

Performing Fire Needs Assessments:

Prioritizing restoration efforts collaboratively in Michigan

Over the course of 2009, The Nature Conservancy's Michigan Chapter planners worked with partners at the Michigan Natural Features Inventory in a research and analysis project designed to support the prioritization of restoration efforts in selected conservation areas. Using LANDFIRE ecological condition datasets and MNFI data, the team developed a fire needs assessment and designed a process for analysis and strategic planning that can be duplicated across ecosystems and conservation areas.

Purpose and Region of Analysis

Natural fire return intervals range from three to 3,000 years in Michigan, in ecosystems from coarse sand to moist and fertile soils. Estimates indicate that, historically, more than 1.5 million acres burned annually. Because Michigan is a fire-prone state and fires have been suppressed for over a century, there are significant changes in vegetation that have led to changes in biodiversity. Because restoring natural fire regimes and fire-adapted ecosystems is not a trivial matter the Conservancy's Michigan chapter undertook a fire needs assessment to help project leaders prioritize restoration efforts in selected conservation areas.

Assessing fire priorities is complex business. The planning team undertook significant research to inform their decisions, including determining the conservation value of priority areas, deciding whether the areas under consideration were irreplaceable and examining the potential for project leverage and feasibility. Information gleaned from expert opinion and Geographic Information Systems (GIS) analysis and data proved invaluable.

Criteria/Methods

The criteria emphasized conservation targets--species and natural communities--that depend on regular fire as a natural disturbance. These targets were prioritized using complementarity, conservation value, threat/feasibility and leverage.

COMPLIMENTARITY (CO)--For this criterion, the team used the concept of "irreplaceability" as it applies to fire dependent targets and scored each site as:

HIGH (Tier 1) - the only known site within a highly imperiled target's range or the only site within its ecoregion;

MEDIUM (Tier 2) - the only sites in the ecoregion where communities and/or species can be conserved, or which contain a high concentration of fire dependent elements; and

LOW (Tier 3) - sites where neither of the above criteria are met.

CONSERVATION VALUE (CV)--This criterion has three components: the number of occurrences of viable, the fire dependent natural community conservation targets in the

site; the number of DIFFERENT kinds of these conservation targets and the “Bio-diversity Health” of these conservation targets.

The first two components were combined into an index of “Number/Diversity of Targets.”

- The scores for number/diversity were ranked from 1=Very High, to 4=Low.
- For “Bio-diversity Health,” scores were based on the site viability ranks from each of the ecoregional assessments.
- Three possible rankings were 1= High, to 3=Low.
- The values for "Biodiversity Heath" and "Number/Diversity of Targets" were combined to provide the CV.

THREAT-FEASIBILITY (TF)--This criterion incorporates both urgency of threat and feasibility (or probability) of conservation, and was developed using *LANDFIRE Fire Regime Condition Class (FRCC)* data.

- The two datasets were combined so that a higher FRCC value and a shorter Mean Fire Return Interval (MFRI) gave the highest threat ranking.
- Feasibility reflects the potential for restorative fire management. This criterion was developed using spatial data that captures ownership patterns and barriers to fire management, e.g. road density, percentage of urban land, etc.

LEVERAGE--This criterion emphasizes the best management resources as they potentially influence local, state and regional fire management strategies. Each site was ranked as High, Medium, or Low with LOW as the default value.

PRIORITY SCORING--Values were assigned across the four criteria to calculate a final score with the lowest total score equated to highest priority.

Process

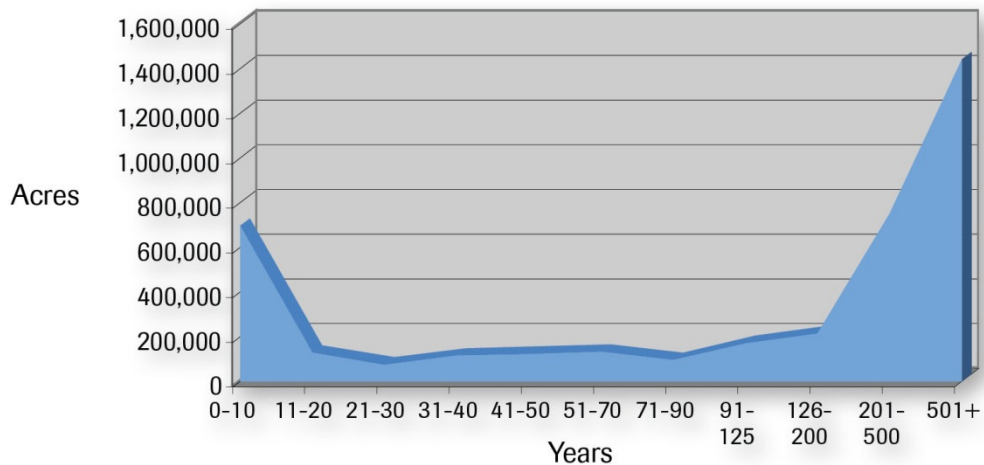
Using the Conservancy's ecoregional planning process, project leaders learned that the landscapes most likely to represent Michigan’s lost biodiversity ranged from the northwest to southeast corners of the state and should be the first landscapes targeted for action.

