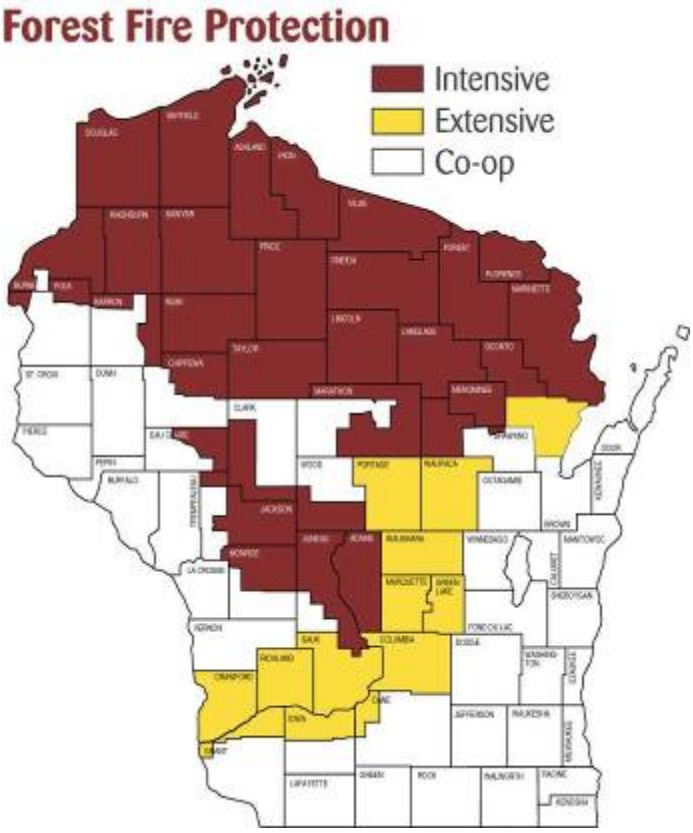
9. Wildfire impacts on forest resource sustainability

Note on data source:
Data in the following section is limited to extensive and intensive areas of forest fire protection. The intensive level of forest fire protection covers areas with more forest cover and high hazard fuel types. DNR takes the lead with a significant commitment of fire suppression equipment and staff in intensive areas, and local fire departments assist. Fire suppression responsibilities in the extensive area are a partnership between DNR and local fire departments. In cooperative level forest fire protection areas, local fire departments take the lead and DNR assists when needed. Tracking fires on the co-operative areas is difficult due to the many units of government responding to fires. This results in a significant data gap for accurate comprehensive information on fire occurrence in the co-op area.



Map 9.a: Forest fire protection areas
Source: DNR, 2009

9.1 Number of forest fires

The number of fires varies annually depending on weather, fuel conditions and human activity. Based on a 33 year average, approximately 1,700 fires burn 6,000 acres each year. These acres are predominately forested but include other vegetation cover such as agricultural fields, shrubland, wetland, etc. About 200,000 acres cumulative burned between 1975 and 2008 in the intensive and extensive protection areas. Many more acres were threatened by small fires, but suppression activities stopped their spread. Periodic drought cycles drastically affect the number of fires and acres burned. (See indicator 7.3 for an in-depth discussion of climate.) In Figure 9.a, fires peaked in 1977, 1980, 1988, 1994 and 2004 due to droughts.

