, G., Ablutz, M., Yaussy, D., Schuler, T. and Dey, D. 2009. Restoring oak ecosystems on National Forest System lands in the Eastern Region: An adaptive management approach. Fire in Eastern Oak Forests Conference Proceedings 3:133-139. USDA Forest Service General Technical Report GTR-P-46.

Nowacki, G.J. and Abrams, M.D. 2008. The demise of fire and “mesophication” of forests in the eastern United States. BioScience 58:123-138.

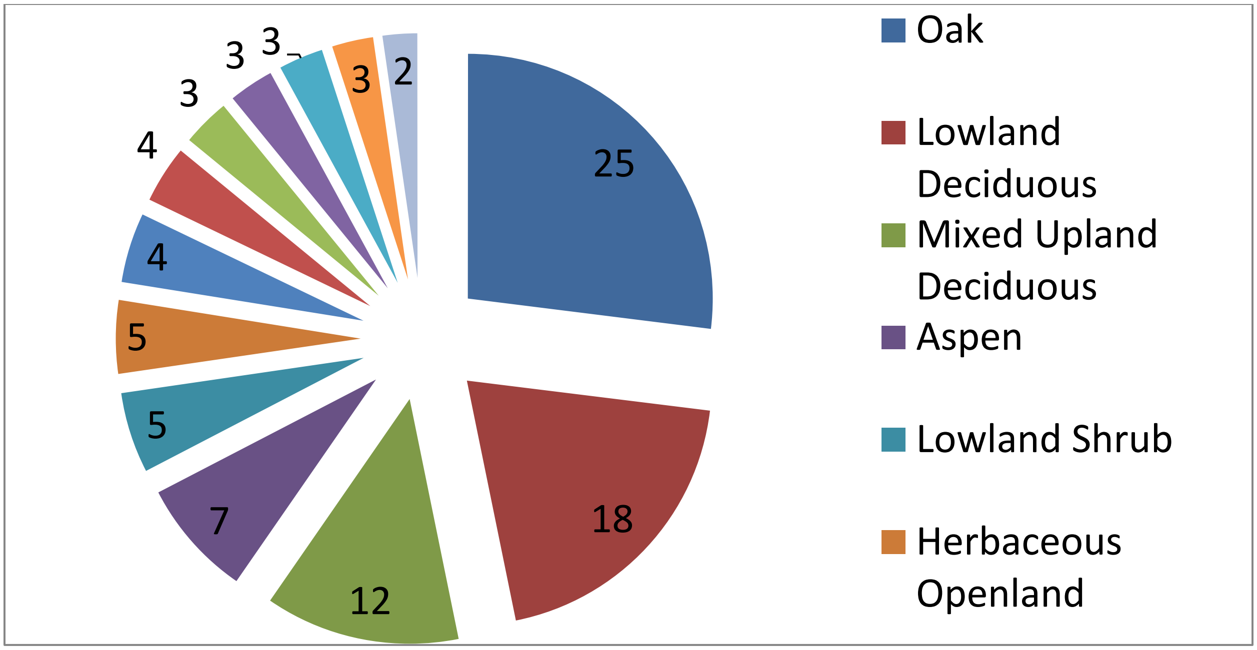

Figure 1. Michigan DNR Wildlife Division Southwest Region Land Cover Types.

