FIRE

DEFINITIONS:

Structure Fire – a fire of natural or human-caused origin that results in the uncontrolled destruction of homes, businesses, and other structures in populated, urban or suburban areas.

Wildland Fire – a fire of natural or human-caused origin that results in the uncontrolled destruction of forests, field crops and grasslands.

Wildland-Urban Interface – a fire of natural or human-caused origin that occurs in or near forest or grassland areas where isolated homes, subdivisions, and small communities are also located.

BACKGROUND INFORMATION:

Skagit County experiences three types of fire threats: structure fires, wildland fires, and wildland-urban interface fires.

Jordan Creek Fire – Skagit County, 1998
Photograph by Randy Warnock

Structure fires do not typically pose a great threat to the community except when the fire spreads to other nearby structures and quickly expands to a size that could threaten large numbers of people and overwhelm local fire resources.

Wildland fires are a natural part of the ecosystem in Washington State. However, wildfires can present a substantial hazard to life and property. Statistics show that on an annual basis, an average of 905 wildland fires burn 6,488 acres resulting in a resource loss of $2,103,884 in Washington State.

Most wildland fires are started by human causes including discarded cigarettes, the discharge of fireworks, outdoor burning and deliberate acts of arson. Many of these fires are usually extinguished in their initial stages being less than one acre in area. Depending upon temperature, wind, topography, and other factors, wildland fires can spread rapidly to over 100,000 acres and may require thousands of firefighters working several weeks to extinguish.

One challenge Skagit County faces regarding the wildfire hazard is from the increasing number of homes being built in the urban/rural fringe (known as the wildland-urban interface) as well

as the industrial forest. Due to a growing population and the desire of some persons to live in rural or isolated areas or on forested hillsides with scenic views, development continues to expand further and further into traditional forest resource lands.

Wildfires occur primarily in undeveloped areas; these natural lands contain dense vegetation such as forest, grasslands or agricultural croplands. Because of their distance from firefighting resources and personnel, these fires can be difficult to contain and can cause a great deal of destruction. Lightning and human carelessness are the primary causes of wildland fires. Fortunately, due to the proximity of advanced fire protection capabilities and our normally wet climate, large-scale wildland fires are rare in Skagit County.


Jordan Creek Fire – Skagit County, 1998
Photograph by Randy Warnock

On occasion, individual fires will spread and merge together to form a firestorm covering vast amounts of area. The involved area becomes so hot that all combustible materials ignite, even if they are not exposed directly to flames. As the fire becomes larger, it has the capacity to create its own local weather as superheated air and hot combustion gases rise upward over the fire zone, drawing surface winds from all sides, often at velocities approaching 50 miles per hour. In exceptionally large events, the rising column of heated air and combustion gases carries enough soot and particulate matter into the upper atmosphere to create a locally intense thunderstorm thereby increasing the possibility of additional lightning strikes.

HISTORY:

Washington State has experienced several disastrous fire seasons in recent years. In 1994, a series of dry lightening strikes created numerous fires in the north-central portion of the state with major fires occurring in near Lake Chelan, Entiat, and Leavenworth. During the fire seasons of 2001 and 2002, lightning again caused numerous fires in Washington and Oregon. In some cases, two or more fires merged together thereby overwhelming resources and creating fires so large and complex that some were not fully extinguished until cooler, damp autumn weather moved into the region.

Although Skagit County typically has numerous fires that occur in forest lands each year, almost all of these fires are extremely small (less than .2 acres in size) and remain so due to the relative high moisture content in fire fuels. The majority of these fires involve minimal resources and response costs are typically less than $500 per fire.

According to Washington State Department of Natural Resources records, 638 reported wildland fires occurred in Skagit County from 1970 through 2001. The largest of these fires (the Jordan Creek Fire) occurred near the community of Marblemount in

1998 and burnt 1,162 acres of forest land and threatened several homes in the area. Costs to fight this fire were in excess of 3 million dollars.

HAZARD IDENTIFICATION:

Unlike other disaster events, the direct effects of even a large fire are generally limited to the immediate area where the fire occurred. However, the community's normal as well as emergency services may be affected as large numbers of agencies and individual responders focus their efforts on the fire. Adjacent fire agencies may be asked for assistance in one form or another and access to a city's business district may be restricted or closed and the influx of sightseers and media personnel can further add to the disruption. Furthermore, since most fire fighters in Skagit County are volunteers, large fire events could significantly affect not only their lives but their source of employment should economic impacts continue.