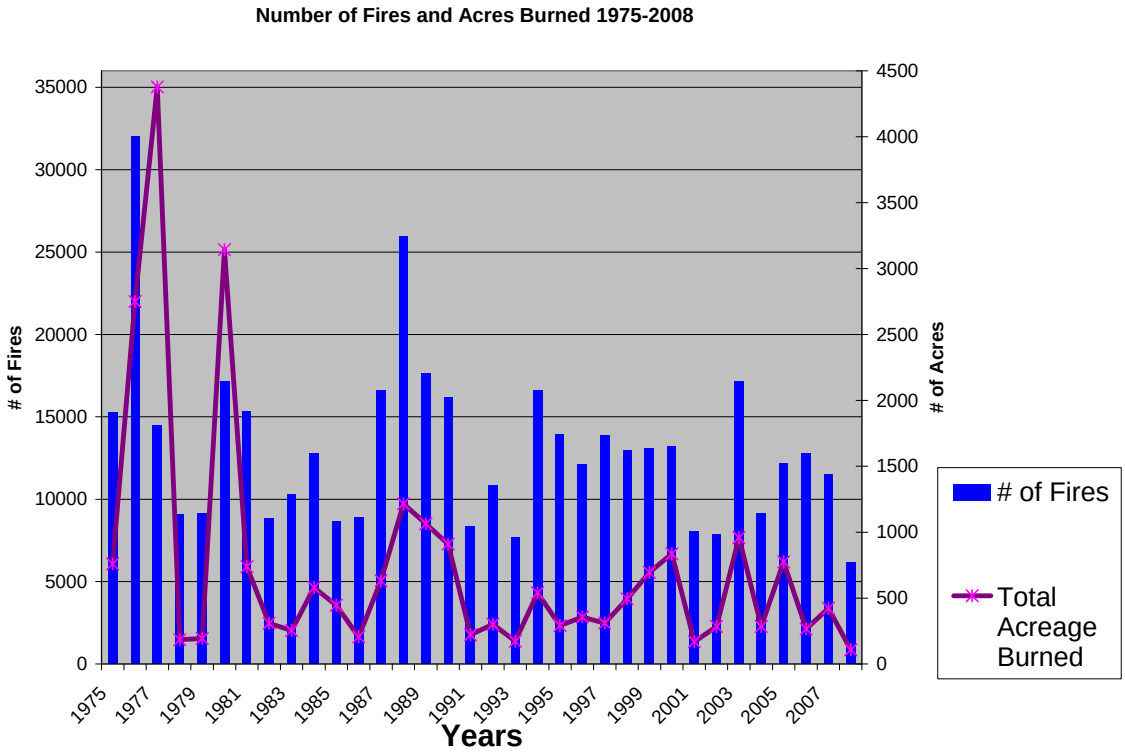


Figure 9.a: Number of fires and acres burned 1975-2008
Source: DNR, 2009

Fire suppression affects the composition, structure, and function of forests. Fire-dependent communities such as oak savannas and pine barrens are unable to maintain their open character and eventually lose the native species that are not adapted to low disturbance habitats. A disruption of the frequency of fires in our forests can result in a build up of down woody debris (fallen trees, branches, leaves, and duff). During times of drought and high fire danger, this material can result in high flame lengths, high heat output, and significant control problems. Very dense and crowded stands with older trees can also facilitate the movement of forest insects and diseases.

9.2 Forest fire influences

Fire ignition and severity are dependent on physical, meteorological and societal factors. Physical factors include fuel type, fuel class, fuel condition and arrangement. Meteorological factors include wind, relative humidity, precipitation patterns and drought. Societal factors include, housing, human attitudes and activities, income levels and government controls. These factors affect the wildland urban interface, wildfire locations, wildfire causes, and the issuance of burning permits as explained below

<u>Landscape Factors – Wildland-Urban Interface</u>
Initially in the 20th century, housing was concentrated mainly in urban areas. By the later part of the century, people began moving to the outer fringe of cities and suburbs. Increasingly, housing development continues to move deeper into rural areas in clustered subdivisions and scattered

individual homes. This movement has created a condition called the wildland-urban interface (WUI) where people, homes, and property are intermingled with wildland vegetation. The structures can potentially become just another piece of burnable fuel in the event of a wildfire. Unfortunately, many people are moving into wildland areas do not adapt to the fire dangers that exist around them.

