

# Ten Sleep Public Land – Private Land Interface Hazardous Fuels Mitigation Report

Draft Report



Prepared For:  
Bureau of Land Management,  
Worland Field Office,  
Worland, Wyoming

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**DRAFT**

**TEN SLEEP PUBLIC LAND – PRIVATE LAND INTERFACE  
HAZARDOUS FUELS MITIGATION REPORT**

**BLM WORLAND FIELD OFFICE  
TEN SLEEP ASSESSMENT AREA**

**Prepared for:**

**U.S. Department of the Interior  
Bureau of Land Management  
Worland Field Office  
Worland, Wyoming**

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Figure 1 Fuel Hazard Assessment

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## ACRONYMS

amsl	above mean sea level
ATV	All Terrain Vehicle
BLM	Bureau of Land Management
CRP	Conservation Reserve Program
GIFF	Gateway Interagency Fire Fund
GVW	Gross Vehicular Weight
NFPA	National Fire Protection Association
NRCS	National Resource Conservation Service
NWCG	National Wildfire Coordinating Group
PLPLI	Public Land – Private Land Interface
USFS	U.S. Department of Agriculture, Forest Service
WUI	Wildland-Urban Interface

## 1.0 EXECUTIVE SUMMARY

During the 2000 fire season, more than 6.8 million acres of public and private lands burned, resulting in loss of property, damage to resources, and disruption of community services. Also, during the 2003 fire season, over 4.0 million acres of land burned, resulting in the loss of millions of dollars, homes, and human lives. Many of these fires occurred in the wildland-urban interface (WUI) areas and exceeded fire suppression capabilities. To reduce the risk of fire in the WUI, the President of the United States directed the Secretaries of the Departments of Agriculture and the Interior to increase federal investments in projects to reduce the risk of wildfire in the WUI. To this end, the Bureau of Land Management (BLM), Worland Field Office, is currently in the process of forming partnerships with local governments and private landowners to plan fuels reduction treatments and other mitigation measures targeted at the WUI in the vicinity of federal lands. These partnerships are indicative of a shared responsibility to reduce wildland fire risks to communities.

The WUI occurs where human structures meet or intermix with wildland vegetation. In certain situations, specific actions such as fuels reduction around communities, forestland and rangeland restoration, infrastructure improvements, and public education and outreach may reduce the risk of catastrophic fire in the WUI. As a result, the BLM implemented the Communities-at-Risk, Wildland-Urban Interface Program. The program seeks to reduce the hazard of wildland fires to communities through public outreach, the reduction or prevention of fuel build-up, and by increasing the fire protection capabilities of communities. The Ten Sleep WUI community was selected by the BLM to assess the hazard of wildland fire and to identify specific actions that may reduce the risk. In this report, the WUI concept is not completely accurate for the Ten Sleep assessment area because of the local situation of fuels and structures so, instead, the term public land – private land interface (PLPLI) will be used.

BLM contracted with Dynamac Corporation (Dynamac) to support the assessment of wildfire risk to the Ten Sleep assessment area. Dynamac scientists conducted fuel surveys by categorizing the vegetation, slope, and aspect of the land in the Ten Sleep assessment area. The risk of wildland fire to homes, structures, and cultural resources on private land was also evaluated according to building materials, the presence of survivable space, road access, and the response time of the local fire department. Dynamac assessed the adequacy of the community's service infrastructure (including roads, water supplies, and fire fighting equipment) by systematic observation, and by interviewing community officials and fire prevention personnel.

Two community open-houses were held to disseminate information about the Communities-at-Risk, Wildland-Urban Interface Program to citizens, to afford them the opportunity to identify resources that are of value to the community, and to discuss actions that may reduce the risk of wildland fire. The information gathered from the fuel survey, structural survey, and community profile was integrated into a hazard assessment report and a mitigation report. The following priority action items were identified to reduce the hazard of wildfire in the Ten Sleep assessment area based on the data collected, hazardous conditions observed during the assessment, and the threats posed by fire to the community:

- Secure access, temporary or administrative, to BLM lands in the assessment area and initiate forest health measures combined with fuels treatments. Priority are the forest stands that are rated as Fire Condition Class 3 and the steep draws and ravines of Ten Sleep Canyon.
- Develop a shaded fuel break along the rims on both sides of lower Ten Sleep Canyon within the assessment area.
- Develop a helicopter dipping site within the confines of the Wyoming Game and Fish, Wigwam Fish Raising Station. This action needs to be coordinated with the Ten Sleep Volunteer Fire Department, BLM, Wyoming Division of Forestry, and USFS Bighorn National Forest.
- Continue the ongoing education and outreach program throughout the assessment area to assist homeowners with firewise practices and procedures. Encourage the development of firewise landscaping and construction practices by private landowners. Specifically stress the development of survivable space around structures and the use of Class A roofing material.
- Reduce fuel loading in the riparian corridor of Tensleep Creek.
- Improve BLM Roads 1414, 1415, and 1117 for wildfire suppression vehicle travel. Many stretches of these roads are narrow and/or steep.
- Plan an aggressive wildfire prevention strategy during summer months within the Ten Sleep assessment area.

A public education and outreach program is important to inform and encourage specific actions that will reduce the chances of wildfire damaging structures. The public outreach program received a low priority, not because of low importance, but because it is an ongoing need throughout the assessment area, while the other proposed actions are time and location-sensitive. However, the public education and outreach program may, in the long run, prove to be the most effective in reducing wildland fire in the Ten Sleep WUI assessment area.

## **2.0 GOALS AND OBJECTIVES**

The goals of the Ten Sleep wildfire hazard assessment and mitigation plans are to evaluate the hazards of wildland fire within the assessment area and identify specific actions that could reduce the risks (**Figure 1**). The objectives are to decrease the chances of wildfire spreading from BLM lands onto private lands while, simultaneously, decreasing the risk of wildfire spreading from private lands onto BLM lands, and to protect life, property, structures and other valued resources in the community.

