

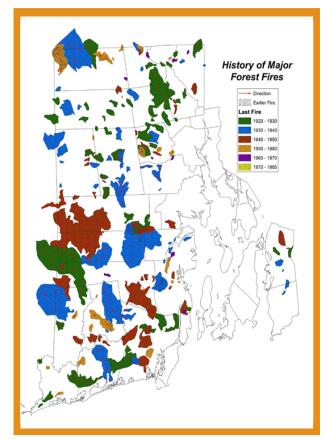
Protecting Your Home from Wildfire:

Creating Wildfire-Defensible Zones

RIDEM - Division of Forest Environment

If your home is located in or around natural vegetation, you live in the **wildland-urban interface** (WUI) of Rhode Island and are inherently at risk from a wildfire. The WUI is any area where structures and other human developments meet or intermingle with wildland vegetative fuels. Even in RI, wildfire presents a real threat to the many residents and businesses in theWUI.

Wildfires are a natural part of the forest processes, restarting forest succession cycles. Many rural communities are located in areas historically prone to natural wildfires. Living in these wildland areas come with the benefits of being surrounded by nature but also with challenges. It may take longer for a fire engine to reach your area, and a small fire department can easily become overwhelmed during an escalating wildfire. Planning ahead and taking actions to reduce fire hazards can increase your safety and help protect your property. As more people choose to live in areas prone to wildfire, additional homes and lives are potentially threatened every year. Firefighters do their best to protect rural residents, but ultimately, it is your responsibility to protect your life, family, animals and property from wildfire.



This document helps landowners reduce wildfire risk on their property. To protect homes, subdivisions, and communities, landowners must work together to reduce fire hazards within, and adjacent to, communities. This includes treating individual home sites and common areas within communities, and creating fuelbreaks within and adjoining the community, where feasible.

This document presents steps individual owners can take to reduce wildfire hazards and protect their property, beginning closest to your house and



Figure 1: Firefighters will do their best to protect homes, but ultimately it is the homeowner's responsibility to plan ahead and take actions to reduce fire hazards around structures. Photo:
National Interagency Fire Center

- Reducing fuels
 around a home will
 increase the chances
 of it surviving a
 wildfire, but there is
 no guarantee.
- This quick guide provides minimum guidelines. The more fuels you remove, the greater the chance your home will survive.
- Working with your neighbors and community will increase the effectiveness of your home's defensible space.





Figure 2: Burning embers can be carried long distances by wind. Embers ignite structures when they land in gaps, crevices and other combustible places around the home. Photo 1: Miguel Cruz, CSIRO; Photo 2: Daniel Shaw, SWA

moving outward, BUT remember, keeping your home safe is not a one-time effort – it requires ongoing maintenance. It may be necessary to perform some actions, such as removing leaf litter from gutters and mowing grasses and weeds

several times a year, while other actions may only need to be addressed once a year. While you may not be able to accomplish ALL of the actions described in this document to prepare your home for wildfire, each completed activity will increase the safety of your home, and possibly your family, during a wildfire.

This guide primarily will help design your defensible space. **Defensible space** is the natural and landscaped area around a home or other structure that has been modified to reduce fire hazard. Defensible space gives your home a fighting chance against an approaching wildfire. Creating defensible space also reduces the chance of a structure fire spreading to the surrounding forest and other homes.

Three factors determine wildfire behavior: fuels, weather and **topography**. Weather or topography cannot be altered, so the focus must be on altering fuels. Fuels include vegetation, such as trees, brush and grass; near homes, as well as things like propane tanks, wood piles, sheds and even homes themselves. Some plant species are more flammable than others, and the flammability of vegetative fuels changes depending on the season, recent weather events, and other factors such as drought. Fuel continuity and density also play an important role in wildfire.

Wildfire can even create its own weather conditions. Hot rising air and associated winds can carry embers and other burning materials into the atmosphere for long distances, where they can ignite vegetation and structures up to several miles away. Embers have caused the loss of many homes during wildfires.

As you think about protecting your home and property from wildfire, consider how you can manage fuels on your property to prevent fire from spreading to your home and other structures.