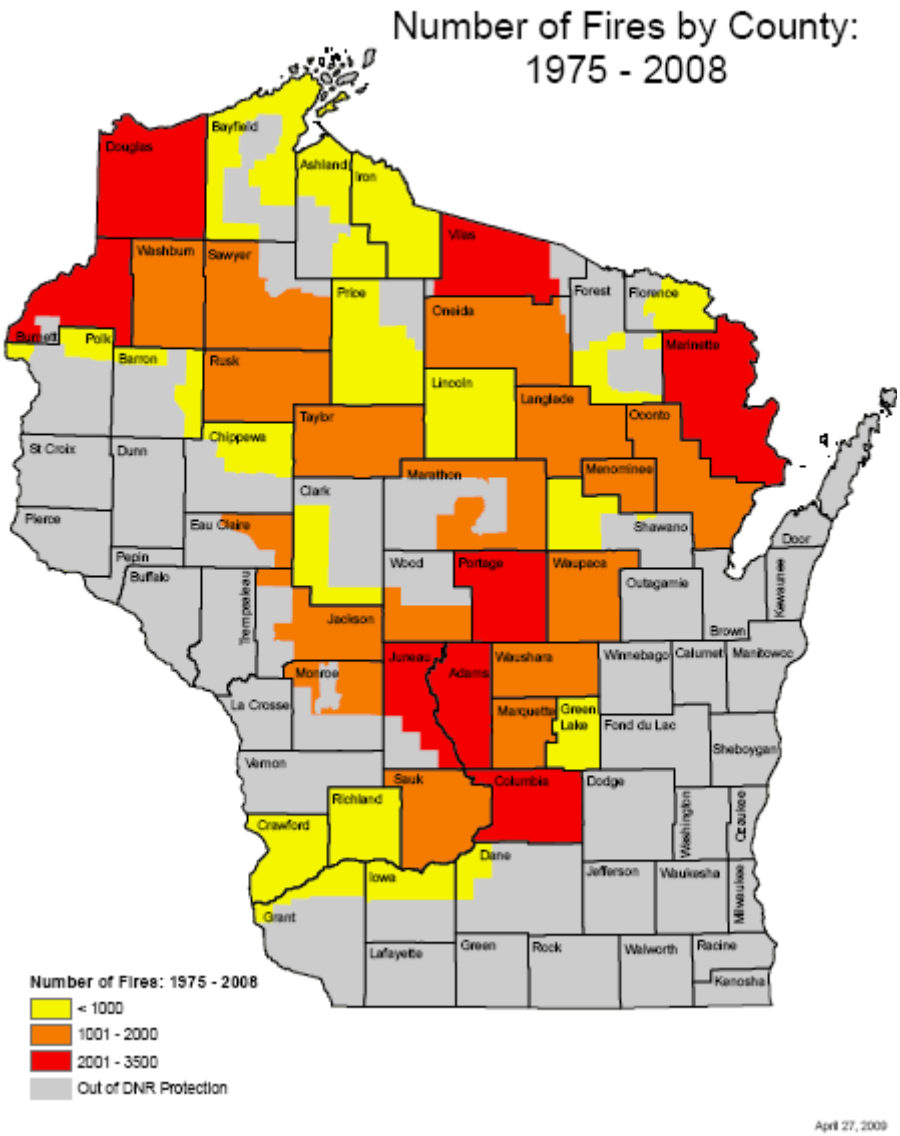
The risk of wildfire increases as more people live and recreate in forested and rural areas. In Wisconsin, people cause over 98% of all wildfires. Most of the ignitions are accidental and caused by debris burning, equipment use, improper ash disposal, and warming fires. The potential increase in frequency of wildfires increases the risk of a catastrophic wildfire.

There is great concern to fire officials when homes are built in areas of highly flammable vegetation, especially when the structures themselves are made of flammable materials. The concern increases when homes are built in remote areas or when roads and driveways are narrow or sandy, which may make it impossible for emergency vehicles to get to homes. Vegetation that is allowed to grow close to the sides of buildings is especially troublesome.

