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Prescribed Fire in Michigan – Best Management Practices

Objectives

The objectives of this paper are to:

- expose the reader to the state of the art, science, and practice of prescribed burning;
- identify the best management practices (BMP) for prescribed burning;
- guide the reader through the safe and prudent application of prescribed burning; and
- connect the reader to related resources to aid in understanding prescribed burning.

Ultimately, this paper is intended to increase the comfort level of the reader regarding prescribed burning. This paper is targeted toward land managers and interested individuals in both the public and private sector, particularly those with an interest in but limited experience with prescribed burning. The information included in this paper is intended for application in Michigan but certainly has application as well in other similar ecosystems with similar urban development. The glossary at the end of this document is useful in clarifying terms.

This document was developed by the Michigan Prescribed Fire Council, drawing from experienced practitioners in the field and from a systematic review of the literature. It notes references to other resources, where applicable. It was reviewed and is endorsed by experienced practitioners. The Council has a mission to protect, conserve, and expand the safe use of prescribed fire in the Michigan landscape. This Council was formed in 1999 on the recommendation of the Michigan Wild Land Fire Protection Association which is composed of all the agencies dealing with wild land fires with the State. The Council includes partners from all levels of government as well as partners from non-governmental organizations and interested private sector individuals.

Introduction

Prescribed burning has been used as a tool by people for hundreds of years. Native Americans are credited with using fire to maintain clearings in which to base their encampments, to encourage growth of plants for later harvest, to rally game as an aid in hunting, to aid in attacking enemies, and to aid in defense from enemy attack. Farmers have used fire to revitalize pastures, to prepare fields for planting, to maintain fence rows and ditches in an herbaceous state, to reduce numbers of undesirable insects, and to reduce fuel loads around buildings susceptible to fire. Forest managers have used prescribed fire to discourage growth of fire-intolerant plants and to encourage growth and reproduction of fire-tolerant plants.

However, there is a well-understood danger when fires are allowed to escape and burn materials that were not intended to burn. The risk of harm associated with unintended burning increases as more people build homes, report to work, recreate on the landscape, and otherwise place themselves and valued possessions in harm's way. Such is the case in Michigan. Unfortunately too often, people's opinions on burning are formed by the harm caused when fire escapes from burn barrels, discarded cigarettes, or campfires. While not prescribed burning, the public often fears a similar outcome whenever fires are set.

Prescribed burning has long been recognized by land managers as a management tool capable of bringing about a complex array of outcomes, depending on how it is applied. These include both encouraging and discouraging plant growth, reducing thatch and duff, increasing nutrient availability, increasing rates of solar soil warming, and exposing mineral soils for better seed germination. More recently, land managers have come to understand the ecological outcomes of burning, particularly increases in biological diversity. When a site is burned, nutrients, metals, and minerals are mobilized both directly and indirectly by the process of fire. These leach through the soil horizons and are chemically or physically trapped by soil particles thereby restructuring the soil. Changes in soil site conditions, especially changes in nutrient availability, moisture retention, and shading, change the competitive balance among plants. Fire-adapted species are favored, and fire-intolerant species are discouraged. Commensal relationships between organisms are also often temporarily interrupted, changing the competitive relationships between them.

Given the great potential of prescribed burning as a land management tool, it is essential that prescribed burning continue to be allowed for use by qualified people. However if the use of this tool is to be preserved in a landscape where there is increasing risk

when fire is applied to the land, then prescribed burning must be conducted in ways so that escapes and other negative impacts are avoided. People must come to appreciate that the benefits from application of this ecological management tool outweigh the risks and embrace its use.

Prescribed Burning Defined

Prescribed burning has been defined as any fire ignited by management action under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Alternatively, prescribed burning can only occur when, at a minimum, there is a goal, the presence of natural fuels, artificial ignition, combustion, control/ suppression, and a burn plan that addresses these elements plus an evaluation. These definitions assume that naturally occurring fuels are present in a quantity and character so that they continue to combust, once ignited, until they are exhausted or extinguished. (For instance, this would exclude from the prescribed burn definition the technique of applying heat with a propane torch to individual actively growing plants to kill them or set back their growth.)