FireWise Construction: Site Design and Building Materials from the CO State Forest Service has information on wildfire behavior also relevant to RI.

Fuel Arrangement and Types

When fuels are abundant, a fire can be uncontrollable and destructive. But when fuels are scarce, a fire cannot build momentum and intensity, which makes it much easier to control and is more likely to be beneficial to the land.

The more dense and continuous the fuels, the bigger threat they pose to your home. The measure of fuel hazard refers to its continuity, both horizontal and vertical. Horizontal continuity refers to fuels across the ground, while vertical continuity refers to fuels extending from the ground up into the crowns of trees and shrubs. Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels.

Heavier fuels, such as brush and trees, produce a more intense fire than light fuels, such as grass. However, grass-fueled fires travel much faster than heavy-fueled fires. Some heavier surface fuels, such as logs and wood chips, are potentially hazardous heavy fuels and also should be addressed.

Surface Fuels

Logs/Branches/Slash/Wood Chips

Naturally occurring woody material on the ground and debris from cutting down trees (also known as slash) can increase the intensity of fires. Increased fire intensity makes a fire harder to control and increases the likelihood of surface fires transitioning to crown fires. Dispose of any heavy accumulation of logs, branches and slash by chipping, hauling to a disposal site, or piling for burning later. Always contact your local fire department first for information and a permit for open burning. Another alternative is to lop and scatter slash by cutting it into very small pieces and distributing it widely over the ground. If chipping logs and/or slash, it's essential to avoid creating continuous areas of wood chips on the ground. Break up the layer of wood chips by adding nonflammable material, or allow for wide gaps (at least 3 feet) between chip accumulations. Also, avoid heavy accumulation of slash by spreading it closer to the ground to speed decomposition. If desired, two or three s mall, widely spaced brush piles may be left for wildlife habitat. Locate these well away from your home.

Grasses

Grasses are a pervasive and abundant surface fuel. Mow grasses and weeds as often as needed throughout the growing season to keep them shorter than 6 inches. This applies to irrigated lawns and wild or native grasses. This is critical in the fall, when grasses dry out, and in the spring, after the snow is gone but before plants green-up.

Be especially careful when mowing in areas with rocks. Mower blades can hit rocks and create sparks, causing fires in dry grass. Consider mowing only on days with high humidity or after recent moisture to reduce the risk of starting an unwanted fire.

When mowing around trees, be sure to avoid damaging the root system and tree trunk by using a higher blade setting on the mower and trimming grass that grows against the trunk only by hand.

Vertical/Ladder Fuels

Ladder fuels are defined as smaller trees and brush that provide vertical continuity, which allows a fire to burn from the ground level up into the branches and crowns of larger trees. Lower branches on large trees also can act as ladder fuels. These fuels are potentially very hazardous, but are easy to mitigate. The hazards from ladder fuels near homes are especially important to address. Prune all tree branches from ground level up to a height of 6 to 10 feet above ground or up to 1/3 the height of the tree, whichever is less. Do not prune further up because it could jeopardize the health of the tree. Shrubs should be pruned based on specifications recommended for the species. Dead branches should be removed whenever possible.

Crown Fuels

An intense fire burning in surface fuels can transition into the upper portion of the tree canopies and become a crown fire. Crown fires are dangerous because they are very intense and can burn large areas. Crown fire hazard can be reduced by thinning trees to decrease crown fuels, reducing surface fuels under the remaining trees, reducing surface fuels under the remaining trees, and eliminating vertical fuel continuity from the surface into the crowns. Specific recommendations are provided in the Defensible Space Management Zones, pages 5-8.



Figure 3: Surface fuels include logs, branches, wood chips, pine needles, duff and grasses. Photo: RIDEM-DFE

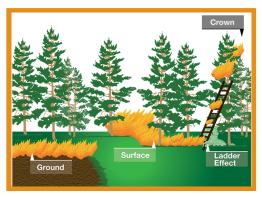


Figure 4: Ladder fuels are shrubs and low branches that allow a wildfire to climb from the ground into the tree canopy.