Evacuation of a fire zone is one of the first tasks that may need to be undertaken by emergency responders. Depending upon the size of the fire zone, the population density of the area, and the number of persons needing emergency shelter, evacuation efforts may have a significant effect on other parts of the community.

Rocky Hull Fire – Okanogan County, 2000
Washington State Department of Natural Resources Photograph

The fire season in Skagit County can begin as early as mid-May and continue through October though unusually dry periods can extend the fire season. The possibility of a wildland fire depends on fuel availability, topography, the time of year, weather, and activities such as debris burning, land clearing, camping, and recreation. In Washington State, wildland fires start most often in lawns, fields or other open areas, along transportation routes, and forested areas.

Due to their size and complexity, large fires can put a tremendous strain on a wide variety of agencies and jurisdictions within the area that the fire occurs and local resources could be quickly overwhelmed in dealing with the impacts of a large fire.

Those persons living or doing business in the area of a large fire could be affected in several ways. Access to the area will probably be controlled or entry may be denied entirely. If a recreational area is involved, this closure may have a severe impact on tourist industry business and logging operations. In many cases, evacuations may be necessary if the fire directly threatens residential or commercial areas or in the event health issues could result from heavy volumes of smoke associated with large fires.

The Jordan Creek Fire near Marblemount in 1998 quickly overwhelmed local fire district personnel who initially responded to the fire. Several homes in the immediate area of the fire were threatened; mutual aid provided by adjacent fire districts and a quick response by a Department of Natural Resources initiated Unified Command using multiple agencies prevented the loss of several homes and other structures. Had the wind been blowing in a different

direction, the fire could have directly threatened the community of Marblemount and local fire resources, already overwhelmed, would have had great difficulty in extinguishing multiple structure fires in close proximity to each other.

The following list is a compilation of comments and suggestions made by various stakeholders and the public regarding possible problems that could result from a wildland or wildland-urban interface fire.

In addition to damaging timber lands, agricultural crops, homes, businesses, property, and the environment, a wildland or wildland-urban interface fire in Skagit County could potentially result in the following:

- Sinclair Island and Cypress Island are particularly vulnerable to wildland fires as there is no fire service on these islands and a response by Washington State Department of Natural Resources crews would be significantly delayed because there is no ferry service to these islands.

- Fidalgo Island and Guemes Island are very susceptible to wildland-urban interface fires due to the lack of rainfall during the summer months and the large number of homes that are located in or very near heavily timbered areas. Fire hydrants in these areas are typically supplied with water from private water systems that may have inadequate supplies of water for firefighting because of a lack of summer rainfall or long-term drought conditions.

- All areas of Skagit County are susceptible to wildland or wildland-urban interface fires caused by fireworks and/or human recklessness.

VULNERABILITY ASSESSMENT:

Those persons living in forested areas or interface areas are most vulnerable to wildland or wildland-urban interface fires.

Within Skagit County, approximately 25 % of the land area is zoned industrial forest and approximately 7 % of the land area is zoned agricultural; these areas are vulnerable to wildland or wildland-urban interface fires. However, the potential for large forest fires in Skagit County is normally small. Improved fire spotting techniques, better equipment, and trained personnel are major factors, as are Skagit County's normally wet climate and high fuel moisture levels. Most of the industrial forest areas of Skagit County receive in excess of 50 inches of rainfall annually with some areas receiving as much as 100 inches or more rainfall annually. This wet climate and the infrequent occurrence of strong, dry winds, normally prevents natural fire fuels from reaching a combustible state. However, warm summer temperatures coupled with seasonal low rainfall amounts sometimes lead to summer drought conditions in the industrial forest. These conditions are reached more often than most people realize. Luckily, there has been a lack of ignition during times of serious fire danger in Skagit County.

The United States Forest Service and/or the Washington State Department of Natural Resources manage most of the forest lands in Skagit County. The excellent fire prevention and control capabilities of these two agencies are partially responsible for the lack of large wildland and

wildland-urban interface fires experienced by Skagit County. However, the absence of large fires coupled with reduced burning has also resulted in greater fuel loading which could lead to a catastrophic fire given the right set of conditions.