## **3.0 BACKGROUND**

Wildland fire is an integral component of many forest and rangeland ecosystems. In the conterminous United States, before European settlement, an estimated 145 million acres were annually consumed by wildfire. In comparison, considerably fewer acres are currently burned annually due to increased agriculture, urbanization, habitat fragmentation, and fire suppression programs. This change from the historical fire regime to the present day has caused a shift in the native vegetation composition and structure of fire-prone ecosystems, such as some forests and rangelands, resulting in a dangerously high accumulation of fuels. As a result, when wildland fires do occur, they may burn larger and hotter than those in the past and pose an increased risk to human welfare and ecological integrity.

## **4.0 EXISTING SITUATION**

### **4.1 Land use**

The Ten Sleep PLPLI provides homeowners with relatively easy access to numerous recreational activities on private, BLM, and USFS lands in the surrounding environs. The development nearest to the lower Ten Sleep Canyon is the community of Ten Sleep, Wyoming. Occupants of Ten Sleep have numerous recreational opportunities within and near the community, including hunting, fishing, scenic vistas, birding, wildlife observation, all-terrain vehicle (ATV) riding, motorcycle riding, hiking, cross country skiing, snow machine riding, and snowshoeing. There are approximately 42 homes and cabins within the assessment area and the addition of new homes and cabins is a possibility. The main location of structures in the Ten Sleep assessment area is in the lower part of Ten Sleep Canyon along Federal Highway 16. BLM lands border Ten Sleep Canyon to the north and south. USFS Bighorn National Forest land is in close proximity,

along with land holding by The Nature Conservancy. Fire suppression for the area is accomplished by the Ten Sleep Volunteer Fire Department with support from the Worland Volunteer Fire Department on private lands and the BLM and USFS on public lands. Close coordination and communication occurs among these agencies.

The major land uses in the immediate area are livestock grazing and big-game hunting. Livestock grazing occurs on BLM and USFS lands, adjacent State of Wyoming lands, and private land not located within Ten Sleep assessment area. Hunting occurs throughout the assessment area. Tensleep Creek is an important cold-water fishery. Firewood, poles and posts, and commercial timber are forest products obtained within and around the assessment area. Access to BLM lands within the assessment area is limited mainly to BLM Roads 1415, 1414, and 1117 and is restricted mainly to 4-wheel drive vehicles because the roads are deeply rutted, narrow, and steep in places.

There are no Washakie County covenants that require the practices of firewise landscaping or construction. However, the Wyoming Division of Forestry and Ten Sleep Volunteer Fire Department are active in public outreach to encourage firewise practices. The Canyon Creek community near Powder River Pass is incorporating firewise practices. This area may be used as a demonstration to illustrate proper firewise landscaping and construction practices as new construction occurs in the assessment area and to retrofit existing structures.

## **4.2 Fire Behavior and Hazardous Fuels**

Wildland fire has played an important role in the shaping of the forest and range ecosystems of Ten Sleep Canyon. Many of the plant species in the area are adapted to wildfire. For example, aspen stands and lodgepole pine stand are rejuvenated by fire. Forage and browse for big game wildlife are enhanced by fire. Wildfire removes diseased trees, reduces overstocked stands, and encourages vigorous plant growth. Evidence of past fire was observed as the fuel survey was conducted.

The main ignition source of fire in the assessment area is lightening. Lightening may strike a tall ponderosa tree and spread to surrounding vegetation such as juniper or sagebrush. The chance of its spread and rate will depend on factors such as fuel abundance, fuel moisture content, and fuel proximity to the burning tree. Predicting the behavior of wildland fire, such as rate of speed, intensity and potential damage to human values and ecological resources is difficult because

many factors have to be considered. Factors such as weather (recent precipitation, humidity, wind, air temperature), terrain, fuel type (grass, forest) and condition (succulent grasses, curd grasses, healthy trees, diseased trees), and structure construction materials and landscaping all interact to determine the rate of spread and intensity that a fire will burn. Recent climate conditions such as annual precipitation are important. For example, if long-term drought conditions are present, then both small- and large-sized fuels will readily burn, causing intense, fast-moving fires. This situation will be exacerbated on steep slopes with a strong wind. Short-term drought conditions may cause only small fuels to be dry and fires will burn slower and be less intense than if the larger fuels are in a condition to readily burn. Wildland fires in areas where structures occur only compound the situation because the potential for loss of property and human lives is high. Structures provide fuel to wildfires, especially if fire resistant construction materials are not used.

With this in mind, it is difficult to predict wildland fire behavior with the Ten Sleep assessment area. Generally fire will burn upslope unless wind strength is sufficient to move it downslope. A review of wind patterns for the general area did not suggest that this condition would occur. However, in the Ten Sleep Canyon or narrow ravine, wind strength could be sufficient to move fire downslope. However, catastrophic fire can be expected in the assessment area because of the buildup of fuel and the numerous steep ravines, chutes, and canyons. The current drought exacerbates the situation. A fire that is started on the Ten Sleep Canyon rim or at higher elevations would be expected to burn upslope away from the structures along Highway 16. However, firebrands could be carried by wind onto the structures in the Canyon, causing them to ignite. If a fire started in Ten Sleep Canyon, structures would be at greater risk from both conductive and convective ignition than if the fire occurred on the Canyon rim or higher elevations on Brokenback. Tensleep Creek or Canyon Creek are not of a sufficient size to serve as firebreaks.

The dominant hazardous fuels in the assessment area are the overstocked ponderosa pine and juniper stands with saplings as ladder fuels that occur on lands in the Ten Sleep assessment area and on private lands. Also, the dead and dying ponderosa and limber pine trees from insect and other diseases exasperates the buildup of hazardous fuels. Sagebrush/grass fuels may present hazardous fuel conditions in late summer and fall as foliage losses moisture content. Resistance to control in the sagebrush/grass fuel will not be as great as in the conifer fuel-type areas; however, if wind and slope combine adequately, rates of fire spread and intensity will increase exponentially.