Prescribed Burning in Application

As already explained, prescribed burning has a history dating back at least to Native American use. However, contemporary prescribed burning probably has its roots more in the traditions of the European peoples that colonized the Americas. While most Colonists were exposed to Native American customs and practices, most continued their own heritage where it had application in the New World. Many Colonists had experience with prescribed burning in the Old World and were comfortable with its application. Others were more influenced by the potential harm from fire and avoided its use. Continuing today, there are communities within Michigan who make significantly greater use of prescribed burning than other communities.

Governmental and non-governmental organizations with a mission to manage lands often apply prescribed burning as a tool. Many ecosystems are fire-adapted (increase in biological diversity when burning is done) and respond best, given ecological objectives, when managed with prescribed burning. Oak and jack pine forest systems and prairies are examples of these ecosystems. Prescribed burning is often chosen as an extensive management tool because it accomplishes many ecological objectives, and its application cost is usually low compared with other tools available. The ecological effects of prescribed burning often cannot be duplicated in the application of other management tools.

Prescribed Burn Plan

BMP No. 1 – Prescribed burns must be done according to a burn plan.

A prescribed burn plan is a document that includes a description of the site to be burned, the objectives of the burn, and a description of how and by whom the burn is going to be accomplished and evaluated. The plan also acts as process documentation for coordination, burn objectives, burn site preparation, burn accomplishment, and burn evaluation. Because of the complexity of this process, prescribed burn contractors are often enlisted to develop the prescribed burn plan and conduct the prescribed burn.

BMP No. 2 – Prescribed burns plans will clearly identify the objective of the burn and the expected ecological results of the burn.

A number of applications or objectives are commonly associated with prescribed burning. These applications include those with a single desired outcome or a combination of desired outcomes to produce a proposed site condition. Those with a single outcome (cultural applications/objectives) include:

- Reduction of Wildfire Fuel Buildup---Reducing fuel (combustible leaves, twigs, grasses, branches, logs, etc.) buildup, by burning under pre-selected conditions that are controllable, reduces the risk of fire occurrence and intensity when conditions are more extreme.
- Site Preparation---Many sites can be improved, using burning, for better seed germination or better survival of transplanted stock.
- Control of Undesirable Vegetation---Burning can be timed to harm actively growing plants while avoiding harm to dormant plants or to selectively harm fire-intolerant plants when growing together with fire-tolerant plants.
- Disease Control---Burning can be used directly to impact plant diseases or indirectly to impact plants that host diseases.
- Insect Control---Burning can be used directly to impact undesirable insects or indirectly to impact plants or organic matter that host or support these insects.
- Reduction of Plant Monocultures---Burning can be used to diversify sites such as cattail-dominated wetlands.
- Improve Aesthetics---Burning can be used to remove dead vegetation and stimulate new plant growth.

Those applications or objectives with a combination of desired outcomes to produce a proposed ecological site condition include:

- Forest Management---Burning can be used to modify sites to:
  - regenerate woody plants
  - favor growth of fire-tolerant plants
  - discourage growth of fire-intolerant plants
  - increase biodiversity
  - control disease and undesirable insects
  - reduce competition to larger trees
  - mobilize nutrients
- Grassland (Forage) Management---Burning can be used to modify sites to:
  - mobilize nutrients
  - stimulate grass growth
  - favor fire-tolerant (warm-season) grasses
  - increase biodiversity especially through increased presence of forbs
  - increase forage biomass
  - increase forage nutrition
  - encourage distribution of grazing animals

- Wildlife Management---Burning can be used to modify sites to:
  - increase biodiversity
  - increase browse and browse nutrition
  - increase soft and hard mast production
  - modify wildlife habitats
  - modify natural (biological) communities
  - increase plant regeneration
  - favor growth of native plants in fire-adapted systems
  - increase seed and nectar production

BMP No.3 – Prescribed burn plans will identify all necessary permits that shall be obtained before conducting the burn.

