Management Of Wildlife, Fuels And The Urban Interface: A Compatible Or A Combustible Situation?

G.M. Sitter[1], S. Hayner[2] & Joe Foran[3]
[1] Bureau of Land Management, Montana State Office
[2] Bureau of Land management, Klamath Falls Field Office
[3] Bureau of Land Management, Klamath Falls Field Office

Abstract

People choose to live in a general area for any number of reasons. Many factors influence the selection of a home site. People generally consider sites with reduced snow depth, better accessibility, more favorable weather conditions, and proximity to water such as streams or lakes.

Historically these sites also contained the most wildlife. During critical wintering periods, wildlife move to areas where forage is more available and temperature and weather conditions are more tolerable. In many cases this means a shift to lower elevations or riparian areas. In areas that receive abundant snowfall during the winter, southern exposures are preferred where sunlight can reduce snow depths and forage is more accessible. These areas tend to dry out faster in the summer and are more prone to fires. Fire generated shrub species are often the preferred forage of big game. Wildlife have adapted to the frequent fires and the resulting vegetation.

When people build their homes within the urban interface, they have generally resisted the use of prescribed fire or vegetation management activities near their homes. People don't like disturbed areas in their backyard. Planned projects take longer due to the long process of explaining to everyone why there is a need, what the benefits are and what it will look like when completed. Agencies often prefer to avoid the conflicts and work on projects elsewhere. This lack of management allows vegetation communities to mature unnaturally without disturbance and allow overcrowding of vegetation which increases stress to the plants; . . . which increases the risk of disease or mortality; . . . which increases fuel loads . . . which makes these areas more susceptible for wild fire.

Fuels management too often only considers the reduction of fuels. For example, uniform fires or total elimination of vegetation in the area do reduce the fuels and the long term risk of wildfire. However they may ignore the important wildlife component.

Wildlife biologists have also been guilty of over simplification taking the easy route in their approach to fuels treatments. We have developed guidelines or screens for each species to 'protect' the habitat from the fuels treatments. (Example – bald eagle guidelines call for no disturbance within ¼ mile of nest site, protect all trees greater than 11 inches diameter at breast height – DBH, etc.). This quick fix method discourages a site-specific treatment for these special habitats.

Fire and wildlife evolved together and fire management needs to have both disciplines represented when planning and implementing these fuel projects especially in the interface.

If wild fire starts in interface, politics dictate protecting developments not resource values. – During wildfire there is "NO TIME for RESOURCE CONCERNS"!

We need to be proactive and consider wildlife and habitat maintenance before the wildfire occurs. A cooperative effort during the fuels treatment stage allows consideration of everyone's objectives.
I will highlight three groups of important wildlife species and show how fire and fuels reduction can be managed to reduce impacts to wildlife and can actually benefit the long range outlook for special habitats.

Bald eagle management
The bald eagle (*Haliaeetus leucocephalus*) is an important species in United States of America. First of all it is our national bird, the Symbol of America! It often represents healthy trees adjacent to clean waters. People have always been fascinated by the bald eagle and like to live or play where they can see an eagle. There is extra enjoyment in being able to view these majestic birds.
However, people have 'loved' this bird too much. The bald eagle was listed under the Endangered Species Act and is considered a "Threatened" Species due to loss of nesting habitat, pollution of waters and disturbances to nest sites. As such it has become a special status species and requires special consideration in management activities.
In the past, most management has been a 'Don't touch!' approach. Typical methodology was to allow no activities within ¼ to ½ mile. Therefore, these areas were protected from fuels treatments and other management for the last 40 years.
As a result, large nest trees are dying from vegetative competition. Adjacent forests are too dense, which prevents replacement roost and nest trees from developing. Vegetation and fuels buildup around nest trees have increased wildfire intensity and duration. Wildfires are causing more long term impacts.
In 2002 in the State of Oregon, 5 nests were destroyed by fire. In several of these cases the nesting territory was the only site within a 40 mile radius, so the loss of the nest was very significant.
Sage grouse
Greater sage grouse (*Centrocercus urophasianus*) are a ground dwelling species of the drier shrub steppe habitats. These birds are considered a sensitive species, and are also considered an indicator for healthy rangelands. Recent population declines have raised concern about habitat conditions. .
Loss of fires and past management has allowed juniper (*Juniperis occidentalis)* to invade many range lands. Natural succession and past management practices have changed the structure or reduced the diversity within the communities and important forage species have been lost. In other areas management has created vast monocultures that allow wildfires to cover great distances without being controlled by natural vegetation breaks.
Juniper invasion of sage areas has reduced the vigor of sage and prevents reproduction of the plants due to shading and competition. Grasses and forbs needed for foraging and brood rearing habitat are also lost due to shading and competition.
Trees provide perch sites for avian predators and also cut down on sight distance. Sage grouse avoid areas with abundant aerial cover. Juniper or conifer invasion of meadow areas has also affected the important brood rearing areas. Important areas or remaining strongholds often contain large expanses of sage habitat. If wildfire occurs we are in danger of losing these large blocks of habitat.
Big game