Figure 5: Tree canopies offer fuel for intense crown fires. Photo: Paul Mintier

Structure Ignitability Defensible Space The Home Ignition Zone

Figure 6: Addressing both components in the Home Ignition Zone will provide the best protection for your home. Credit: CSFS



Figure 8: (above right) Class A roofing materials including tile, clay, concrete, slate and asphalt shingles are fire-resistant options. Photo: CSFS

Photo: CSFS



Figure 9: Decks, exterior walls and windows are important areas to examine when addressing structure ignitability. Photo: CSFS

The Home Ignition Zone

The primary determinants of a home's ability to survive a wildfire are the quality of the defensible space and a structure's ignitability. Together, these two factors create a concept called the **Home Ignition Zone** (HIZ), which includes the structure and the space immediately surrounding the structure. To protect a home from wildfire, the primary goal is to reduce or eliminate fuels and ignition sources within the HIZ.

Structural Ignitability

The ideal time to address home ignition risk is when the structure is in the design phase. However, you can still take steps to reduce ignitability to an existing home.

The **roof** has a significant impact on a structure's ignitability because of its extensive surface area. When your roof needs significant repairs or replacement, use only fire-resistant roofing materials. Wood and shake-shingle roofs are discouraged because they are highly flammable. Asphalt shingles, metal sheets and shingles, tile, clay tile, concrete and slate shingles are all recommended roofing materials.

The extension of the roof beyond the exterior structure wall is the eave. This architectural feature is particularly prone to ignition. As fire approaches the building, the exterior wall deflects hot air and gases up into the eave. If the exterior wall isn't ignition-resistant, this effect is amplified.

Most **decks** are highly combustible. Their shape traps hot gases, making them the ultimate heat traps. Conventional wooden decks are so combustible that when a wildfire approaches, the deck often ignites before the fire reaches the house.

The exterior walls of a home or other structure are affected most by the radiant heat from the fire and, if defensible space is not adequate, also by direct contact with flames from the fire.

Windows are one of the weakest parts of a building with regard to wildfire. They usually fail before the building ignites, providing a direct path for flames and airborne embers to reach the building's interior. Radient heat can also ignite materials like sheer curtains inside the building.

Burning embers are produced when trees and structures are consumed by wildfire. These embers sometimes can travel more than a mile. Flammable horizontal or nearly horizontal surfaces, such as wooden decks or shakeshingle roofs, are especially at risk for ignition from burning embers. Since airborne embers have caused the loss of many homes in the WUI, addressing structural ignitability is critical, even if the area surrounding a home is not conducive to fire spread.

This guide provides only basic information about structural ignitability. *FireWise Construction: Site Design and Building Materials* from the CO State Forest Service has information on this topic also relevant to RI.

Defensible Space

Defensible space is the area around a home or other structure that has been modified to reduce fire hazard. In this area, natural and man-made fuels are treated, cleared or reduced to slow the spread of wildfire. Creating defensible space also works in the reverse, and reduces the chance of a structure fire spreading to neighboring homes or the surrounding forest. Defensible space gives your home a fighting chance against an approaching wildfire.

Creating an effective defensible space involves a series of management zones in which different treatment techniques are used. Develop these zones around each building on your property, including detached garages, storage buildings, barns and other structures.



Figure 10: Homesite before defensible space. Photo: CSFS

The actual design and development of your defensible space depends on several factors: size and shape of building(s), construction materials, slope of the

ground, surrounding topography, and sizes and types of vegetation on your property. You may want to request additional guidance from RIDEM-Division of Forest Environment Forest Fire Program staff, local fire department or a consulting forester as you plan defensible space for your property.

Defensible space provides another important advantage during a fire: increased firefighter safety. Firefighters are trained to protect structures only when the situation is relatively safe for them to do so. They use a process called "structural triage" to determine if it is safe to defend a home from an approaching wildfire. The presence or absence of defensible space around a structure is a significant determining factor used in the structural triage process, as defensible space gives firefighters an opportunity to do their job more safely. In turn, this increases their ability to protect your home.

If firefighters are unable to directly protect your home during a wildfire, having an effective defensible space will still increase your home's chance of survival. It is important to remember that with wildfire, there are no guarantees. Creating a proper defensible space does not mean that your home is guaranteed to survive a wildfire, but it does significantly improve the odds.