The completed prescribed burn plan can also serve as document support for any permits that may be necessary. Burn permits (either general or blanket) are almost always required, and they are generally administered by local units of government. Local ordinances may also be applicable to these plans. Where burn sites are located near water or on slopes, soils may be disturbed during burn site preparation or during fire control, and this activity is often covered under the Soil erosion and Sedimentation Control Act. If this should occur, a Soil Erosion and Sedimentation Control Plan and Permit will be needed. Also, where burn site preparation and control activities occur in wetlands, permits are often needed that can require site stabilization and recovery plans. This permitting function is administered by the Department of Environmental Quality, Geologic and Land Management Division.

The completed prescribed burn plan can serve as a public disclosure document. The public is entitled to see plans and other documents relating to prescribed burns on public lands. The public may also be entitled to see documentation relating to prescribed burns on private lands, especially when these efforts are publicly funded. These plans can also be used to demonstrate a responsible approach to the use of fire and thereby gain public support.

BMP No. 4 – The burn plan shall include a description of the parcel to be burned and the objective of the burn.

The burn plan includes a description of the land to be treated and the objectives to be met through this treatment. Restrictions or limitations that bear upon the accomplishment of these objectives are also listed. The proposal typically includes a site evaluation process that reflects on how effectively the prescribed burn objective contributes to the overall management goals for the area.

The prescribed burn objective must be clearly specified. The rest of the plan hinges around this single Plan attribute so the objective must be carefully considered and precisely stated. Desired prescribed burn outcomes can more easily be maximized when a single cultural objective is the focus of the Plan. Where a more complex mix of outcomes is desired, as reflected in ecological objectives, the expected outcomes are more often an optimization and balance across the various outcome elements implied from the ecological objectives.

BMP No. 5 – The burn plan describes the conditions and prescription for the burn to safely meet the objectives of the burn.

The Plan also provides a prescription for precisely how the prescribed burn objective is to be accomplished. This part includes information on the acceptable ranges of fuel condition, acceptable ranges of wind speed and direction, minimum personnel and equipment needed, ignition plan, containment/suppression plan, and contingency plan. This part also includes an evaluation process that focuses on how effective these prescription elements were in accomplishing the prescribed burn objective.

BMP No. 6 – The burn plan will identify the landowner of the parcel to be burned along with the adjacent landowners.

The landowner must be identified for the land on which the prescribed fire is to take place. Land ownership records should be consulted to confirm this ownership. The landowner should sign the completed prescribed fire plan indicating acceptance of the document, including the prescribed fire objective. Identifying and gathering contact information on adjacent landowners will facilitate interaction during the planning of the burn.

Often, restrictions are placed on the manner in which prescribed burns are planned and conducted. These restrictions stem from a number of considerations. The occurrence of sensitive plant and animal species on or close to the burn site often prompt modifications to the Plan to protect these species. In like manner, the presence of sensitive habitats also can prompt Plan modification. Neighboring landowner and local government concerns are also often addressed through Plan restrictions or modifications. These might include restriction to weekday-only burning, burning only with certain wind directions or wind speeds, burning only when local government representatives can be present, or burning when local government representatives can attend training.

Sometimes in the process of planning and sharing plans for a prescribed burn with other interested parties, opportunities come available to include adjacent land parcels in the burn. In this way, burn acreage is sometimes expanded with inclusions in the prescribed burn project, and provision for this opportunity places an emphasis on early completion of the initial planning process.

BMP No. 7 – The burn plan will include considerations for smoke management.

Smoke management is an element of the Plan that often functions as a Plan restriction. However because of its importance in the burning process, it is usually considered separately. Major considerations in smoke management typically include potential impacts on people and the human environment. Generally, smoke management becomes more critical as the burn sites are located closer to the human environment. Smoke can also impact other living things like honey bees, other insects, and certain plants. Smoke can also scare or rally other animals like cattle and birds.