Big game is a term that represents several socially important ungulates – deer (*Odocoileus hemionus*), elk (*Cervus canadensis)*, moose (*Alces alces*), etc. These wild animals are managed to allow for hunting and for important viewing opportunities.

When people build houses in an important habitat for big game, there is a double loss to habitat. Houses and roads invading the winter range take away production ground. One mile of road removes five acres of habitat. The addition of a house, garage and driveway takes away more land for habitat. In areas adjacent to roads, habitat effectiveness is reduced within sight distance of a road due to disturbance factors. Not only is the habitat reduced but the remaining habitat becomes even more important.

Lack of fire in these areas has caused major shifts in vegetation health. In some stands, the vegetation is over mature and decadent. In other areas juniper encroachment has eliminated important browse species. No shrub regeneration is occurring when juniper reaches fifty percent of the capacity of the site (Miller, 2001).

Lack of fire has caused vegetation to become overcrowded and of poorer quality due to density and lack of sunlight. In many areas important browse species, especially fire generated species, are no longer available for forage. Stands of oak have become overgrown with young saplings. These dense stands no longer produce the mast (acorns) crops needed for big game forage and for the many other species that rely on these mast crops.

Timber stands and juniper invasion areas have become dense and the areas no longer produce forage. University of Idaho study (Peek et. al., 2001) has shown that due to past and current timber management practices and fire protection, the timbered areas produce 1/3 less forage than they did 30 years ago due to higher density and more canopy closure. Agencies have been afraid to treat adjacent to residential areas. Since even less management has been done adjacent to the urban interface, even more production has been lost in these areas.

The Bureau of Land Management (BLM) Klamath Falls Resource Area – An Interdisciplinary approach to fuels management.

The areas for treatment are selected by various specialists – Wildlife Biologist, Hydrologist, Forester, or fuels specialist.

Once an area has been selected, the group of specialists (called the interdisciplinary team - ID team) lists the objectives, short term and long term for each discipline. Approaches and options are discussed. The process will be planned as a multiple entry in order to complete various objectives and consider long term maintenance.

Example –

a) Fuels - reduce fuels to point where wild fires would be controllable

b) Wildlife - treatments will protect special status species, improve forage for big game.

[If special status species are involved, other entities like the United States Fish and Wildlife Service (FWS) or state agencies need to be involved for legal compliance with the Endangered Species Act.]

c) Hydrology – rehab eroded areas on access roads.

d) Timber – reduce competition of conifer trees to maintain a healthy stand.

Benefits of the team effort – maintain a healthy ecosystem, manage the fire potential, and keep important wildlife species and habitat healthy.

Implementation:

Bald eagle management vs. fuels management.

In Oregon's, Klamath Falls Resource Area a unit was selected for treatment which had an eagle nest in the middle of it. The area was characterized by steep slopes, excess fuel loading – 45 tons per acre, heavy brush, ladder fuels, and deep duff layers.

Since the unit contains an active eagle nest the ID team needed to address the usual concerns:

1) The fuel reduction activities should not destroy or kill the nest or roost tree.
2) Disturbance during the courtship, incubation or nesting season should not cause abandonment of the nest or mortality of the young eaglets.
3) Smoke concentrations at the nest site are reduced.
4) Avoid excessive heat at the nest site which could cause mortality.

Fire Prescriptions and models indicated that with the existing fuel loading, we could not conduct a late season prescribed fire and still expect to maintain the existing nest tree. Fuel loading in excess of 20 tons/ acre would destroy any canopy trees under most burn conditions.