Should a wildland fire or wildland-urban interface fire occur, the impacts of the fire would vary greatly with the size and location of the fire, the weather, and time of year. It is unlikely that a major wildland or wildland- urban interface fire would seriously impact Skagit County as a whole. In the event of a large wildland or wildland-urban interface fire, additional resources could be requested through activation of the **Northwest Region Fire Mobilization Plan** and/or the **Washington State Fire Mobilization Plan** in addition to other state and federal fire resources.


Bitterroot Valley, Montana - 2000

While there have always been a certain number of people that have built homes in wooded areas, in recent years, the numbers of people choosing to build in or very near forest areas has increased dramatically as city limits have expanded into previously unpopulated and forested areas. As the population of Skagit County increases and people desire to live in more rural or isolated areas outside of the floodplain, development in the wildland-urban interface will continue to expand thereby increasing the potential risk to lives and property from wildland and wildland urban-interface fires.

Should a large wildland or wildland-urban interface fire occur in Skagit County, the effects of such an event would not be limited to just the loss of valuable timber, wildlife and habitat, and recreational areas. The loss of large amounts of timber on steep slopes would increase the risk of landslides and mudslides during the winter months and the depositing of large amounts of mud and debris in streams and river channels could threaten valuable fish habitat for many years. In addition, the loss of timber would severely impact the watershed of the Skagit River and could drastically increase the vulnerability to flooding for many years.

The loss of large amounts of timber in the industrial forest areas of Skagit County could severely impact the logging industry and possibly the overall economy of the county for many years. With a fixed number of acres of timber land available for harvest, timber owners must limit the acres harvested each year in order to properly manage their timber holdings and maintain a continual and sustainable supply of timber. The immediate loss of several hundred or thousands of acres of timber could potentially equal several years of timber harvest acreage.

If a significant portion of the business area has been affected, the loss to the community can be overwhelming. Reduction of payrolls and long-term layoffs during recovery from a large fire could have a serious impact on the buying power of a large sector of the population. A long-term business closure could also have a large impact to the community's tax base.

The Washington State Department of Natural Resources, Northwest Region, has conducted a region-wide wildland fire hazard assessment utilizing the following method:

1. R.A.M.S (Risk Assessment and Mitigation Strategies) was developed for fire managers to be an all-inclusive approach to analyzing wildland FUELS, HAZARD, RISK, VALUE, and SUPPRESSION CAPABILITY. It considers the effects of fire on unit ecosystems by taking a coordinated approach to planning at a landscape level. The steps involved in this process include:

    a. The identification of spatial compartments for assessment purposes:

        i. Skagit County (county # 29) was subdivided into 3 risk assessment compartments based on IFPL (Industrial Fire Precaution Level) Shutdown Zones. Zone 653 represents the islands and tidal lowlands; Zone 656 represents the interior lowlands - roughly the Interstate 5 corridor; Zone 658 represents the uplands to the Cascade Crest (roughly 1500 feet elevation and above). Skagit County risk assessment compartments are numbered utilizing the county number (29) combined with the shutdown zone number. Using this scheme, the three risk assessment compartments within Skagit County are numbered 29653, 29656 & 29658.

    b. The assessment of significant issues within each compartment are then related to:

        i. Fuels Hazards ~ The assessment of FUEL HAZARDS deal with identifying areas of like fire behavior based on fuel and topography. Given a normal fire season, how intense (as measured by flame length) would a fire burn? Under average fire season conditions, fire intensity is largely a product of fuel and topography.
        ii. Protection Capability ~ Initial attack capability will be evaluated on the following criteria. Determining fire PROTECTION CAPABILITY for the purpose of this assessment involves estimating the actual response times for initial attack forces and how complex the actual suppression action may be once they arrive because of access, fuel profile, existence of natural or human-made barriers to fire spread, presence of structures and predicted fire behavior.
            a. Initial Attack Capability - actual time of first suppression resource.
            b. Suppression Complexity - access, fuel conditions, structure density, and so forth.
        iii. Ignition Risk ~ Ignition risk evaluation will be completed for each compartment. Ignition risks are defined as those human activities or natural events which have the potential to result in an ignition. Wherever there are concentrations of people or activity, the potential for a human-caused ignition exists. After assessing the risks within an area, it is helpful to look at historical fires to validate the risk assessment. Historical fires alone, however, are not an accurate

reflection of the risks within a given area. The objective of this effort is to determine the degree of risk within given areas.