Smoke management typically includes consideration of wind speed and direction, the nature of the burn fuels, expected burn intensity, potential for temperature and air-mass inversions, and humidity. These considerations are often reflected against such smoke targets as homes, highways, office complexes, and recreation areas. The sophistication of the information used in formulating a smoke management plan and the difficulty in predicting potential smoke outcomes strongly suggest the involvement of a trained, experienced planner for burn sites where smoke management is a significant concern.

BMP No. 8 – The prescribed burn plan will identify all individuals and organizations which need to be notified of the burn, including the day of the burn.

Notification to interested parties of intent to burn is an essential part of any burn plan. These interested parties are often divided into those who have a need to know for regulatory reasons or to further a government function and those who have a personal interest in the activity. Regulators are typically involved at least twice: during application for a burn permit and when the burn is conducted. Those in charge of the burn should ensure that at a minimum Central Dispatch, Fire, Police/Public Safety and Local Unit of Government are notified immediately prior to conducting the burn.
Other interested parties include neighbors, people who may also wish to use prescribed fire, and those who are simply curious about the process or the fire itself. These parties are often more difficult to reach. Depending on the nature of the burn site, contacting neighbors may be sufficient in this regard. Where more extensive communication is desired, print media can sometimes be solicited. County, township, or city governmental entities may also be enlisted in hosting public meetings.

The safe and effective execution of prescribed burning results from a carefully planned, highly coordinated approach. Execution of this approach is the application to the land of the prescribed burn objective formulated for this Plan. This strategy includes a number of elements directly related to fire.

- Assignment of burn prescription windows needed to attain the objective as modified by site restrictions and smoke management considerations.
- Assessment of the amount and combustibility of the fire fuels available to be burned (Fuel Model).
- Assessment of hazards that may complicate burn execution or make burn conditions more extreme (extreme slopes, exposed pitch on pine trees, fuels that easily become airborne when ignited, fuels that roll when ignited).
- Assessment of the range of weather conditions acceptable in attaining the objective.
- Assessment of topography especially as it contributes to fire behavior.
- Assessment of air quality considerations (Air Quality Notification requirement).
- Prediction of fire behavior (flame height/length, spread rate, residence time).

BMP No. 9 – The prescribed burn plan will identify the location and specifications for all fire breaks.

The provision of a fire control line for fire containment (fire break) involves the removal of burnable fuels from an area, the use of an area that contains no burnable fuels, or the treatment of fuels so they are non-burnable. Fire control lines are typically constructed using mechanical means, chemical, water. Often a combination is used. Mechanical control includes soil exposure by scalping, plowing, disking, or tilling. Chemical line employs chemicals that either act directly to retard combustion or act indirectly as surfactants or wetting agents, extending the value and effectiveness of the water. Water, by itself, can be used to build control line, either prior to ignition or once the fire is progressing. Natural barriers such as roads, water courses or green belts are all effective containment options.

BMP No. 10 – The prescribed burn plan will identify the method and specifications for ignition of the burn.

Burn ignition patterns include a number of considerations. There are a number of ignition strategies that can be used depending on the burn objectives. Head fires (ignited on the up-wind side of the burn area) typically move quickly over the landscape. Residence time is short, heat intensity is high, and flame lengths are often longer. Backing fires (ignited on the down-wind side of the burn area) have a relatively longer residence time, lower heat intensity, and shorter flame lengths. Strip fires (ignited in a manner so they burn for only a short distance before encountering a fire break) combine the characters of head and backing fires but limit the area to be burned at any instant so intensity is controlled. It should be noted that using head fires is a relatively high risk ignition technique whereas using backing fires is a relatively low risk ignition technique.

Fire ignition strategy is also dependent of the nature of the fuels, the burn objective, and the character of the burn desired. Perimeter ignition provides a high degree of fire control. Concentric ignition promotes strong development of smoke columns and increases the amount of heat generated on the center of the burn area. Spot ignition allows for simultaneous ignition of the burn area and reduced burn time.