To improve the chance of success, the ID team decided to reduce fuels using manual and mechanical methods. These could be done near the nest area but after the nesting activity had already finished.

The manual activity occurred in the steep, 20 acre area around the nest tree. All brush and small trees were cut and removed from the area within the drip line of all large trees or ideal replacement trees. The debris was piled and then burned later in the fall when chance of escaped fire was reduced.

On flatter areas, mechanical methods were used to reduce fuel and canopy closure. This involved removing ladder fuels at the base of potential nest or roost trees. This approach can be very important at the base of the slope beneath the nest. Reducing the impact of the fire in this area can increase the chances of the nest tree up slope surviving a wildfire. The loss of one nest tree in Oregon during a wildfire was attributed to the unthinned second growth down slope of the nest tree. The crowning of the stand on the lower slope increased the convectional heating and scorch height on the nest tree. Even though the tree was not consumed by the fire, it was killed by the intense heat.

Competing conifers were also being removed at the same time with this equipment. Culturing of future nest trees was also accomplished during this step. Individual trees with the desired form and species for nest trees were selected. Smaller pines (12 to 16 inches DBH) were selected and all trees within 2 to 3 drip lines were removed. This created an open-grown tree that would develop large branches that would be stout enough to hold a nest. The forestry specialists were very instrumental in selecting appropriate trees and developing the marking prescription. This approach is a very long term and optimistic approach. We are creating replacement trees that will be available in fifty years when the nest tree dies of old age.

Removing larger competing trees also creates breaks in the canopy which reduces the chance of a crown fire moving through the stand and destroying the nest tree.

Some of the ladder fuels and excess canopy trees were piled or yarded outside the stand. If the canopy trees were merchantable they were marketed through a stewardship contract or sold separately. This approach reduced the overall costs of the project both by using an efficient method and selling a by-product of the fuel reductions.

Even after these types of fuel treatments, it was necessary to consider a spring prescribed-burn to further reduce fuels to a more historic level. Consultations with the United States Fish and Wildlife Service or State wildlife agencies may be necessary if this option is considered. Certain precautions were used to reduce potential impacts. Delaying the activity to occur as late as possible in the nesting season allowed site tenacity to develop in the nesting birds. If the nestlings have hatched there is less chance of abandonment by the adults.

If the adults are flushed from the nest, the young eaglets could die from exposure to the elements. Prescribed burns are usually conducted during good weather conditions so the threat of winds or rain affecting the young is reduced. The later in the nesting cycle that the activity occurs, means the eaglets will be better able to thermo-regulate and tolerate a variety of weather conditions until the adult returns.

Minimizing the time spent and number of disturbances near the nest tree during the burn activities will reduce the potential for disturbance and flushing of the birds. This was accomplished by completing the layout and as much of the line construction and prep work before the nest season. During the burn, the number of igniters near the nest tree was reduced. The ID team considered the tradeoffs between having hand crews make the ignition passes and the time needed and safety for the igniters vs. one or two passes with a helicopter.

The use of a fire prescription will determine amount of time and spread expected with the various methods. Fuel types, temperature, fuel moistures and objectives may alter the method of ignition.

Protection of the nest tree and important roost trees is extremely important during the burn itself. Pre-treatment of the ladder fuels, as discussed earlier, is only one of the steps that may be needed. Fine fuels and duff were "pulled –back" to reduce the heat and residence time of the fire at the base of the selected tree. This is more effective if done immediately prior to the burn; however, we need to consider the trade off between the disturbance to the nesting birds and the need for added protection. Wet lining or spraying foam on the tree or an area around the tree prior to ignition can also be used as a technique. Foaming the tree may be critical if the nest or roost tree is a snag or contains open cavities. Timing of the wet line or foaming needs to be coordinated closely with the ignition near the nest not only to increase effectiveness of the technique but also reduce the length of disturbance to the nesting birds to as short of time period as possible.

Another technique to protect the nest tree is to wrap the tree trunk with fire shelters. This can be done days or weeks prior to the ignition itself.

During the actual burning activity, care must be taken to protect the young birds from heat and smoke. We are not sure what temperature is lethal to young birds. However we do know several basic facts that will help plan the intensity of the burn that will be allowed. We know that at a certain temperature needles or vegetation will be killed but not consumed by the fire. This phenomenon is called 'scorch height'. Science has determined that scorch occurs when a temperature reaches 140 degrees F for one minute.