1. Compartment Ignition Risk is based on the following:
    a. Population Density
    b. Power Lines – distribution as well as transmission
    c. Industrial Operations - timber sale, construction project, fire use, mining, and so forth
    d. Recreation - dispersed, developed, OHV, hunting, fishing
    e. Flammables
    f. Other - fireworks, children, shooting, incendiary, cultural, power equipment
    g. Railroads
    h. Transportation Systems - state, federal, public access
    i. Commercial Development - camps, resorts, businesses, schools

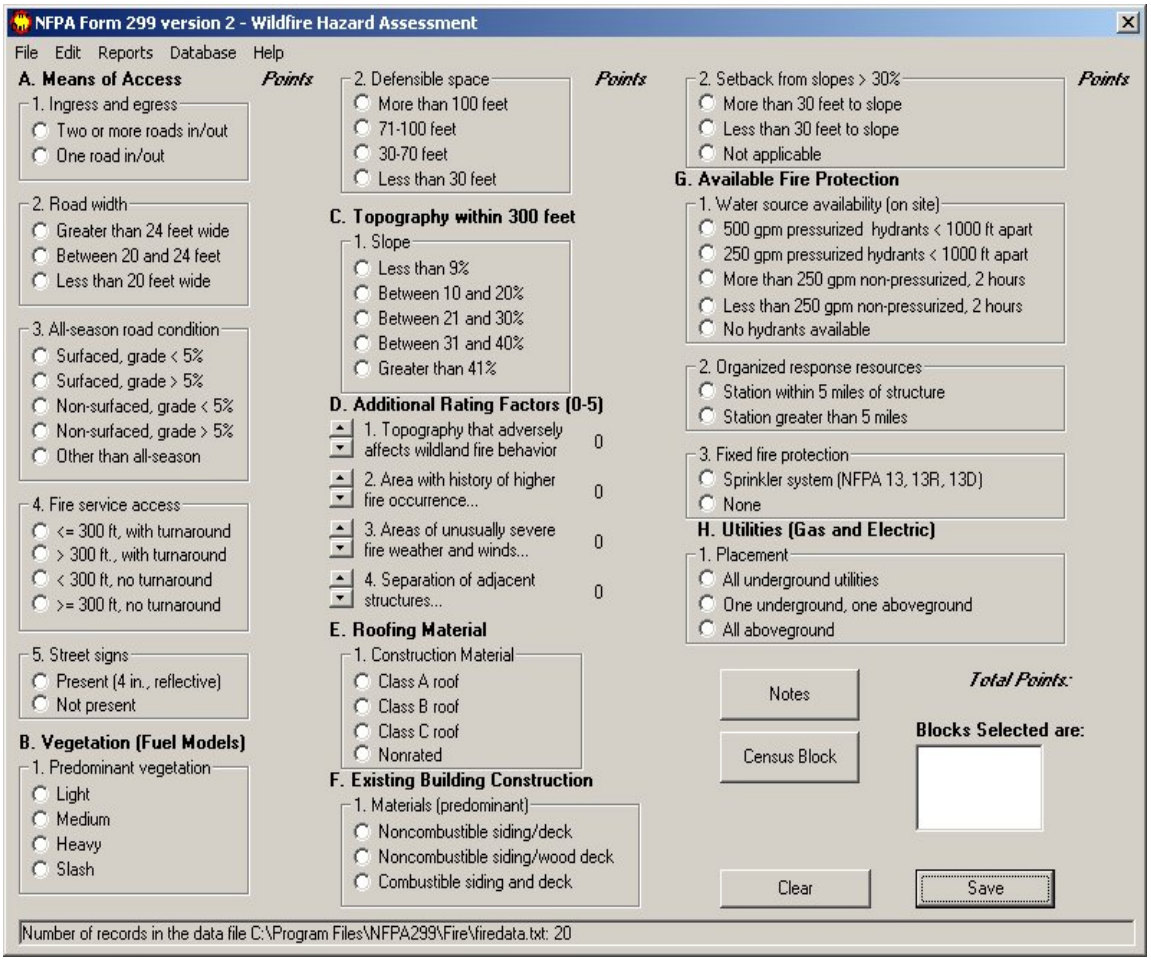
iv. Fire History ~ Fire history will be completed for each compartment. The history will reflect the following:
    1. Fire location
    2. Cause
    3. Average annual acres burned
    4. Average annual number of fire by cause