The conifer fuel types will exhibit a high resistance to fire control and make initial attack difficult when fire danger ratings are high combined with low relative humidity and fuel moisture, and a high Haines index. Continuous fuels, downed, dead, woody material, ladder fuels (seedling and saplings), and standing dead (snags) or dying trees will enable torching, crowning out, and spotting. Observed stand density on some slopes will enhance the possibility of a crown fire. Wildfire in the conifers of Ten Sleep assessment area will be topographically influenced in combination with fuels and wind. The possibility of ignition in both conifer and sagebrush/grass fuel types is high. The main source of ignition is lightening strikes. However, human-caused fires will probably increase with an increasing population. The fuels assessment area includes numerous topographic features that will increase rates of spread, and allow fires to “roll out” beneath fire fighters or spot over roads (steep slopes, draws, and chutes). With present fuel loading and windy conditions, existing roads should not be relied upon as fire breaks.

### 4.3 Hazardous Fuel and Structure Assessments

A companion report to this volume, the Hazard Assessment Report for the Ten Sleep assessment area, presents and summarizes data for fuel and terrain conditions for the forest polygons that were assessed. These data are also summarized briefly, below. Classes A, B, and C refer to low, moderate, and high hazard conditions, respectively. The main points of the fuels survey are as follows:

- **Slope:** 26% of the forest polygon areas that were surveyed occur on slopes less than 10% (Class A), 69% of the area occurs on moderate slopes of between 10 to 30% (Class B), and 5% of the area occurs on slopes greater than 30% (Class C).
- **Aspect:** 18% of the forest polygon areas have northern exposures (Class A), 10% occurs on east facing slopes (Class B), and 72% of the area has southern and western exposures (Class C).
- **Elevation:** The majority (98%) of the forest polygon areas that were surveyed occur at elevations above 5,500 feet amsl (Class C), while the remaining 2% occur at elevations between 3,500 and 5,500 feet amsl (Class B).
- **Fuel Type:** 26% of the surveyed forest polygons that were surveyed have light fuels (Class A), 23% have medium fuels (Class B), and 51% have heavy fuels (Class C).

- **Fuel Density:** 68% of the forest polygons that were surveyed have light, non-continuous fuel loading (Class A), 27% have broken, moderate fuels (Class B), and 5% have a heavy, continuous fuel bed conducive to crown fires and high intensity surface fires (Class C).
- **Fuel Bed Depth:** 57% of the forest polygons have fuel bed depths of less than 1 foot (Class A), 40% have fuel bed depths of 1 to 3 feet (Class B), and 10% have fuel bed depths of over 3 feet (Class C).
- **Fire Condition Class:** 43% of the forest polygons that are surveyed were in Condition Class 1 (stand composition and structure are functioning within their historical range), 48% are in Condition Class 2 (stand composition and structure have been moderately altered from their historical range), and 9% are in Condition Class 3 (significantly altered).

A second component of the Hazard Assessment was to characterize structures in the assessment area for structure density, building materials, proximity to fuels, presence of a survivable space, and roads/accessibility. The assessment area was evaluated for structures such as homes or buildings, which occurred on private land within one mile of public land. Approximately 42 structures are located in the lower Ten Sleep Canyon, lower Canyon Creek, and the higher elevations of Brokenback. Class A, B, and C, refer to low, moderate, and high hazard situations, respectively. The main points of the structural survey are as follows:

- **Structure Density:** 33% of the sections have at least one structure per 0-5 acres (Class A), 8% have at least one structure per 5-10 acres (Class B), and 58% of the sections have less than one structure per 10 acres (Class C).
- **Flammable Fuel Proximity to Structures:** 17% of the sections contain structures with flammable fuels greater than 100 feet from structures (Class A), 17% of the sections are determined to have flammable fuels between 40 and 100 feet of structures (Class B), and 67% of the sections contain structures less than 40 feet from flammable fuels (Class C).
- **Predominant Building Materials:** 58% of sections contain structures where the majority have fire resistant roofs and/or siding (Class A), 8% of the sections have 10-50% of the structures with fire resistant roofs and/or siding (Class B), and 33% of the sections are determined to have less than 10% of their structures featuring fire resistant roofs and/or siding (Class C).
- **Survivable Space:** 42% of the sections contain a majority of homes with improved survivable space around property (Class A), 33% have 10-50 % of the homes with a sufficient survivable space (Class B), and 33% have a majority of homes with insufficient survivable space around the property (Class C).

- **Roads:** 37% of the sections contain wild loop roads that are maintained, paved or solid surface with shoulders (Class A), 8% of the sections have roads that are maintained but are narrow with no shoulder (Class B), and 58% contain roads that are narrow, and/or single lane, minimally maintained, with no shoulder (Class C).
- **Response Time:** There were no sections in the assessment area with a response time of 20 minutes or less (Class A), response times in lower Ten Sleep Canyon are 20-40 minutes (Class B), and response times in the more northerly portions of the assessment area are greater than 40 minutes (Class C).
- **Access:** There are no sections in the assessment area with multiple entrances and exits that are well equipped for fire trucks with turnarounds (Class A), 8% of the sections have limited access routes with two ways in and out and moderate road grades (Class B), and 92% of the sections have narrow, dead end roads or one way in and out, and steep grades (Class C).

Overall risk is high in many sections not only because of the long response times, but also because of the narrow and steep roads (BLM Roads 1414, 1415, and 1117) that will limit access by fire suppression equipment. Two sections received overall hazard ratings of high (T47N, R87W, Sec. 5, and T48N, R87W, Sec. 3). Another seven sections received moderate wildfire hazard ratings and three sections received a low hazard rating. For lower Ten Sleep Canyon specifically, Section 1, T47N, R88W was rated low hazard, Section 6, T47N, R87W was rated moderate, and as stated above, Section 5, T47N, R87W was rated high. This indicates a trend of a hazard increase moving up the canyon from west to east in the assessment area.