In 1995, the Klamath Falls Resource Area conducted an under burn of a timber stand. During the mop-up phase of the fire, a Cooper's hawk (*Accipiter cooperri)* nest with young was discovered within the fire area. The branch holding the nest was completely scorched (Steve Hayner, Wildlife Biologist; personal communication) yet the young survived and fledged successfully. These birds were able to tolerate the 140 degrees F for one minute and survive.

We can use fire models to predict the scorch height. By making sure the expected scorch height is well below the nest height, we can be reasonably sure that the temperature at the nest will be less than 140 degrees F. There may also be added insulation from the nest itself which could moderate the temperatures. This indicates that fire may be used as a tool even under an occupied nest if other precautions are taken to reduce scorch height and disturbance is kept within tolerable levels.

Smoke is always a concern! Many people have a fear of smoke, and they feel that even drift smoke could affect special status species. (Too many anti-smoking or second hand smoke commercials?) There are often stipulations of no smoke within ¼ mile and even up to ½ mile from nest sites. Smoke is made up of heat, gasses, and particulates. It is logical that any one of these in excess could cause breathing problems. However there is also a lack of documentation of smoke alone causing mortalities. There are many incidences of birds of prey moving into burn areas even while there are active flames to forage for prey.

Radio telemetry of northern spotted owls (*Strix occidentalis*) in central Washington state, indicated owls remained within the fire area during a wildfire and immediately after. So birds are not indicating an avoidance of smoke. Under current smoke management regulations, good dispersion and mixing is required during and after the fire. If smoke management is practiced then smoke should not be a problem at nest sites.

As the fire prescription was developed, the specialists continued to be involved with the process to understand the risks and trade offs. Before the fire plan was approved by management, the specialists agree to the methodology and set up the monitoring process both during the burn and for a period of time after the treatment.

Sage grouse and fuels management.

When fuels treatments are considered in sage grouse habitat, wildlife specialists need to be involved to help set priorities and objectives. Perhaps the most critical areas for sage grouse are the mating areas which are called leks. It is important to consider vegetation management options in these areas. The evaluation should consider current health of the lek and surrounding area. Is it currently being used on a yearly basis? What are the vegetation conditions at or near the lek? Is it open or is vegetation evolving toward taller shrubs and trees? What is the natural escape cover and hiding cover for the sage grouse near the lek site?

After the current conditions are evaluated, the ID team can discuss options and desired future conditions. Within the selected treatment unit, historic and active lek sites should become priority areas to be evaluated for treatment. Buffering the lek area is always a primary consideration but should not be an absolute. Some historic lek sites may have been abandoned because of encroachment of junipers or development of tall shrubs. Sage grouse avoid areas that provide aerial perches for predators. Aerial fuels and tall shrubs may need to be removed. Sage grouse need to be able to see predators yet be able to escape. The treatment should maintain escape cover near the lek sites.

The ID team also discusses important brood rearing and wintering areas. What type of treatments could be conducted and what would be the potential conflicts? Can treatments be designed to improve species diversity and amount of preferred forage plants? Small fires or light intensity fires can stimulate forb growth which can have a beneficial effect if some shrub cover is still present.

Protection of large blocks of habitat from destruction by wildfire or disease, should also be considered. How do we create control points within blocks of habitats so wildfires can be controlled before the entire habitat is lost? Can we create a mosaic of habitats or age structures that improve the diversity and at the same time allow natural fuel breaks?

Fire prevention in critical areas or habitats is often overlooked. Trying to stop a wild fire in an important habitat may cause more damage to the habitat than if the treatment was conducted prior to the burn. Fuel breaks using mechanical brush cutters or hand thinning of shrub stands in strategic control areas may be important tools to protect from catastrophic fire. Prescribed burns conducted during the wet end of the prescription help create a mosaic of burn and vegetation conditions that can be very helpful in control efforts of future wildfires.

BLM has conducted many fire and fuels treatments that have benefited sage grouse habitats. In 1996, a unit was randomly selected for fuels treatments. This unit contained a historic lek site that was last documented as occupied in the mid 1980's. Historic photos and range surveys documented an increasing invasion of western juniper (*Juniperus occidentalis*). The ID team recommended treatment of the invasive juniper in the area with the long term goal of returning the vegetation to more natural conditions that could allow natural fire. Since the area was quite extensive -1400 acres, the ID team recommended using mechanical methods. This allowed the cut trees to be piled in the same process so they could be burned at a later date. The area around the lek site was scheduled to be treated in late summer or fall to avoid any activity near the historic mating area during the critical spring mating period.