BMP No. 11 – The burn plan will identify the fire containment strategy or strategies to be followed for the burn.

Fire containment strategies include an understanding of the fire fuels (fuel model) as modified by fuel moisture and local weather conditions, fire control line of a nature and scope to address expected fire intensity, firing and ignition strategies that are coordinated with the containment strategy, and equipment and trained staff sufficient to safely and effectively carry out the prescribed burn.

BMP No. 12 – The burn plan will identify the crew requirements for the burn including the number of personnel, duties and responsibilities, safety equipment and training needs.

Crew needs include training, personal protective gear, orientation, and contact information. Training for crew members minimally includes training on burning, training on equipment to be used in managing the burn, and training in fire line safety and first aid.

Training and safety considerations are a major part of any prescribed burning program. The need for training generally increases as involvement in the program shifts from helping to conduct the burn to planning the burn. Training needs also increase as the complexity of the equipment being used (hand tools to bulldozers) increases. An emphasis on proficiency with the use of equipment increases as the complexity of the equipment increases.

Basic training for individuals wishing to participate in prescribed burns must include training in fire behavior. This, coupled with training in safety and first aid and training in the safe and effective use of hand tools, prepares the individual to work under direct supervision on burns. A necessary prerequisite for this training and for participation on a burn is a health physical. The strenuous nature of the work coupled with an inherently dangerous work site demand that individuals participating in the burns be in good physical condition and free from the effects of alcohol and controlled substances. Most agencies and organizations that conduct burns establish minimum requirements for individual physical condition.

Planning prescribed burns and taking charge of conducting burns, as Burn Planner, requires considerably more training. The planning function assumes a thorough understanding of fire behavior, ecology, smoke management along with the laws and regulations relating to burning; permitting and related permit processes. The mechanics of conducting a burn; and the health/safety considerations involved in planning and conducting a burn. Assistance is available from the Natural Resources Conservation Service. Consulting contractors are also available to help with both planning and conducting prescribed burns.

The Burn Boss must have a thorough understanding of the mechanics and safety considerations involved in conducting a burn, the ability to comprehend and implement a prescribed burn plan, and the ability to effectively supervise a burn control crew. This advanced training is typically offered by a sanctioning organization and is highly structured to instill a thorough understanding of management using fire. Most agencies that conduct burns insist on this level of training for employees that have a significant portion of their job function focused on fire. Increasingly, local fire departments are insisting that prescribed burn plans, written for application on private lands, must be prepared by experienced planners before Burning Permits are issued.

Often overlooked safety considerations are environmental factors that can come into play as burns are conducted. Climate concerns such as heat and dry air can stress fire crew members and render them less effective in their assignments. Heat can make insects and ticks more active. Poisonous plants can be rendered more toxic as the heat mobilizes irritating oils. Heat and moving air (updrafts and convection currents) can also mobilize introduced on-site contaminants asbestos, PCBs, and solvents.

BMP No. 13 – An orientation meeting will be conducted for all crew members before the burn is ignited.

Immediately prior to initiating the burn, crews need an orientation to the prescribed burn, how it is to be carried out, and the individual assignments needed to get it done. On-site communication, coordination, and safety are also covered. This orientation is usually conducted by the Burn Boss, often on the burn site. Communication is critical from this point forward in effectively and safely completing the burn. Burn bosses usually adopt a communication style at this point that involves direct orders enabled through a recognized chain of command within the burn team.

BMP No. 14 – The burn plan will include a complete list of the equipment needed to conduct the burn.