## 5.0 COMMUNITY VALUES AND DESIRED CONDITION

Lives, homes, property, terrestrial and aquatic wildlife habitat, recreation, possible historic/cultural sites, livestock grazing, soil stability, watershed protection, water quality, air quality, and timber are the values that are at risk to wildfire within the Ten Sleep assessment area. A catastrophic wildfire in the assessment area would put at risk these values. Economic impacts would include a reduction in livestock grazing and hunting until grazing land and big-game habitat improved, which could be upward of 5 years. Health issues such as decreased air quality and water quality are important. Air quality in the immediate area and downwind would be reduced from smoke during and immediately after a fire. Water quality could be reduced for several years until vegetation is sufficient to filter sediments from entering streams. Emergency rehabilitation efforts will be necessary to re-establish vegetative cover to reduce soil erosion and protect water quality.

The BLM-administered assessment area is bordered by a mosaic of lands, much of which is privately owned by individuals, the Nature Conservancy, the United Methodist Church, and Wyoming Game and Fish. The United States Forest Service administers much of the land immediately east of the assessment area. There are also two sections of state-owned land within the assessment area.

Based on the interviews with community officials, discussions during the public meetings, and survey form responses, Dynamac ascertained that the following high-priority actions should occur in the Ten Sleep assessment area:

- Continue the cooperation among BLM, USFS, and Wyoming Division of Forestry, Washakie County, and private landowners concerning wildland fire and forest health issues. A memorandum of understanding or similar agreement between the BLM Worland Field Office and the USFS Bighorn National Forest to improve forest health and fuels issues in the Ten Sleep assessment area would provide for increased effectiveness in planning and completion of required regulatory documents while decreasing federal duplication of work. This type of teamwork and coalition building between Federal, State and County agencies are supported by the National Fire Plan. The Southwest Fuels Project that is currently being planned may be a step to achieve improved cooperation and collaboration among agencies.
- Reduce diseased timber and fuel loadings on public and private lands within the assessment area. The development of partnerships among private landowners, BLM, USFS, and Wyoming Division of Forestry is necessary to achieve this goal.
- Construct shaded firebreaks along the canyon rims of lower Ten Sleep Canyon within the assessment area. Also, reduce the buildup of hazardous fuels in ravines, draws, and chutes of the steep canyon walls and along the riparian corridor of Tensleep Creek to inhibit fire from moving from the canyon to higher elevations.
- Improve BLM Roads 1414, 1415, and 1117 for wildfire suppression vehicle travel.
- Develop a helicopter dipping site within the confines of the Wigwam Fish Raising Station.
- Continue the distribution of firewise educational materials to residents in order to promote knowledge and understanding in implementing proper firewise activities such as landscaping, use of fire resistant building materials, proper access roads, and emergency evacuation procedures. Develop partnerships with private landowners to reduce hazardous fuels within the PLPLI.
- Maintain wildlife habitat and scenic quality of the assessment area.

## 6.0 NEED FOR ACTION

Wildland fires have occurred in the assessment area. Ignition usually results from natural causes such as lightening, although human-caused ignition potential is high. The potential for human caused fires will become greater as the population in the area continues to increase. The current hazard of wildland fire is very high because of the buildup of standing dead, dying, and diseased trees; semi-continuous, heavy, downed, dead, woody material; ladder fuels; canopy spacing; topography in conifer forest stands; and the close proximity of fuels to structures, especially in the lower Ten Sleep Canyon. Evidence of past stand-clearing fires was found during the fuel survey.

Wildland fire risk is increased due to forest health issues, such as infestations of various parasites in the conifers that result in standing dead, red-needled, or dying trees. High canopy densities, combined with even age conifer stands, and heavy loadings of downed, dead, woody material yield minimal vegetative biodiversity. This scenario, combined with steep ravines, draws, and slopes will enable the propagation of fast-burning, intense crown fires. Fuel loadings, private home placement, and adjacent public lands in the assessment area combine to produce a high potential for catastrophic wildfire occurrences.

Both general and specific actions are needed to mitigate the wildland fire risk, improve forest health, and enhance vegetative diversity. General actions include the adherence to firewise practices within the assessment area and continued public outreach. Specific actions include the development of a shaded fuel break along the north and south rims of Ten Sleep Canyon. The removal of ladder fuels, dead and dying trees, and tree thinning in forest stands rated as Condition Class 3, along the steep slopes of the Canyon walls and the riparian corridor of Tensleep Creek, as appropriate. The development of a helicopter dipping site within the confines of the Wigwam Fish Rising Station is recommended.

The vegetation growing around structures and along roads needs to be maintained at an acceptable level. The recommended firewise distance to achieve a survivable space is a minimum 30–40-foot perimeter around a home or structure with a greater perimeter as slope increases. The survivable space perimeter should be properly landscaped with fire-resistant vegetation. Prescribed methods to maintain the vegetation are the use of hand crews, mechanical removal or herbicidal treatments (limited use). All vegetation removed should be piled and burned under carefully controlled conditions or transported to a designated landfill or

composting facility. There are numerous instances where ponderosa pine, juniper, and Douglas-fir trees are growing close to structures. A professional arborist should carefully remove these trees or remove limbs that hang over structures or that are within 30 feet of the ground.

Flammable vegetation such as sagebrush also needs to be removed within the survivable space. In addition, wood piles and propane tanks should be placed at least 30 feet from structures. Class A roof materials and fire retardant building materials are essential. These firewise practices are general, but long-term in nature, because they require continual adherence to reduce the hazard of wildfire.