The areas where the piles were burned created small pockets of early seral vegetation with an abundance of forbs on the edge. This created added diversity in the immediate area and provided more preferred forage for the sage grouse than what was present before the treatment.

Several meadow areas that had documented use by sage grouse broods were also treated. The treatment type was determined by size of the area, size of the invading trees, and-or soil moisture conditions. If tree size or unit was small, then hand crews cut and piled the invasive vegetation. Mechanical methods were used when the trees were too large or needed to be removed from the area. In some areas, the juniper or conifers were only slashed as a site preparation for a prescribed fire. A broadcast burn allowed a more natural method to set back the seral stage around the meadows. Again, final treatments were decided by an ID team that considered other resource objectives, risks, options and long range goals.

Big game habitat management

We have already explained the conflicts between the housing developments and the important ranges for big game. Lack of fire has caused vegetation to become overcrowded and of poorer quality due to density and lack of sunlight. In many areas important browse species, especially fire generated species, have become decadent and no longer available for forage. Stands of oaks have become overgrown with young saplings.

Fuel treatments that reduce the density of the stand or regenerate the forage species will be beneficial to big game habitat. However, caution should be taken to avoid destroying the existing forage. Prescribed fire may reduce the fuels but actually remove the vegetation that is most critical to the wildlife.

Mechanical treatments allow us to be more selective on type of vegetation removed. A shear can actually remove unwanted vegetation such as juniper trees or oak saplings yet leave the desired forage species untouched. Brush cutters or mowers can do a great job of removing aerial fuels. They can also be used to remove selected plants and leave desired species.

Manual methods can also be used very effectively. Manual projects can be very precise, and not create the ground disturbance generally associated with mechanical methods. The draw backs for using manual methods would be the extra time needed to complete the project and the cost of the precision treatment. Manual projects are also limited by the size of the material that can be safely and efficiently removed.

Fire can also be used to reduce the fuel loading. Fire was used to treat the piles created by the mechanical and manual methods. This created small patches of intense burn surrounded by a mixture of lightly burned and unburned areas. A prescribed fire could also treat the entire area after the piles are removed. Again, a broadcast burn may eliminate the very same forage plants that we want to protect. Such a burn has a tendency to remove all plants and could have a major impact on the ability of wildlife to forage in the area until the next growing season. This forces the wildlife to move to new areas or utilize the landscaping around the homes. Removal of the vegetation also reduces the hiding and escape cover for wildlife. Lack of cover increases the stress on the animals and reduces their ability to survive.

Both prescribed burns and mechanical methods can be designed to create a very rough mosaic in the vegetation community. This allows reduction of fuel loadings and creates natural fuel breaks within the stand. These mosaic methods allow treatment of the old and decadent brush and reduce fuels yet still keep some plants available for forage and to provide escape and nesting cover.

Some argue that creating a mosaic will require more frequent treatments. Even the "scorched earth" approach will require periodic fuel reductions. Creating a mosaic requires the manager to think about the return interval for maintenance.

Part of the long term management goals are to return native plants to the treatment area. The BLM's Klamath Falls Resource Area has used the fuel treatment areas as planting sites for important browse species. Bitterbrush (*Purshia tridentata)* and Mountain mahogany (*Cercocarpus* species) are important browse species that have been eliminated in some areas by juniper invasion, past grazing practices, or high intensity fire. Klamath Falls Resource Area has had good success in planting patches of the shrub species in the burned areas. This takes advantage of the reduced competition from other vegetation.

Using a mixture of these techniques allows BLM to not only reduce fuels, but also to plan for the future improved conditions for big game.

Conclusion

"Fires will occur!" When wildfire removes the excess fuels from the urban interface, we will lose homes and habitat for both people and wildlife. If our focus is too narrow in the fuels treatment process we will also lose wildlife and wildlife habitat.

Fire and wildlife evolved together. Fuels management needs to have both disciplines represented when planning and implementing fuel projects especially in the urban interface.

When it comes to fire prevention in the urban interface, the best defense is a good offense! Fuel treatments have been designed to both reduce fuels and improve conditions for wildlife and humanity.