Figure 11: Homesite after creating a defensible space. Photo: CSFS

Defensible Space Management Zones

Three zones need to be addressed when creating defensible space:

Zone 1 is the area nearest the home and other structures. This zone requires maximum hazard reduction.

Zone 2 is a transitional area of fuels reduction between Zones 1 and 3.

Zone 3 is the area farthest from the home. It extends from the edge of Zone 2 to your property boundaries.

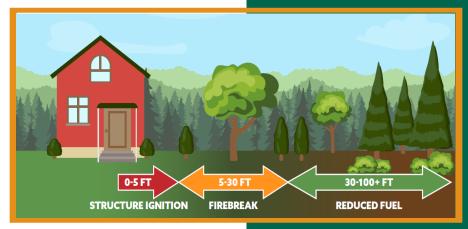


Figure 12: Defensible space management zones. Credit: RIDEM-DFE



Figure 13: This homeowner created a defensible space around the home. Notice that all fuel has been removed within the first 5 feet of the home. Photo: Christina Randall, Colorado Springs Fire Department



Figure 14: Clearing pine needles and other debris from the roof and gutters is an easy task that should be done at least once a year.

Photo: CSFS



Figure 15: Enclosing decks with metal screens can prevent embers from igniting a house. Photo: Marilyn Brown, La Plata County

Zone 1

The width of Zone 1 extends 0-5 feet outward from a structure. All flammable vegetation is removed in this zone, with the exception of a few fire-resistant plants.

Increasing the width of Zone 1 will increase the structure's survivability. This distance should be increased 5 feet or more in areas downhill from a structure. The distance should be measured from the outside edge of the home's eaves and any attached structures, such as decks. Several specific treatments are recommended within this zone:

- Install nonflammable ground cover like fire-resistant plants. This will help
 prevent flames from coming into direct contact with the structure. This is
 particularly important if a building is sided with wood, logs or other
 flammable materials. Decorative rock creates an easily maintained,
 nonflammable, ground cover.
- If a structure has noncombustible siding (i.e., stucco, synthetic stucco, concrete, stone or brick), widely spaced foundation plantings of low-growing shrubs or other fire-resistant plant materials are acceptable. However, do not plant directly under windows or next to foundation vents, and be sure areas of continuous grass are not adjacent to plantings.
- Prune and maintain any plants in Zone 1 to prevent excessive growth. Also, remove all dead branches, stems and leaves within and below the plant.
- Mow and irrigate grass and plants during the growing season.
- Do not store firewood or other combustible materials anywhere in this zone. Keep firewood at least 30 feet away from structures, and uphill if possible.
- Enclose or screen decks with ¹/₈-inch or smaller metal mesh screening (¹/₁₆-inch mesh is preferable). Do not use areas under decks for storage.
- Ideally, remove all trees from Zone 1 to reduce fire hazards.
- If you do keep any trees in this zone, consider them part of the structure and extend the distance of the entire defensible space accordingly.
- Remove any branches that overhang or touch the roof, and remove all fuels within 10 feet of the chimney.
- Remove all pine needles and other debris from the roof, deck and gutters.

Zone 2

Zone 2 is an area of fuels reduction designed to diminish the intensity of a fire approaching your home. The width of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space in Zone 2 should extend at least 30 feet from all structures. If this distance stretches beyond your property lines, try to work with the adjoining property owners to complete an appropriate defensible space.

The following actions help reduce continuous fuels surrounding a structure, while enhancing home safety and the aesthetics of the property. They also will provide a safer environment for firefighters to protect your home.

Tree Thinning and Pruning

- Remove stressed, diseased, dead or dying trees and shrubs. This reduces the amount of vegetation available to burn, and makes the forest healthier.
- Remove enough trees and large shrubs to create at least 18 feet between crowns. Crown separation is measured from the outermost branch of one tree to the nearest branch on the next tree. On steep slopes, increase the distance between tree crowns even more.