To determine irreplaceability and conservation value, scientists consulted data from the Michigan Natural Features Inventory that had been collected for decades, while leverage was based on Conservancy staff’s expert opinion, based on locations of the conservation areas and nearby owners’ land management policies. All information was grounded in fire-centric and ecological condition datasets provided by LANDFIRE.

LANDFIRE’s Mean Fire Return Interval (MFRI) spatial data quantify the average period between fires under the modeled historical fire regime. Reference condition models for each Ecological System (aka Biophysical Settings, or BpS) — developed in expert

modeling workshops that were held nationally over two years — provided fire regime information for each BpS. To get spatial data, GIS analysts “spread” fires across the landscape using LANDSUM to obtain pixel-by-pixel estimates of MFRI. As illustrated in the accompanying chart, roughly 700,000 acres of Michigan would have had a MFRI of 0–10 years historically, mostly in grassland and oak ecosystems, and were mainly low-severity surface fires. The map of averaged MFRI indicates the conservation sites that are historically the most dependent upon fire.

Distribution of Modeled Reference Condition Fire Return Interval in Michigan



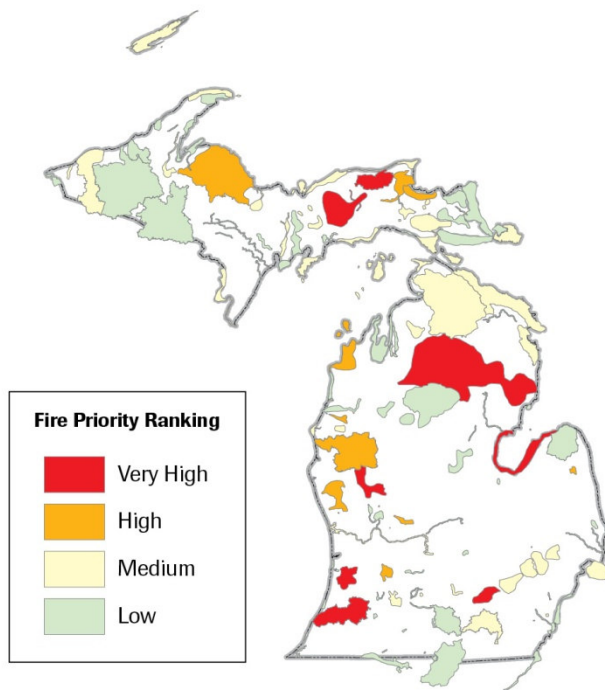
LANDFIRE’s Fire Regime Condition Class (FRCC), a metric that compares ecological reference conditions with current conditions in terms of vegetation structure and composition, was used to identify the conservation sites that were least departed from ecological reference conditions. By assessing FRCC per conservation area, Michigan chapter staff could estimate how much work lay ahead. However, because FRCC does not include a fire component, it was combined with MFRI to estimate how much work could be undertaken in fire-dependent ecosystems.

Benefits of the process

- Uses existing data
- Background data is objective, science-based
- Considered ecological and feasibility factors
- Establishes common references
- Process is insular within TNC, thus providing common reference points that build on existing data
- Collaborative learning experience for TNC staff can be replicated
- Provides solid foundation for future fire management in Michigan
- Is cost effective in that staff resources are used efficiently

Products/Outcomes

The assessment showed that seven of 157 conservation sites ranging from fire-independent northern hardwood forests to extremely fire-dependent grassland sites had a priority level of Very High (see map). For example, the Two Hearted River conservation site has relatively low FRCC (not prohibitively departed = restoration has a good chance of success), a high number of fire-dependent conservation targets and is relatively fire dependent as a whole due to the conifer and wetland ecosystems. Additionally, feasibility and leverage rankings are fairly high in this conservation area due to increased levels of public land ownership and low population/road density. Low FRCC + high fire dependence + high feasibility + high leverage = higher probability of success when restoring fire-adapted ecosystems.



Each criterion resulted in a map where all the conservation action portfolio sites were rated. The final result was a map that prioritized each site as very high, high, medium or low.

The map was sent out for partner review, and is expected to be a valuable tool for both internal communication and strategic planning. The Nature Conservancy's science-based assessment provides a foundation for stakeholder planning as well.

Overall, the LANDFIRE datasets provided the ecosystem-level information that led to a reliable and valuable assessment. Had LANDFIRE data not been used, this particular analysis would lack complete data coverage for the state and/or it would have relied upon disparate datasets.

LANDFIRE tools

Fire Regime Condition Class (FRCC) and Mean Fire Return Interval (MFRI) were used because they gave the only ecological assessment of vegetation conditions across Michigan. FRCC provided an index of ecological departure, comparing reference conditions to current conditions.

FRCC alone does not indicate departure of fire regimes, however, because departure could be caused by a number of factors, including logging, herbivory and altered fire regimes. To address fire management issues, the Michigan Field Office coupled FRCC with MFRI in order to tease out the highest departure levels that were caused by fire compared to other factors.

Suggestions for others

Training on using the LANDFIRE tools is essential, either by conferring with the TNC-LANDFIRE national team members or by training the individuals who would most likely continue using the tools.

References

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