The reduction of hazardous fuels within the assessment area is critical to reducing the threat of fire. The construction of a shaded fuel break along both rims of Ten Sleep Canyon within the assessment area is a high priority. The purpose of the wide fuel break is to reduce the chance of firebrands igniting spot fires or blowing down on the structures in the Canyon in the event of a wildfire on the rim. To reduce the chance of fire from spreading, the fuel break should be approximately 300 feet wide, including the removal of ladder fuels and tree canopy and shrub spacing of 20–30 feet. Fuel removal near the rim should be more intense than in areas away from the rim.

There are several forest stands on Brokenback, Sand Draw, and lower Canyon Creek that are rated as Condition Class 2 or 3 because of the buildup of overstocked tree growing conditions, dead and dying tress, and the accumulation of woody debris (Figure 1). Condition Class 3 stands should receive higher priority. These stands need projects to reduce the amount of hazardous fuels within them. Mechanical and prescribed fires are recommended to achieve the desired condition for these stands. Flammable fuels should be reduced in overstocked conifer stands on BLM, USFS, and private lands. Diseased and dying trees should be designated for removal. Commercial tree thinning and tree removal using horse logging and light mechanical methods will need to be employed to successfully mitigate forest health issues and reduce the buildup of hazardous fuel loadings and ladder fuels in mixed conifer stands. Projects funded by the Interagency Joint Fire Sciences program have indicated that thinning alone will reduce possible crown fires for 15 to 20 years whereas thinning combined with selective tree removal will reduce crown fire possibility significantly for over 50 years. A “no action” decision would exacerbate the current fuel loading problem, increase forest health problems, increase potential wildfire intensity and severity, and increase risk potential for home owners. The expected results of thinning, removal, piling and burning, and shaded fuel breaks will increase forest floor vegetative diversity and improve wildlife habitat. Scattered large standing dead trees may be left

on-site as raptor perches and possible nest areas. Once accomplished, these actions will improve forest health and decrease the risk that wildfire will evade initial suppression tactics.

The Ten Sleep assessment area is in need of a reliable, permanent helicopter dipping site. Water sources for dipping include Ten Sleep Creek, Canyon Creek, and area ponds, however, these sources can be limited, especially during the fire season. A permanent dipping site should be developed at the Wigwam Fish Raising Station by either using the settling pond or Creek Pond. Water flow to these two areas is reliable and has a sufficient flow rate. The Station Director is amenable to developing the dipping site.

Consideration is needed to improve road conditions within the assessment area. The only two paved roads are Highways 16 and Canyon Creek Road. These roads are sufficient for carrying emergency vehicles. However, the other roads in the assessment area, such as BLM Roads 1415, 1414, and 1117, are composed of dirt and gravel and have steep, narrow grades. In many places, the steep and narrow roads will inhibit firefighting equipment from rapidly accessing the assessment area. These roads should be inspected and proper actions should be taken to improve emergency vehicle access and evacuation travel.

## **7.0 METHODOLOGY TO DEVELOP MITIGATION PLAN**

The mitigation actions proposed herein for the Ten Sleep assessment area are based on information acquired from fuel and structure surveys, public meetings, and interviews of community officials. The majority of information presented in this report was gathered during May 2004.

The fire hazard assessment area was defined by BLM. The BLM requested fuel survey points and forest polygons in the assessment area to be evaluated by Dynamac (Figure 1). Dynamac field crews collected information on forest health, forest-stand composition and structure, and hazardous fuel information. Additionally, a fire hazard assessment was completed which rated the hazards posed by topographic characteristics and fuel sources of the area. The rating elements included slope, aspect, elevation, fuel type, fuel density, and fuel bed depth, and were assigned a risk category of low, medium, or high, as defined by BLM.

Dynamac staff also collected information on the flammability and defensibility of structures on private land located within one mile of public land within the assessment area. The structural

hazard assessment rated the structures, building materials, and the distance of flammable fuels to the structures located within a section. The rating elements included structure density, proximity of flammable fuels to the structures, building materials, survivable space, type of roads, response times, and access. Each element was assigned a low, medium, or high hazard category based on rating criteria defined by BLM.

A public meeting was convened on November 4, 2003 at the Senior Center, Ten Sleep, Wyoming. The community was invited to attend through newspaper articles in the local papers, radio announcements, and flyers posted in public places. Dynamac, BLM, USFS, State of Wyoming Forestry Division, local fire chiefs, and citizens attended the public meeting. The purpose of the meeting was to discuss the goals of the project, provide firewise brochures, obtain information from the community on hazardous fire situations and desired conditions, and to be an informational resource to those attending the meeting. The Dynamac Community Relations Specialist conducted interviews with numerous local public officials and residents. Individuals or groups interviewed include the county fire warden, emergency management director, county sheriff, USFS, and State of Wyoming Forestry Division employee(s), and local residents.

A second public meeting was convened July 20, 2004, at the Ten Sleep Senior Center to review the findings of the risk assessment and to present proposed mitigation projects to reduce the risk of fire in the assessment area. Public officials and citizens were invited to the meeting through newspaper articles, radio announcements, flyers in public locations, and personal invitation. The main goal of the meeting was to discuss the proposed mitigation projects and allow the public a chance to provide information that may have been overlooked in the hazard assessment process. Information on firewise practices and fire ecology was also provided to the participants.

## **8.0 ACTIONS AND METHODOLOGY**

The proposed projects and their priority are based on information obtained from the fuel and structure surveys, community meeting, and interviews of agency personnel. The following specific action items, in order of priority, were identified to reduce the hazard of wildfire in the Ten Sleep assessment area:

- Continue the cooperation among BLM, USFS, and State of Wyoming, Washakie and Bighorn Counties, and local residents concerning wildland fire and forest health issues.  
Initiate a memorandum of Understanding with BLM and USFS, addressing the forest health

and fuels planning issues in the assessment area. Continue to develop the Southwest Fuels Project.