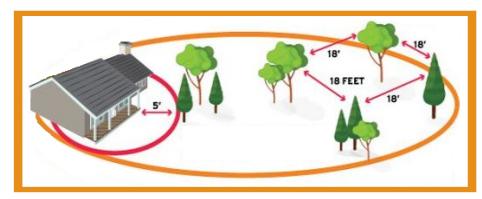


Figure 16: In Zone 2, make sure there is at least a 18-foot spacing between tree crowns. Credit: NFPA

- Remove all ladder fuels from under remaining trees. Prune tree branches off the trunk to a height of 6-10 feet from the ground or 1/3 the height of the tree, whichever is less.
- If your driveway extends more than 100 feet from your home, thin out trees within a 30 foot buffer along both sides of your driveway, all the way to the main access road. Again, thin all trees to create 18-foot spacing between tree crowns.
- Small groups of two or three trees may be left in some areas of Zone 2, but leave a minimum of 30 feet between the crowns of these clumps and surrounding trees.
- As in Zone 1, the more trees and shrubs removed, the more likely your house will survive a wildfire.

Shrub Thinning/Pruning and Surface Fuels

- Isolated shrubs may be retained in Zone 2, provided they are not growing under trees.
- Keep shrubs at least 10 feet away from the edge of tree branches. This will prevent the shrubs from becoming ladder fuels.
- Minimum spacing recommendations between clumps of shrubs is 2 1/2 times the mature height of the vegetation. The maximum diameter of the clumps themselves should be twice the mature height of the vegetation. As with tree-crown spacing, all measurements are made from the edge of vegetation crowns.
- Example For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more (measured from the edge of the crowns of vegetation clumps). The diameter of these shrub clumps should not exceed 12 feet.



Figure 17: Pruning trees will help prevent a wildfire from climbing from the ground to the tree crowns. Credit: CSFS

- Periodically prune and maintain shrubs to prevent excessive growth, and remove dead stems from shrubs annually.
- Keep lawn and wild grasses mowed. This is especially critical in the fall, when grasses dry out.
- Avoid accumulations of surface fuels, such as logs, branches, slash and wood chips.
- Limit the number of dead trees (snags) to one or two per acre. Be sure snags cannot fall onto the house, power lines, roads or driveways.

Firewood

- Stack firewood uphill from or on the same elevation as any structures, and at least 30 feet away.
- Clear all flammable vegetation within 10 feet of woodpiles.
- Do not stack wood against your home or on/under your deck, even in the winter. Many homes have burned as a result of a woodpile that ignited first.

Propane Tanks and Natural Gas Meters

- Locate propane tanks and natural gas meters at least 30 feet from any structures, preferably on the same elevation as the house.
- Clear all flammable vegetation within 10 feet of all tanks and meters.
- The tank should not be located on a slope below your house because
 if it ignites the fire would tend to burn uphill. Conversely, if the tank
 or meter is located above your house and it develops a leak, gas will
 flow downhill into your home.
- Do not visibly screen propane tanks or natural gas meters with shrubs, vegetation or flammable fencing. Instead, install 5 feet of nonflammable ground cover around the tank or meter.



Figure 18: Keep firewood, propane tanks and natural gas meters at least 30 feet away from structures.



Photo 1: CSFS. Photo 2: RIDEM-DFE



Figure 19: This pitch pine forest has been thinned, which will not only help reduce the wildfire hazard, but also increase tree health and vigor. Photo: RIDEM-DFE

Zone 3

Zone 3 typically extends to 100 feet beyond all structures. It should provide a gradual transition from Zone 2 to areas farther from the home that have other forest management objectives.

This zone provides an opportunity to improve the health of the forest through proper management. With an assortment of stewardship options, the forest can be managed to reduce wildfire intensity, protect water quality, improve wildlife habitat, boost the health and growth rate of your trees, and increase tree survivability during a wildfire.

In addition, properly managed forests can provide income, help protect trees against insects and diseases, and even increase the value of your property. Typical forest management objectives for areas surrounding home sites or subdivisions provide optimum recreational opportunities; enhance aesthetics; improve tree health and vigor; provide barriers

against wind, noise, dust and visual intrusions; support production of firewood, fence posts and other forest commodities.