Equipment needs in conducting a prescribed fire are dependent on and are an integral part of the Prescribed Fire Plan. Most prescribed fires can be planned to be completed in different ways that use different compliments of fire equipment and personnel. Personal gear includes both appropriate clothing and hand tools to be employed in burn management. Clothing serves to protect against the effects of radiant heat and resists combustion and melting. Clothing that has been used in this regard varies from shirts and pants made of special flame-resistant apparel such as Nomex®, to a minimum of pants and shirts made of cotton. Hand tools often categorized as personal gear include axes, shovels, fire brooms, backpack pumps, drip torches, and fire rakes. Tracked or wheeled tractors, pump trucks, and fire trucks, are also employed on some prescribed burns, and are classified as equipment. Contact information for individual crew members is necessary to provide a means for dependably contacting them, often with short lead times. However, personnel must be trained and proficient in the use of the equipment identified in the Plan. Once the Plan has been written to identify the compliments of equipment and personnel needed to complete the burn, different equipment should not be substituted to complete the burn without a complete review and modification of the Plan. In short, the prescribed fire must be conducted as prescribed in the Plan.

BMP No. 15 – The burn plan will identify a contingency plan to follow if the burn does not progress as expected.

Contingency plans are a part of every prescribed fire plan. Contingency plans are alternatives available to the Burn Boss that can be implemented when something unexpected occurs or something goes contrary to the prescribed fire plan. Contingency plans are written to make use of both existing equipment and personnel resources and expanded resources like local Fire Departments and additional burn crews. Often, multiple contingency plan levels are formulated with plans for sequential implementation. Contingency plans that utilize existing resources can often be implemented more quickly. These may include developing new control lines outside original lines, burning out from new control lines, and attacking the fire itself. Contingency plans that make use of expanded resources may include calling on the services of fire departments or other burn crews to compliment existing resources

after initial efforts, such as with new control lines, have been attempted. These plans also include contact information for first aid and medical emergency services.

Prescribed burn plans and the contingency plans that are a part of the fire plans are built on the assumption of redundancy in burn control. This is a major distinction separating prescribed burns from wildfires or fires burning in an uncontrolled manner. Redundancy in burn control is the recognition and application of separate systems, often interacting with each other, that operate to either place bounds on burn scope and intensity or contain and control the burn. Recognizing the nature and amount of fuels available to be burned (fuel model) allows prediction of maximum burn potential and how intense the burn is likely to be. Knowledge of fuels on adjacent sites helps to assess risk and plan contingencies. Monitoring of adjacent sites during the burn provides a mechanism to trigger implementation of these contingencies. Knowledge of local site atmospheric conditions and weather projections allows prediction of how these weather effects will change the manner in which the available fuels burn. Dividing the burn site into subunits often places bounds on burn intensity. Selection of burn ignition pattern and manner of completion can also place bounds on burn intensity. For example, burns conducted through the use of a backing fire will generally have much lower intensity than burns completed through the use of a head fire. Building burn control lines that are a combination of mechanical line and black line are often more effective in containing the burn.

BMP No. 16 – The burn plan will identify the communication requirements for the crew and interested parties involved in the burn.

A communications plan is an essential element of the prescribed burn plan. Communications among the crew conducting the burn are vital to safe and successful completion. Most communications plans are built around a simple structure with the designation of a Burn Boss in a command role in charge of safely completing the plan. Communications flow between the Boss and each member of the crew with the crew receiving orders and the Boss receiving progress information on the burn and progress on crew member assignments. On large projects with large crews or more complex plans, the Burn Boss may have subordinates direct elements of the project, with their respective crew, and report back to the Burn Boss.

BMP No. 17 - The burn plan will identify any requirements needed to restore the site after the burn.

Site recovery is a consideration within any prescribed fire plan. Soil stabilization may be required on slopes and in areas where the site has been reduced to mineral soil. This action may be required as a part of a Soil Erosion and Sedimentation Control Permit. It may include water bars on slopes and seeding and covering on denuded areas or areas like plow furrows and disk lines where soil was disturbed in preparation for the burn. Site recovery may also include access control like closure of roads and posting of signs to reduce disturbance and promote recovery.

BMP No. 18 – The burn plan will identify the procedure to be used to evaluate the burn to determine if the objectives of the burn are met.