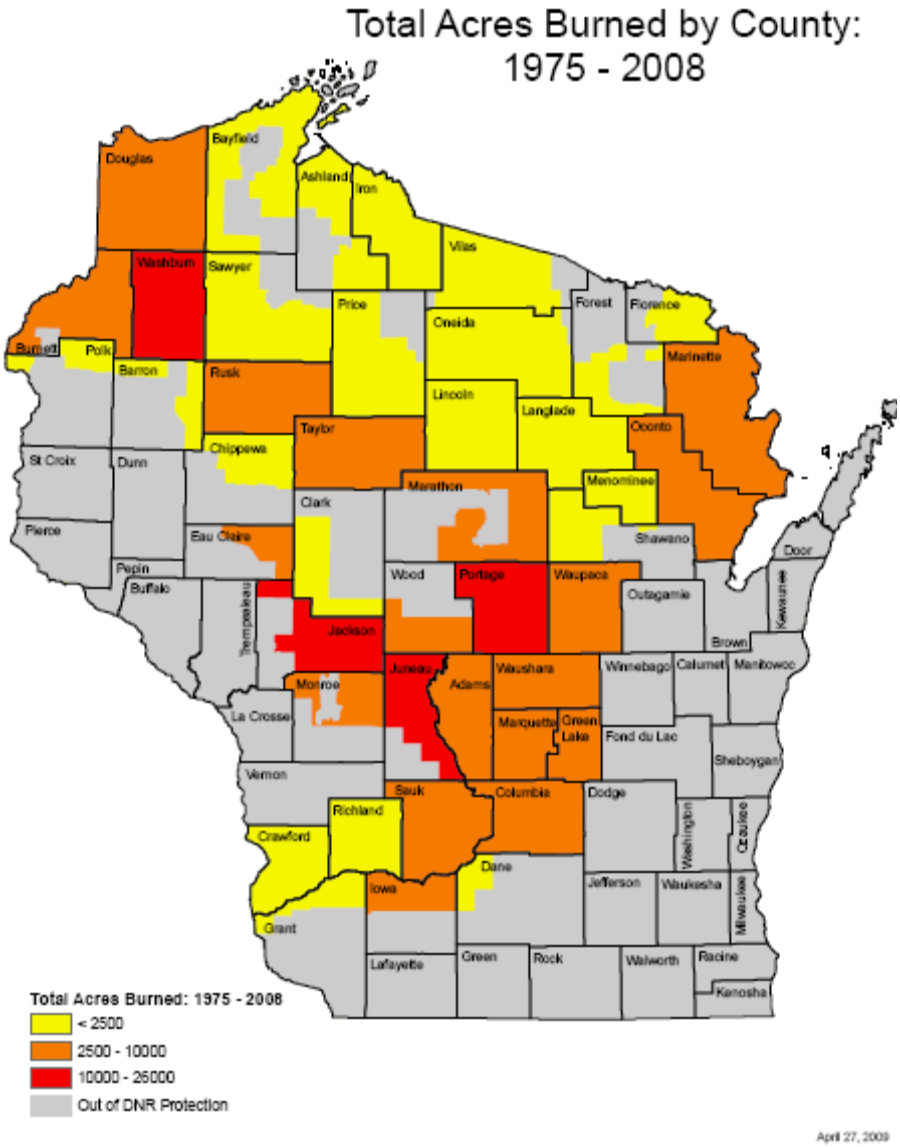
Although housing in the WUI is increasing, the number of available firefighters and equipment is not growing at the same rate. Often times, firefighters in fire-prone areas are working as volunteers and may not be fully aware of the potential problems in a community. These firefighters may be expected to evacuate communities, fight structure fires and respond to wild fires all in the same day. Such demands require a higher level of training than may be available.

Fire Locations

Forest fire occurrence and location are directly related to residential population and seasonal recreational activities. Forest fire causes in Wisconsin are 98% human activity related. Counties with high fire occurrence (see Map 9.b and Map 9.c) have a large residential or seasonal recreation population base. Furthermore, the relationship between human activity and fire starts also mean forest fires in Wisconsin tend to threaten structures and related property improvements. These wildland urban interface fires are complicated and challenge efforts to limit damage to forests and improvements.



Map 9.b: Number of fires by county: 1975-2008
Source: DNR, 2008



Map 9.c: Total acres burned by county 1975-2008
Source: DNR, 2008

Fire Causes 1975-2008

As noted previously, 98% of Wisconsin's fires are caused by human activity. The number one cause of forest fires in Wisconsin is debris burning, which includes the burning of household waste, brush, leaves and broadcast burning. Control of this human activity is primarily done through a burning permit system. DNR requires burning permits in intensive and extensive areas, and some municipalities in the cooperative fire protection areas also require burning permits. These burning permits regulate the type, quantity, days and time of debris burning. The number two cause of forest fires fall into the miscellaneous category, which includes fireworks, power lines and improper ash disposal. Equipment and arson are the third and fourth leading causes of wildland fires, respectively.