- Continue public outreach and education efforts, such as the use of firewise landscaping, the use of fire resistant building materials, proper road access, and evacuation procedures.
- Create 300-foot shaded fuel breaks on both the north and south rims of lower Ten Sleep Canyon in the assessment area.
- Develop a comprehensive fuels reduction plan for the assessment area that will reduce diseased timber and fuel loadings on public and private lands in the assessment area. High priorities are the forest stands that were rated to be in Condition Class 3 and the steep walls of Ten Sleep Canyon. Secondary priority is the forest stand rated to be in Condition Class 2.
- Reduce the buildup of fuels and diseased trees on private lands, along roads, and near homes within the assessment area.
- Develop a helicopter dipping pond in the Wigwam Fish Raising Station.
- Improve BLM Roads 1415, 1414, and 1117 for fire suppression vehicle travel.
- Maintain wildlife habitat and scenic quality of the assessment area.

The locations of the proposed forest health, fuel reduction projects, and fuel breaks are illustrated on **Figure 2**. These projects are proposed because of the impact they would have on reducing the hazard of wildland fire in the Ten Sleep WUI assessment area. The fuel survey and visual examination of the assessment area demonstrated the widespread occurrence of overstocked mixed conifer stands. Residents that attended the community meetings are in favor of reducing the buildup of hazardous fuels in the assessment area, increasing water sources, and the construction of fuel breaks. Also, all agencies that were interviewed stressed the need to reduce fuel loads throughout the assessment area.

The structure survey identified a lack of firewise practices associated with structures in each section. Therefore, a public education and outreach program should continue to inform and encourage specific actions that will reduce the chances of wildfire damaging structures. The public outreach program received the lowest priority, not because of low importance, but because it is an ongoing need throughout the assessment area, while the other proposed actions are time and location-sensitive. However, the public education and outreach program may, in the long run, prove to be the most effective in reducing wildland fire in the Ten Sleep WUI assessment area.

## 8.1 Shaded Fuel Break and Forest Health Treatments

The USFS and BLM are partners in a nationwide fuels reduction and forest health project. The Ten Sleep assessment area is of primary importance to these agencies and to the State of Wyoming. One of the objectives of the project is to reduce the buildup of hazardous fuels and improve forest health. The BLM, USFS, and private landowners may choose to enter into agreements to reduce the accumulation of hazardous fuels in the assessment area. In addition, BLM and private landowners, through a partnership, may choose to have BLM construct shaded fuel breaks that are maintained by Ten Sleep residents. Sections 1 and 12 (T47N R88W), and Sections 5 and 6 (T47N R87W), where BLM land is adjacent to private land (Figure 2), are recommended for shaded fuel breaks. Associated with the fuel breaks is the reduction of fuel within the steep draws and ravines of Ten Sleep Canyon and the riparian corridor of Tensleep Creek, as appropriate, to inhibit fire from moving between the Canyon and the higher elevations. Forest health projects include the removal of diseased and overstocked trees by thinning and selective removal.

High priority fuel reduction projects are (1) a shaded fuel break to be developed on the north and south rim of the lower Ten Sleep Canyon within the assessment area; and (2) fuels reduction in forest stands that are rated Condition Class 3. The shaded fuel break is a higher priority than the fuels reduction projects.

The shaded fuel breaks will occur on both rims of the lower Ten Sleep Canyon with a recommended distance of 300 feet. The extensive fuel break will greatly decrease the chance of firebrands from blowing into the canyon and igniting structures and spot fires when fire occurs above the canyon. Shaded fuel breaks are areas where understory trees and large shrubs are removed to create an area relatively free of midlevel fuel. Grasses, forbs, and low-flammable shrubs may be left to control soil erosion. Certain trees may also be left in the fuel break for aesthetic appeal. Trees that are left in the fuel break should have limbs removed to as high as is practicable (10 to 20 feet) from the ground. The vegetation can be removed in the fuel break through the use of hand crews, mechanical treatment, and/or limited herbicide treatments. Excessive vegetative litter should be piled and burned or removed.

Forest Health treatments consist of removal of ladder fuels to encourage fire to stay at ground level and not “crown out” in the forest stands. Also, tree densities need to be decreased to levels where tree crowns are approximately 20 to 30 feet apart. Dead and diseased trees need to be

removed. Also excessive downed woody debris needs to be removed. Two to three dead trees (snags) and downed wood per acre should be left to enhance wildlife habitat.

Commercial thinning, prescribed fire, and selective mechanical treatments, combined with piling and burning, are proposed to improve forest health and reduce the amount of flammable vegetation in the forest stands rated Condition Class 3 and along Ten Sleep Canyon walls. The appropriate treatment for a given forest stand will depend on stand type, slope, aspect, associated vegetation, and other factors. The proposed treatment area includes all the BLM-administered acres. Steep slopes, springs, seeps, and riparian areas will require specific planning and consideration. The treatments could be implemented in multiple phases over a time period of four to six years. After the Condition Class 3 stands have been treated, work can proceed to Condition Class 2 forest stands.

Action is a necessity in the assessment area. A “no action” decision will result in additional diseased, dying, and dead trees while simultaneously increasing dead fuel loading and potential fire intensity and severity.

**Locations of Fuel Breaks and Forest Health Treatments:** Sections 1 and 12 (T47N R88W), and Sections 5 and 6 (T47N R87W), where BLM land is adjacent to private land (Figure 2), are recommended for shaded fuel breaks. Based on ownership, the BLM and private landowners would be responsible for approximately 75% and 25%, respectively, of the fuels reduction treatments. An appropriate split of construction and maintenance between the BLM and private landowners is reasonable for the firebreaks, which would depend on agreements reached through partnerships.

**Project Timing:** BLM generally schedules projects in the following manner: Year One is the year during which identification and justification of projects occurs, treatment objectives are determined, and field surveys begin. In Year Two, projects that require compliance with the National Environmental Policy Act (NEPA) are planned, analyzed, and designed; projects that do not require NEPA compliance begin implementation. In Year Three, NEPA projects begin implementation. All steps are contingent on available funding. In Year Four, post-treatment monitoring begins. The fuel breaks are high priority and should be initiated during spring 2006. Planning forest health and fuels thinning, removal, piling, and burning should be initiated during winter 2006. These efforts will require considerable public input and cooperation, and the timing may depend on funding and federal clearances.

