

CITY OF LYNDEN

FIRE DEPARTMENT

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On May 27, 2025, Assistant Chief Kristie Watson and Fire Chief Mike Noonan did a fuel analysis on the Homestead Golf Course area as a direct result of a citizen residing at 1924 Greenview Ln., who expressed concerns about the potential for fire spreading into the homes in the area if there were a fire. This memo will review the findings, provide a hazard analysis and make recommendations for strategies to prevent fire spread, and tactics to be utilized if a fire were to occur without modifications.

Findings at the Homestead Golf Course are as follows:

1. Very dense three-foot grasses predominantly headed out
2. The curing stage of the Grass was Purple. (As seen in the photo below)
3. Fuels Run from Homestead Blvd. and arterial streets to East Badger Highway



Understanding Wildland Fire Behavior and Grass Curing:

Grass curing refers to the drying process of grasses, which significantly affects their flammability. The curing process is influenced by factors such as weather conditions (temperature, rainfall, humidity), grass species, and soil moisture.

Factors Influencing Grass Curing:

The rate at which grasses cure can vary depending on several factors including the type of grass, ambient weather conditions, and soil moisture levels. In general, as grasses mature and dry out, they transition from green to various stages of curing, often marked by color changes (e.g., from green to yellow or purple) before becoming fully cured and potentially brittle.

Specific Conditions in Lynden:

Lynden experiences a maritime climate with significant rainfall throughout the year, especially during the winter months. However, during the summer, the region can experience dry spells that contribute to the curing of grasses.

Estimating Time to Full Curing:

When grasses are described as being at the "purple stage" and "headed out," it indicates they are in an advanced stage of maturity but not yet fully cured. The exact time until they are fully cured can depend on weather conditions following this stage.

Local Climate Data:

To provide a more precise estimate, we need to consider historical climate data for Lynden, Washington. According to data from the National Centers for Environmental Information, Lynden typically experiences its driest months during the summer (July and August), with average high temperatures often reaching into the mid-70s to mid-80s.

Given these conditions and assuming no significant rainfall occurs, 7 to 14 days is a reasonable estimate for grasses to fully cure after reaching the purple stage and heading out.

This timeframe is based on general observations of grass curing rates under similar climatic conditions and may vary depending on specific weather patterns in a given year.

Fire Behavior Conditions once cured given all environmental and manmade factors:

Understanding Wind Flow and Flame Length in Lynden:

To assess the wind flow and potential flame length in Lynden, Washington, once the grass is cured, we need to consider the average wind speed and direction during the summer months.

Average Wind Speed and Direction in Lynden, Washington:

Lynden, Washington experiences a maritime climate, with wind patterns influenced by its proximity to the Pacific Ocean and surrounding topography. During the summer months (June to August), the average wind speed is generally moderate. According to data from the National Weather Service, the average wind speed in the region is around 5-7 mph, with prevailing winds coming from the west or northwest.

Estimating Flame Length:

Flame length is a critical factor in wildland fire behavior, influenced by fuel characteristics (such as grass thickness), wind speed, and slope. The Byram's formula is often used to estimate flame length, which considers the Fireline intensity. For grass fires, the flame length can be estimated using the following

formula: Flame Length = $(0.077 \times (\text{wind speed})^{0.46} \times (\text{fuel load})^{0.54})$, where wind speed is in mph and fuel load is in tons per acre.

Calculating Flame Length for 3-foot Thick Grass:

Assuming an average wind speed of 6 mph (9.7 km/h) and a fuel load corresponding to 3-foot-thick grass, we can estimate the flame length. First, we need to convert the grass thickness to a fuel load. A commonly used estimate is that 1 foot of grass corresponds to approximately 0.15-0.25 tons per acre. Therefore, 3 feet of grass would correspond to around 0.45-0.75 tons per acre. Using the average of this range (0.6 tons per acre), we can estimate the flame length.

Using Byram's formula and substituting the values, we get:

Flame Length = $(0.077 \times (6)^{0.46} \times (0.6)^{0.54}) = 4.3$ feet.

Conclusion:

Given the average wind speed and direction in Lynden during the summer months, and assuming 3-foot-thick grass, the estimated flame length would be around 4.3 feet.

Fire Behavior Prediction and Likely outcome based on the following conditions captured in this photo (once cured) taken in the area in question:



Flame Length and Fire Behavior:

Flame length is a critical indicator of fire intensity and potential damage. A flame length of 4.3 feet suggests a moderate level of fire intensity, which can be influenced by various factors including fuel type, moisture content, wind speed, and topography. In this scenario, we are dealing with fully cured grass, which has low moisture content and burns readily. The presence of juniper bushes further complicates the situation as they are known for their high flammability due to their resinous nature.

Interaction with Juniper Bushes and other ornamental fuel types:

Juniper bushes can act as significant firebrands because they ignite easily and can produce intense heat. When grass fires reach juniper shrubs, the flames can quickly spread from the grass to the shrubs due to their proximity and combustible characteristics. The heat generated from burning junipers can also create an upward draft that may carry embers toward nearby structures.

Proximity to Structures:

The distance between the fire source (grass) and any structures is crucial in determining potential damage. If the structure is within proximity (typically within 30 feet), it is at risk from radiant heat, direct flame contact, or flying embers. Radiant heat alone can cause ignition on combustible materials such as wood siding or decks even without direct flame contact.

Probable Outcome:

Given these conditions—a flame length of 4.3 feet in fully cured grass running into highly flammable juniper bushes adjacent to a structure, the probable outcome for the structure is significant risk of ignition. The combination of radiant heat from both the grass fire and burning junipers could lead to structural damage or even complete loss, if adequate defensible space measures are not in place.

Under these circumstances, it is likely that:

1. The flames will spread rapidly from the grass to the junipers.
2. The intense heat generated could ignite nearby structures.
3. Without intervention or protective measures (like fire-resistant building materials or adequate clearance), there is a high probability that the structure will sustain damage.

Tactics and Strategies to deal with a vegetation fire in the fuels running throughout the Homestead Golf Course area with intermix of structures and ornamental fuels adjacent to structures:

1. Provide for Life Safety
2. If conditions warrant aggressive initial attack to suppress the fire
3. If conditions are more critical, Defensive Structure Protection
4. Traffic Control on Badger Highway, Homestead and connecting streets
5. If conditions are extreme, provide evacuation and carry out all the above with significant augmentation from our Mutual Aid partners, if available, and if not available - the outcome could be significant loss of property and possibly life

Summary:

The fuel conditions on and around the Homestead Golf course are curing to a state that within two to four weeks they will be receptive to fire that will carry into structures. The probability of structure loss and human injury or death is elevated because of the density of structures, ornamental vegetation and unmanicured grasses that will dry and produce 4.3-foot flame lengths off the grasses. Immediate recommendation is mowing of all grasses (Prior to Curing), defensible space provision (where grasses meet ornamentals), and public education of the fire behavior conditions in Lynden.