Any effective prescribed fire plan has an evaluations phase where the results of the burn are reflected against the plan objectives. This evaluation typically includes a review of the results of the burn on both plants and plant response and dead organic matter on-site. It includes an assessment of whether the cost of the burn was in line with expectations. It also assesses whether the burn was executed within safety expectations. Plan evaluation may occur over a period of time depending on the nature of the change effects being evaluated. For instance, evaluation of fire impact on woody vegetation within a burn site may require site review in year 1, 3, 5, and 10 after the burn.

BMP No. 19 – The burn plan will identify media considerations for the burn.

Development of a media plan, typically inserted within the prescribed burn plan, is often a valuable exercise whenever there is opportunity for contact from the media or the public as a result of the prescribed burn. This process allows for anticipation of and advance preparation to deal with issues and concerns that may arise from the burn. The plan provides for notification to those with an interest in the project. The plan also provides a mechanism to present the project in its entirety so interested individuals can fully understand the project. Pre-fire activities under this plan include notification to adjacent landowners, press releases, Public Safety notification, and local government notification. Burn day activities include provision of an on-site Information Officer, identification of safe and restricted areas, and provision of media fact sheets and fire brochures. Post-burn activities include the posting of information and the evaluation of the media plan.

Conclusion

This document serves as a broad introductory overview of the application of prescribed burning on the landscape and suggests minimum application standards in the embedded BMPs. In so doing, it reflects on why burning remains an essential tool in contemporary land management and supports the importance of the related BMPs. It is hoped that the detail in this document will raise the comfort level of the reader regarding prescribed burning as it increases awareness of the process and the recognition of the need to apply these BMPs when conducting prescribed burns. The information presented here is not comprehensive, and the reader is encouraged to consult other references for a more in-depth understanding of this management technique. The Michigan Prescribed Fire Council maintains a website (www.firecouncil.org) that is useful in this regard.

The mission of the Michigan Prescribed Fire Council is to protect, conserve, and expand the safe use of prescribed fire in the Michigan landscape.

Glossary

This glossary contains working definitions that are intended to clarify technical terms and to provide a context in which words with multiple connotations are used in relation to prescribed burning.

Aerial Fuels: All live and dead vegetation above surface fuels including tree branches, twigs, cones, snags, moss, and high brush.

Aerial Ignition: Ignition of fuels by dropping incendiary devices or materials from aircraft.

Aspect: The direction a slope faces.

Backfire: A fire set along the inner edge of a fireline to consume the fuel in the path of an existing fire and/or change the direction of force of the existing fire's convection column.

Backpack Pump: A portable sprayer with hand-pump, fed from a liquid-filled container fitted with straps, used mainly in fire and pest control.

Biological Diversity: Simplified; the number or richness of living organisms occurring at a genetic, species, ecosystem, or landscape scale.

Blow-up: A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or upset control plans.

Burn Boss: (Fire Boss) A person assigned to direct and control all aspects of a prescribed burn.

Burn Evaluation: An evaluation of the results of a prescribed burn as reflected against the objectives for that action.

Burn Out: Setting fire inside a control line to widen it or consume fuel between the edge of the fire and the control line.

Combustibility: The propensity of a fuel to ignite; often expressed in terms of the minimum temperature required for ignition.

Commensal Relationship: (Commensalism) A relationship where two or more organisms interact in ways that benefit all of the involved organisms.

Concentric Ignition: Setting fire simultaneously to the center and perimeter of a burn area.

Contingency Plan: A plan that is implemented on the occasion where conditions change to fall outside the range of conditions included as assumptions in a base or original plan.

Control line: All built or natural fire barriers and treated fire edge used to control a fire.

Creeping Fire: A fire burning with a low flame and spreading slowly.

Crown Fire: (Crowning) The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Dead Fuels: Fuels with no living tissue; fuels in which moisture content is governed by atmospheric moisture (relative humidity and precipitation), temperature, and solar radiation.

Debris Burning: A fire spreading from a fire originally set for the purpose of clearing land of unwanted plant materials or for rubbish, garbage, or refuse removal.
Drip Torch: A hand-held device consisting of a fuel fount, burner arm, and igniter used for igniting fires by dripping burning liquid fuel onto materials to be burned.