**Project Necessity:** The combination of fuel breaks and fuel reduction has been shown to be an effective means by which communities can reduce the risk of wildland fire. Forest health issues (standing dead, dying, diseased trees) will continue without action, yielding increased potential wildland fire and WUI problems and forest degradation. A “no action” decision would exacerbate the current fuel loading problem, increase forest health problems, increase potential wildfire intensity and severity, and increase risk potential for homeowners, while at the same time decrease areas of forage for wild ungulates and decrease adequate habitat for other wildlife.

A solid assessment of specific hazards and threats to a community has helped to identify problems and solutions for both federal and private landowners, and has offered opportunities for partnerships and agreements. The risk of wildland fire losses would be reduced for approximately 42 existing homes and cabins in the assessment area. Also, the projects would improve overall forest health, wildlife habitat, watershed quality, recreational opportunities, and aesthetic quality.

## **8.2 Helicopter Dipping Site**

**Improve Water Supply Capabilities:** The assessment area has few ponds and streams for drafting of water by fire equipment, but additional capability is needed and water distribution needs to be improved. However, helicopter dipping sites are limited in the assessment area. The Wigwam site would provide a constant, reliable water source for a dipping pond.

**Locations of Water Storage Facility:** A dipping site can be developed at the Wigwam Fish Raising Station to rectify this situation. The Station is revamping its pond system this summer and this would offer an opportunity to develop a dipping pond such as the settling pond, which water is directed through before it is returned to Ten Sleep Creek. The Settling pond is devoid of fish and therefore fish capture in the dipping bucket would not be an issue. The Wigwam Fish Raising Station is also a source of water to re-fill tankers.

**Project Timing:** This dipping point would be available immediately based on developing a Memorandum of Understanding among the BLM, USFS, and the Wyoming Game and Fish Department.

**Project Necessity:** Readily available water sources have been shown to be effective in reducing the risk of wildland fire, especially in areas where structures are located. The assessment of

specific hazards and threats to a community has helped to identify problems and solutions for both State, County, federal and private landowners, and offers opportunities for partnerships and agreements. Approximately 42 structures within the Ten Sleep assessment area would have reduced risk from wildland fires as a result of the mitigation actions.

### **8.3 Community Education and Outreach**

**Purpose of Public Education and Outreach:** The purpose of the community-wide education program is to (1) educate the public of the dangers of wildfire in the area with aggressive prevention measures during summer months; (2) urge residents to take responsibility in reducing the risk of wildfire and to create defensible space around their residence; and (3) increase awareness of the natural role of fire in ecosystems and the benefits from removal of overstocked trees. The public education and outreach program should be co-sponsored by the BLM, USFS, Washakie County, and the Ten Sleep Volunteer Fire Department through a partnership agreement.

**Outreach Occurrence:** An annual “Firewise Clean-Up Week” is one tool that is recommended to encourage residents to create defensible and survivable space around their residence. In conjunction with the Firewise Clean-Up Week, specific demonstration projects may be designed and utilized to educate residents about longer-term investments they could make to increase fire safety. The clean-up week would occur in conjunction with public demonstrations, education programs, and speakers on wildfire and firewise practices.

**Outreach Timing:** The annual “Firewise Clean-up Week,” education program, and public demonstrations would likely be most effective in the spring or early summer to remind people to prepare their properties for the coming fire season.

**Outreach Necessity:** Citizen involvement in wildfire mitigation in and around communities is a necessary element for success. Public education and outreach is an effective means of engaging the public in the process of reducing risks to a community, can help identify problems and solutions for both federal and private landowners, and offer opportunities for partnerships and agreements. Such education and outreach has been shown to motivate homeowners to incorporate firewise measures around their individual properties, thereby contributing to the reduction of wildfire hazards in a community. Further, a community education and outreach

program would help identify problems and solutions for both federal and private landowners and offer opportunities for partnerships and agreements.

## **9.0 ROLES AND RESPONSIBILITIES**

The PLPLI planning and mitigation process within the Ten Sleep assessment area is a community effort consisting of the BLM Worland Field Office, USFS Bighorn National Forest, Wyoming Division of Forestry, Wyoming Division of Game and Fish, The Nature Conservancy, Ten Sleep Volunteer Fire Department, Washakie County, and private landowners. Partnerships among these stakeholders are essential to plan for fuels reduction and other actions to reduce the threat of wildfire. Fire does not respect administrative boundaries and, therefore, it is essential that all entities cooperate on projects to maximize effectiveness. This collaboration requires a strong joint effort and stakeholder commitment. The BLM needs to take the lead in all collaborative efforts, but strong support from the USFS and The Nature Conservancy is needed because of their adjoining lands. For example, to incorporate the proposed shaded fuel breaks on the Canyon rims and to improve forest health throughout the assessment area, cooperation between BLM, USFS, and The Nature Conservancy is important. BLM and private landowners will need to develop partnerships because the fuel breaks will occur on both BLM and private land. BLM should take the lead in developing this partnership with private landowners. Consultation with the Wyoming Division of Game and Fish is necessary to minimize impact to wildlife habitat and special status species. BLM will need to also develop a partnership with the Wyoming Division of Game and Fish to develop the proposed helicopter dipping site on the Wigwam Fish Raising Station property. This effort will greatly improve water accessibility for fire suppression on BLM, USFS, Wyoming State Land, and private land within the assessment area and the surrounding lands. BLM needs to take the lead in this effort, with consultation with the USFS. Finally, the Ten Sleep Volunteer Fire Department, in cooperation with Washakie County, needs to take the lead on continued community outreach. This effort is essential to reduce the direct threat of wildfire to homes and structures. Owners need to realize their role in protecting their property from wildland fire by the implementation of firewise landscaping and construction practices.