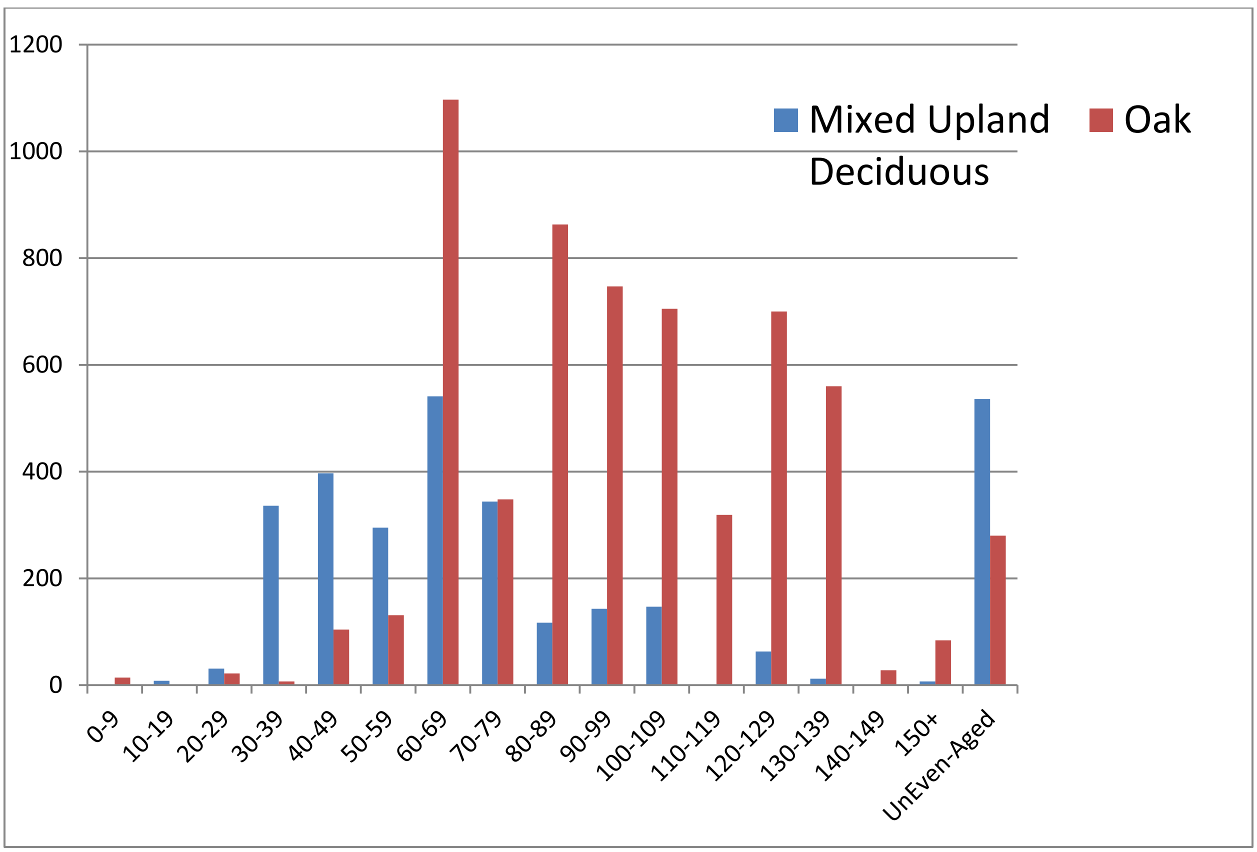

Figure 2. Michigan DNR Barry State Game Area Oak and Mixed Upland Deciduous Age Class Distribution, 2016.