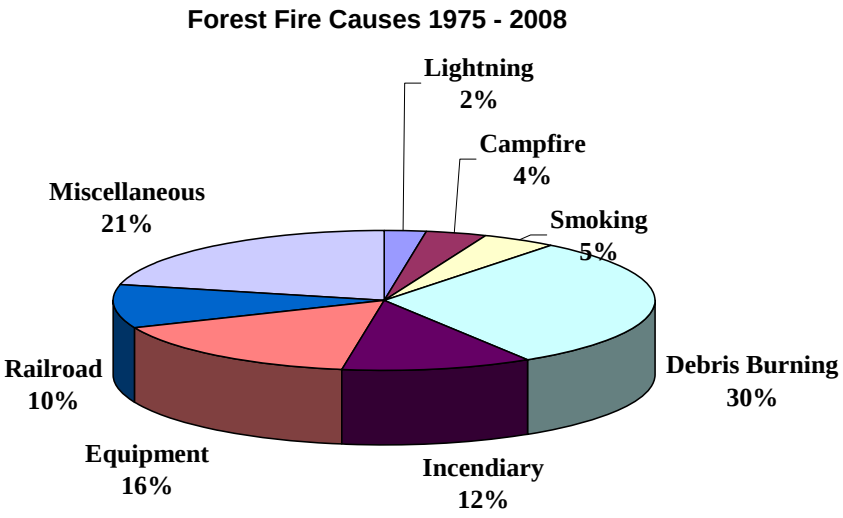


Figure 9.b: Forest fire causes 1975-2008
Source: DNR, 2009

Railroad fires decreased significantly over the last 30 years. Engineering improvements in fuels, exhaust systems, and brake technology have caused this reduction. Furthermore, technology has improved the monitoring of train and locomotive systems and has allowed malfunctions to be repaired before multiple fires are ignited.

Equipment fires jumped substantially in recent years. The increase of more mobile and available machinery in the forest has increased the occurrence of fires. Recreational use of machines, primarily ATVs, has produced fires in more remote and inaccessible areas. These fires can produce larger more damaging fires due to a delayed detection.

The trend in debris burning caused fires has remained relatively stable for the last three decades. Prevention of these fires has relied on statewide efforts to regulate burning. A burning permit system is in place across all areas where DNR has forest fire protection responsibilities. This burning permit system is enforceable through state statutory authority. Debris burning is limited to natural materials and certain times usually after 6 pm, and fires must be attended.

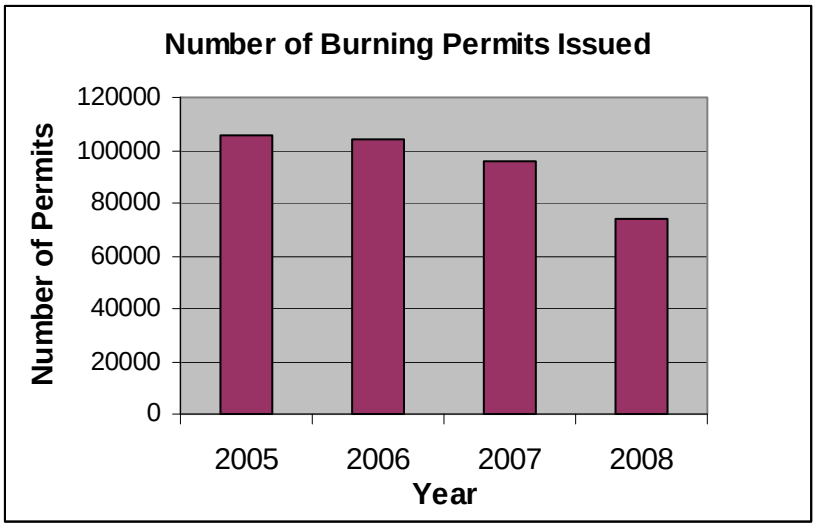


Figure 9.c: Burning permits issued 2005-2008
Source: DNR, 2009

As population increases, the expectation was that burning permits would also increase. That general trend has ended recently with the automation of the DNR burning permit system. The automated system allows the restrictions of burning activity to be controlled on a daily basis, based on weather conditions and activity. This new control is very responsive and will help manage burning activity on a day-to-day basis to decrease debris fire starts. In 2007, the burning permit system was converted to a web based and telephone call-in system. Each day, the fire danger is considered and the restrictions on burning determined. This system, based on physical and meteorological factors, allows day-to-day decision making on when burning will be allowed, tightening the control on burning activities. This control reduces fire starts and limits the corresponding damage that fires will cause. Further refinement and improvement of this burning permit system is ongoing.

9.3 National Fire Danger Rating System

The National Fire Danger Rating System (NFDRS) is a predictor of fire risk. The system uses weather factors, fuel characteristics, and many other factors. It is commonly used to inform and educate the public of the risk of fire in a particular area. The system is also used as a planning tool for fire suppression to determine staffing, resource needs and detection levels.