## 10.0 POTENTIAL SOURCES OF FUNDING

Potential funding sources should be coordinated with Washakie County, State of Wyoming Forestry Division, BLM, and USFS. Potential funding sources include, but are not limited, to the following:

- Volunteer fire assistance: Assistance is funded 50/50 by USFS grants to State Foresters.
- Federal Excess Property: USFS equipment loan to State Foresters. Recipients include State Forestry Programs and Volunteer Fire Services.
- Economic Action Programs (EAP): A USFS, State, and Private program that can assist in diversification for uses of forest products, including utilization of hazardous fuels byproducts; 80% federal funding, 20% nonfederal funding (<http://www.fs.fed.us/r3/spf/community/>).
- Assistance to Fire Fighters: The FEMA and U.S. Fire Administration Program can improve fire fighting operations, services, and equipment; 90% federal funding, 10% nonfederal funding ([www.usfa.fema.gov](http://www.usfa.fema.gov)).
- Pre-Disaster Mitigation Program: A FEMA program delivered through the state's emergency management agency to be used for emergency management and assistance to local governments to develop all hazard mitigation plans.

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Video: Firewise Landscaping, Part 1-Overview.

Video: Firewise Landscaping, Part 2-Design and Installation.

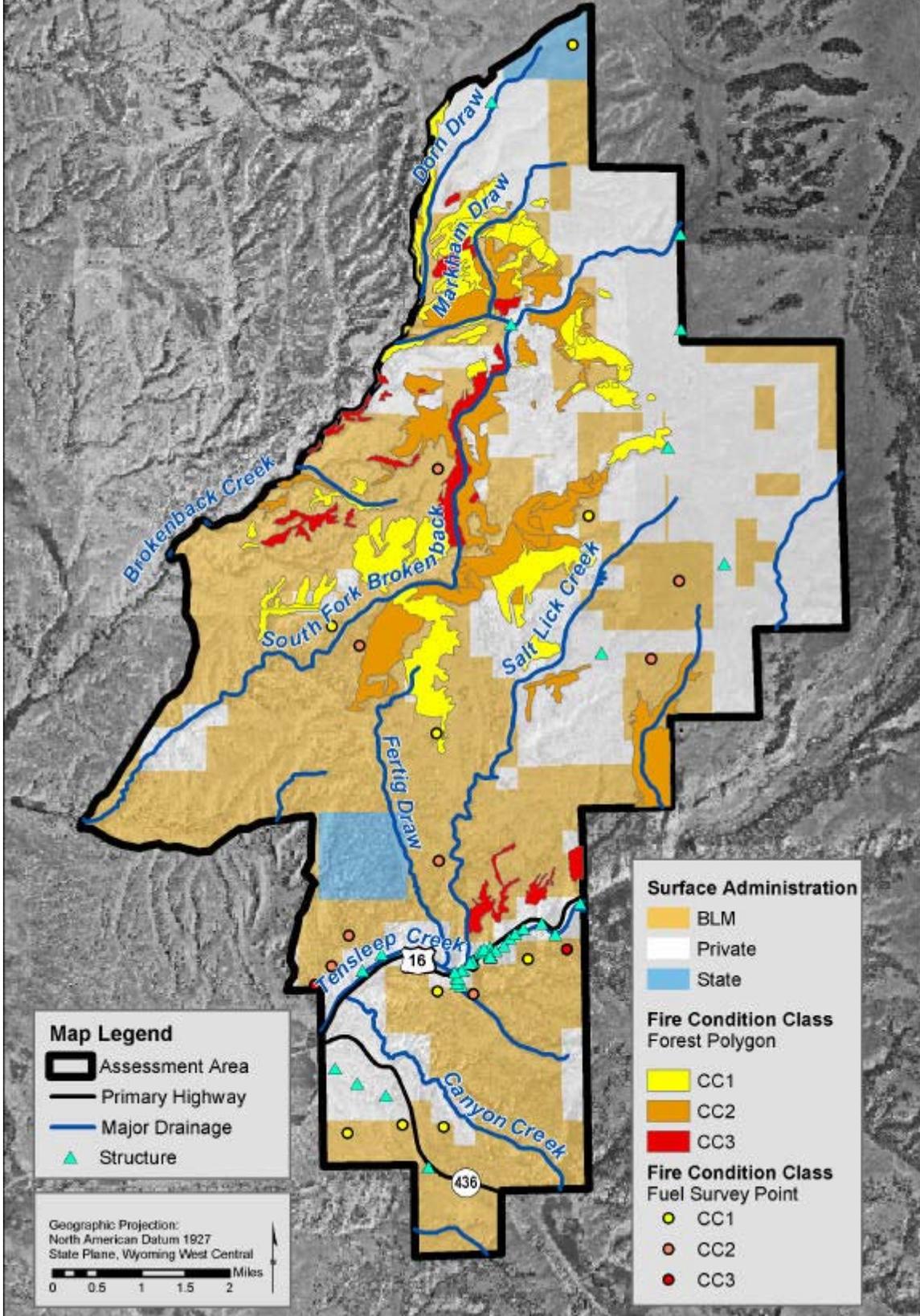
Video: Firewise Landscaping, Part 3-Maintenance.

Video: Wildfire Control--An Introduction for Rural and Volunteer Fire Departments.

Video: The Meeting: Fire Protection Planning in the Wildland/Urban Interface (1991).

## Appendix: Maps

Figure 1 - Fuel Hazard Assessment



**Map Legend**

- Assessment Area
- Primary Highway
- Major Drainage
- Structure

Geographic Projection:  
 North American Datum 1927  
 State Plane, Wyoming West Central

0 0.5 1 1.5 2 Miles

**Surface Administration**

- BLM
- Private
- State

**Fire Condition Class Forest Polygon**

- CC1
- CC2
- CC3

**Fire Condition Class Fuel Survey Point**

- CC1
- CC2
- CC3

Figure 2 - High Priority Mitigation Projects