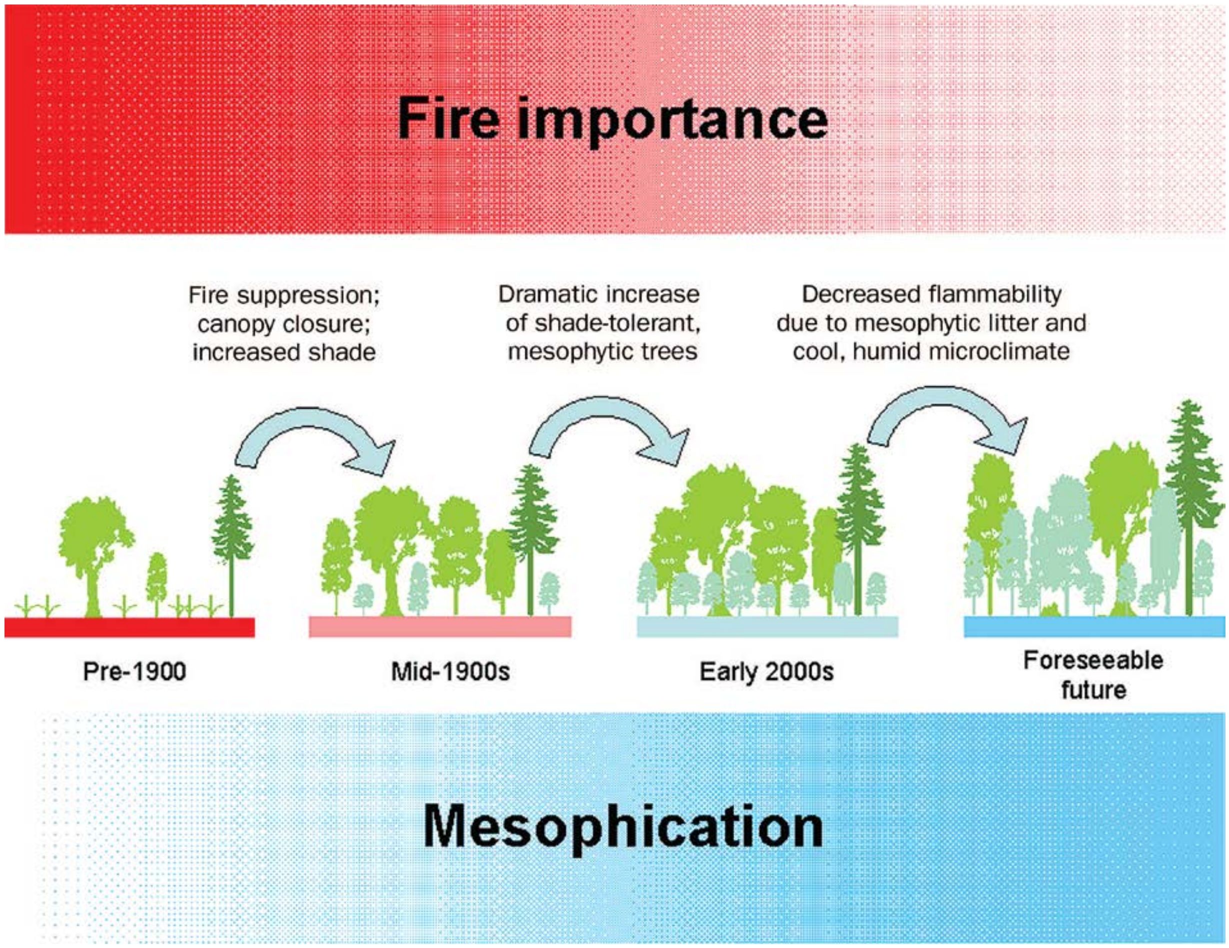

Figure 3. Temporal changes in fire importance (fire frequency and severity) and mesophication (development of cool, moist understory conditions) for oak-pine ecosystems in the eastern United States. Olive green trees represent oaks, dark green trees represent pines, and aquamarine trees represent mesophytic species (e.g., maples, beech, black cherry). [Figure from Nowacki and Abrams 2008.]