Figure 9.d compares the number of days, number of fires and average fire size by the 5 levels of NFDRS danger. On a Low fire danger day, a fire will occur only every third day. A fire burning on a Low fire danger day will burn, on average, 1.7 acres (larger, perhaps, because of a lack of detection activity on such days). On an Extreme fire danger day, on average, 1.5 fires can be expected to occur, with each fire burning 4.6 acres. The NFDRS system is an accurate predictor of fire activity and fire size on a day to day basis. The NFDRS system is predicated on accurate local weather data collected at automated weather stations. The DNR must continue to take advantage of technological advances in weather gathering systems to assure that our fire prediction systems are based on accurate weather data.

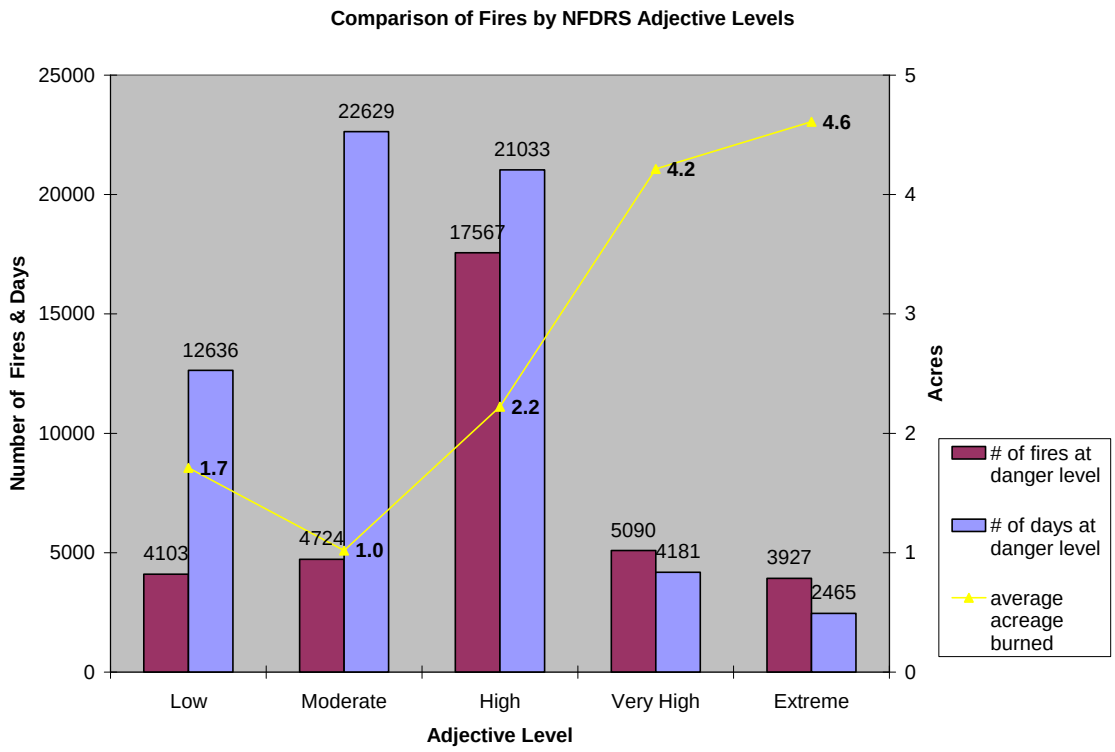


Figure 9.d: Comparison of fires by NFDRS adjective level 1975-2008
Source: DNR, 2009

9.4 Prescribed fire

Prescribed fire is the intentional application of fire to vegetation under specific environmental conditions to accomplish planned land management objectives. Many federal, state and non-government organizations promote the use of fire to efficiently achieve land management goals including: fuel reduction, site preparation, disease control, wildlife management, and biological community restoration and maintenance.

About 500 prescribed burns are conducted on over 20,000 acres per year (Figure 9.e), but the need in Wisconsin is much higher. There are, however, numerous constraints. Conducting a prescribed burning program involves the cost to equip and train experienced crews. Smoke and its impact on air quality are a major concern in many parts of the state. There is also an increasing risk of property damage if fires escape due to an abundance of improvements across the landscape.

The purpose of most prescribed fire applications in Wisconsin is to positively affect habitats. Some examples include maintaining grassland habitat for nesting waterfowl and other grassland birds; maintaining oak woodland vegetation; maintaining native prairies and savannas; rejuvenating brushy wetlands; and natural regeneration of forests, such as jack pine and oak. Other habitats have either degraded beyond maintenance and/or need full restoration. Restoration sites generally need more prescribed fire treatments than those only in need of maintenance.