Duff: The layer of decomposing organic materials lying immediately above the mineral soil but below the litter layer of freshly fallen twigs, needles, and leaves; the fermentation layer.

Ecological Integrity: Simplified; the degree to which the function of a natural community or ecosystem is complete, unimpaired, and sound; especially as it relates to the biological diversity appropriate to achieve this functionality.

Ecological Management: Management directed to ecological rather than cultural objectives.

Escaped Fire: A fire which has exceeded prescription.

Fine Fuels: Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than ¼ inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire Behavior: The manner is which fire reacts to the influences of fuel, weather, and topography.

Fire Break: A natural or constructed barrier used to stop or check fires that may occur; to provide a control line from which to work.

Fire Intensity: A general term relating to the heat energy released by a fire.

Fire-intolerant Plant: A plant that is killed or more severely set back in its growth by thee action of fire than other plants growing with it.

Fire Line: A linear fire barrier that is scraped or dug to mineral soil or otherwise rendered non-burnable.

Fire Perimeter: The entire outer edge or boundary of a fire.

Fire-tolerant Plant: A plant that is less severely set back in its growth by the action of fire than other plants growing with it.

Fire Weather: Weather conditions that influence fore ignition, behavior and suppression.

Flame Height: The average maximum vertical extension of flames at the leading edge of the fire front.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flare-up: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Flash Fuels: (Fine Fuels) Fuels such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash, that ignite readily and are consumed rapidly when dry.

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or difficulty of control under specified weather conditions.

Fusee: A colored flare designed as a railway warning device and widely used to ignite suppression and prescription activities.

Hand Line: A fire line built with hand tools.

Hotspot: A particularly active part of a fire.

Litter: The top layer of fuels on the ground, directly above the fermentation or duff layer; composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Mop-up: To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material along or near the control line, felling snags, or moving logs so they will not roll down hill.

Nomex®: Trade name for a fire resistant synthetic material used in the manufacturing of flight suits and pants and shirts used by firefighters.

Nutrient Mobilization: The physical or chemical modification of nutrients that facilitates transport from site, especially through water and air.

Prescribed Burn: (Prescribed Fire) Any fire ignited by management actions under certain, predetermined conditions, to meet specific objectives related to hazardous materials or habitat improvement.

Prescribed burn Plan: (Prescribed Fire Plan) A document that provides the information needed to implement an individual prescribed burn project; a documentation of the process involved in implementing a prescribed burn project.

Prescription: Measurable criteria that define conditions under which a prescribed burn may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Prevention: Activities directed at reducing the incidence of fires including public education, law enforcement, personal contact, and reduction or fuel hazards.

Retardant: A substance or chemical agent which reduces the flammability of combustibles.

Running Fire: A rapidly spreading surface fire with a well-defined head.

Slash: Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps, and broken under story trees or brush.
Smoke Management: Application of fire intensities and meteorological processes to minimize degradation of air quality during prescribed burning.

Snag: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Spot Fire: A fire ignited outside the perimeter of the main fire by flying sparks or embers.

Strip Fire: A fire ignited in a pattern so that the fire travels only a short distance before encountering a fire break; indirect control of fire intensity.

Structure Fire: A fire originating in and burning any part or all of any building, shelter, or constructed entity.

Test Fire: A small fire ignited within the planned burn unit to determine the characteristic of he prescribed fire, such as fire behavior, detection performance, and control measures.

Topography: The configuration of the ground surface including its relief and the relative position of natural and cultural features.

Torching: The ignition and flare-up of a tree or small group of trees, usually from bottom to top.

Uncontrolled Fire: (Wildfire) Any fire which threatens to destroy life, property, or natural resources and is not prescribed.

Wet Line: A line of water, or water and chemical retardant, applied along the ground that serves as a temporary control line from which to ignite or stop a low intensity fire.

Wildland Fire: Any non-structure fire, other than a prescribed burn, that occurs in wildland.