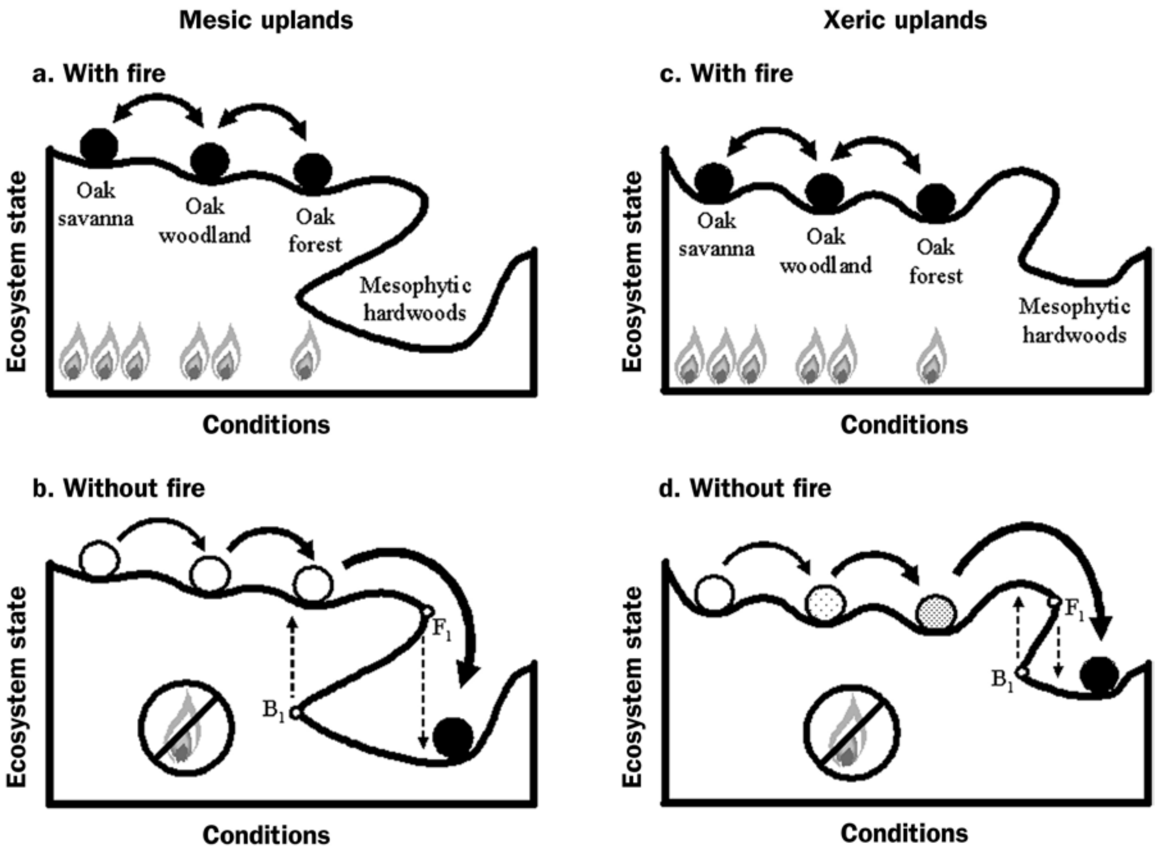

Figure 4. Ball-in-cup diagrams showing conceptual alternative stable states for two contrasting landscapes with abiotic factors held constant. Balls represent community states under the prevailing disturbance regime (with and without fire). Basins in the surface represent domains of attraction; their size and configuration (depth; surrounding slopes) govern the degree of attraction and thus of community stability. Forward (F1) and backward (B1) shifts occur at inflection points along the bifurcated fold; their horizontal distance corresponding to the degree of hysteresis (state entrenchment). (a) A number of fire-adaptive community states exist along a fire continuum on mesic uplands. Shallow basins permit communities to shift in accordance with fire frequency and severity. (b) Without fire, fire-adaptive communities progressively destabilize (hollow balls), eventually shifting wholesale to a mesophytic hardwood-dominated state. Hysteresis is invoked once in this state, making it difficult and costly for fire-adaptive communities to be restored. (c) On xeric uplands with fire, fire-adaptive communities are moderately resilient, represented by deeper basins along the upper plane. (d) Without fire, state shifts proceed slowly because of edaphic controls (infertility; drought) on the mesophication process, with some states partially maintained even in the absence of fire (shaded balls). Hysteresis is not as severe in the mesophytic state as on mesic landscapes. [Figure from Nowacki and Abrams 2008.]