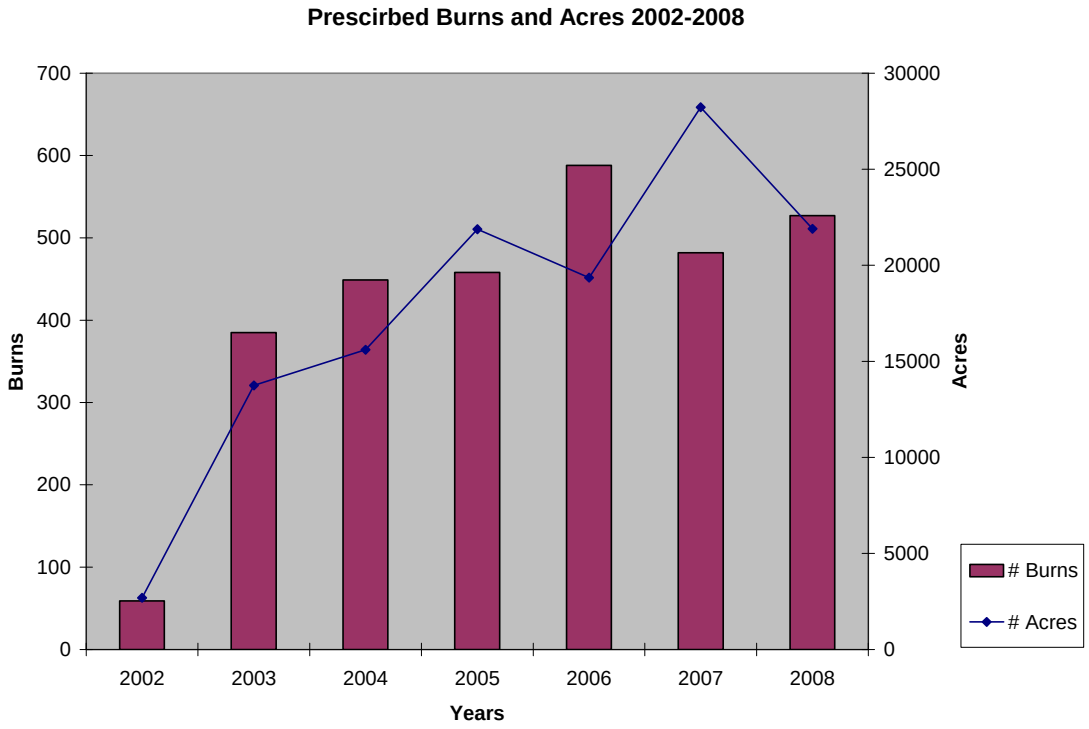


Figure 9.e: Prescribed burns and number of acres 2002-2008
Source: DNR, 2009

A major component of Wisconsin's natural heritage is fire-derived. Many ecosystems in the state developed under the regular influence of fire. Oak is of special concern. Field foresters have generally recognized the challenge of regenerating oak in oak and central hardwood stands, especially on better sites. Fire has been a powerful influence in establishing and maintaining the oak component in these types, and prescribed burning is a critical tool to address the oak regeneration issue. There are also similar issues with various pine and other timber types, where prescribed burning could play an important role in the future. Specific acreages of such types and the extent of the need for prescribed fire on an annual basis are not clear.

Prescribed fire in Wisconsin is being accomplished by a variety of agencies, companies and individuals. Land management objectives vary greatly from hazard mitigation, fuels reduction, forest regeneration, and invasives control to prairie rejuvenation. One of the identified needs to better assess the efficacy of prescribed burning would be a web-based system to assess the impact of burns. Such information is not always captured and shared to help others burn more effectively. The system would require time and funding to develop, and resources for training and maintenance.

The present statewide prescribed burn management program is insufficient for existing public lands. With additional purchase of land and cooperative grassland/savanna management by all partners, the need will continue to grow. Several issues that will need to be addressed are:

1. Resources to manage the prescribed burn needs on state lands are inadequate.

2. The DNR’s goals for maintaining biological diversity, especially for oak savanna and barrens species, will mostly likely be difficult to attain without more emphasis on prescribed burning.
3. Non-burning alternatives to prescribed fire such as fuel removal through biomass harvests, mechanical site preparation, improved artificial tree regeneration, and herbicide use may be necessary to improve biological diversity and achieve forest management goals in some vegetative types.