v. Catastrophic Fire Potential ~ An evaluation of fire history reflects the potential for an event to occur. An example is if large damaging fires occur every 20 years and it has been 18 years since the last occurrence, this would reflect a priority for fire prevention management actions.
    1. Evaluate large fire history
    2. What are the odds of a stand replacement type fire occurrence in that compartment?
        a. Unlikely
        b. Possible
        c. Likely

vi. Values ~ A value assessment will be conducted for each compartment. Values are defined as natural or developed areas where loss or destruction by fire would be unacceptable. The value elements include:
    1. Recreation - undeveloped/developed
    2. Administrative sites
    3. Wildlife/Fisheries - habitat existing
    4. Range Use
    5. Watershed
    6. Timber / Woodland
    7. Plantations
    8. Private Property
    9. Cultural Resources
    10. Special Interest Areas
    11. Visual Resources
    12. T & E Species
    13. Soils
    14. Airshed
    15. Other necessary elements

This evaluation process provides the basis for determining the *Skagit County Wildland-Urban Interface Fire Risk Assessment Compartments* map. Additional information regarding the results of this process can be found in Appendix A, Excerpts from the *Washington State Department of Natural Resources Northwest Region R.A.M.S. Assessment*.

2. R.A.M.S risk assessment compartments were further broken down to identify Wildland-Urban Interface Hazards. Using 2000 Census data, individual areas were identified in the Wildland-Urban Interface and assessed using the N.F.P.A. (National Fire Protection Association) 299, Wildfire Hazard Assessment. The results of this assessment are depicted in the *Skagit County Wildland-Urban Interface Fire Risk Assessment Based On NFPA 299 Risk Assessment* map.



PROBABILITY and RISK:

Based on historical evidence, there is a **low probability** of a large wildland or wildland-urban interface fire occurring in Skagit County and a **low risk** to people and property in Skagit County as a result of a large wildland or wildland-urban interface fire.

However, based upon the newly developed wildland fire hazard assessments conducted by the Washington State Department of Natural Resources utilizing R.A.M.S. and N.F.P.A. 299, there is

*a **moderate to high potential** for a large wildland fire to occur in Skagit County with the **potential for moderate to high (with isolated areas of extreme) risk** to people and property as a result of a catastrophic wildland or wildland-urban interface fire.*

CONCLUSION:

Skagit County's typical moist marine climate and low frequency of lightning provide natural protection against large wildland or wildland urban-interface fires experienced in Eastern Washington, California, and other portions of the United States. While wildland and wildland urban-interface fires do occur in Skagit County on a fairly regular basis during the warm summer months, these fires are typically very small and are usually extinguished with personnel and equipment.

Approximately 32 % of the land in Skagit County is comprised of industrial forest or agricultural land that is vulnerable to wildland or wildland urban-interface fires. Current zoning regulations limit minimum lot size to 80 acres in the industrial forest and 40 acres in agricultural areas. In addition, much of the industrial forest lands are located outside the boundaries of established fire districts. Building homes or other structures in or near forested areas increases the risk of loss from fires. In the past, structures were often built with minimal awareness regarding the risks associated with wildland or wildland urban-interface fires.

According to Skagit County Code 14.04.190, new single family dwellings and/or accessory buildings constructed in areas outside of a fire district are required to meet the following requirements:

1. The lot must be a legal lot of record prior to June 11, 1990.
2. Approved non-combustible roofing materials must be used.
3. All slash must be abated within 200 feet of any portion of the exterior of the structure, or to the maximum extent possible if 200 feet cannot be achieved due to lot size.
4. A safety zone must be cleared of flammable vegetation for a distance of 30 feet from any portion of the exterior of the structure on level ground and for a distance of 100 feet downhill on sloped ground. If these dimensions cannot be achieved due to lot size, then dimensions are to be achieved to the maximum extent possible.
5. Any structure greater than 800 square feet in area must have building sprinklers installed that meet National Fire Protection Association 13D standards.

With the completion of the recent wildland fire hazard assessments conducted by the Washington State Department of Natural Resources, we now have a better idea of those areas within Skagit County that are most susceptible to wildland-urban interface fires. This information will hopefully provide an incentive for local government to implement new and/or additional fire education programs such as FIREWISE as well as provide the basis for new and/or additional building regulations in those areas of Skagit County that have been identified by this assessment as having high-fire hazard and/or extreme fire hazard.

Information regarding what steps homeowners can take to help safeguard against wildland-urban interface fires can be found at http://www/firewise.org/.