Consider the following when deciding forest management objectives in Zone 3:

- The healthiest forest is one that includes trees of multiple ages, sizes and species, and where adequate growing room is maintained over time.
- Remember to consider the hazards associated with ladder fuels. A forest with a higher canopy reduces the chance of a surface fire climbing into the tops of the trees, and might be a priority if this zone has *steep slopes*.
- A greater number of snags two or three per acre, standing or fallen can be retained in Zone 3 to provide wildlife habitat. These trees should have a minimum diameter of 8 inches. Make sure that snags pose no threat to power lines or firefighter access roads.
- While tree pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and firefighter access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within tree stands, thus reducing the risk of crown fire.
- Any approved method of slash treatment is acceptable, including piling and burning, chipping or lop-and-scatter.

Maintaining Your Defensible Space

Your home is located in a dynamic environment that is always changing. Trees, grasses and shrubs continue to grow, die or are damaged, and drop their leaves and needles each season. Just like your home, the defensible space around it requires regular, ongoing maintenance to be effective. Use the following checklists to build and maintain your defensible space.

Defensible Space: Initial Projects

- \square Properly thin and prune trees and shrubs.
- ☐ Create wildlife habitat by piling slash or pruning debris.
- ☐ Screen attic, roof, eaves and foundation vents, and periodically check them to ensure that they are in good condition.
- ☐ Screen open spaces under porches and decks; screens should be ¹/8-inch or smaller metal mesh (¹/16-inch mesh is best).
- □ Post the house number at the end of the driveway to be noncombustible, reflective, and easily visible to emergency responders.



Figure 20: Proper thinning and pruning within the defensible space will reduce the chances of a home burning during a wildfire. Photo: RIDEM-DFE

- ☐ Make sure that the driveway is wide enough for fire trucks to enter and exit, and that trees and branches are adequately cleared for access by fire and emergency equipment.
- ☐ Take pictures of your completed defensible space for comparison of forest growth over time.

Defensible Space Tasks: Annual Requirements

- ☐ Clear roof, deck and gutters of pine needles and other debris. *
- ☐ Keep lawns green and mowed. *
- □ Rake all pine needles, leaves mulch, and other flammable debris away from the foundation of your home and deck. *
- ☐ Remove trash and debris accumulations from the defensible space.*
- Check fire extinguishers to ensure that they have not expired and are in good working condition.
- ☐ Check chimney screens to make sure they are in place and in good condition.



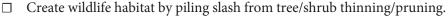






Figure 21: Sharing information and working with your neighbors and community will give your home and surrounding areas a better chance of surviving a wildfire. Photo: CSFS

Be Prepared

- ☐ Complete a checklist of fire safety needs inside your home (these should be available at your local fire department). Examples include having an evacuation plan and maintaining smoke detectors and fire extinguishers.
- □ Develop your fire evacuation plan and practice family fire drills. Ensure that all family members are aware of and understand escape routes, meeting points and other emergency details.
- ☐ Prepare a "grab and go" disaster supply kit that will last at least three days, containing your family's and pets' necessary items, such as cash, water, clothing, food, first aid and prescription medicines.
- ☐ Have a weather alert cell phone app or radio that announces all hazard emergencies.

Preparing your home and property from wildfire is a necessity if you live in the wildland-urban interface. It is important to adequately modify the fuels in your home ignition zone. Remember, every task you complete around your home and property will make your home more defensible during a wildfire.

Always remember that creating and maintaining an effective defensible space in the home ignition zone is not a one-time endeavor – it requires an ongoing, long-term commitment.

If you have questions, please contact your local DFE Forest Fire Program Prevention Officer: Allan.Waterman@dem.ri.gov

List of Additional Resources

- RIDEM- Division of Forest Environment: www.dem.ri.gov/wildfire
- Resources for RI Homeowners: www.dem.ri.gov/programs/ forestry/fire-program/homeowners.php#homeowners
- Resources for RI Communities: www.dem.ri.gov/programs/ forestry/fire-program/homeowners.php#community
- National Fire Protection Association's Firewise Communities USA: www.firewise.org
- Fire Adapted Communities: http://fireadapted.org/
- Ready, Set, Go!: http://wildlandfirersg.org/







RIDEM-DEE FOREST FIRE PROBRAM









www.dem.ri.gov/programs/forestry

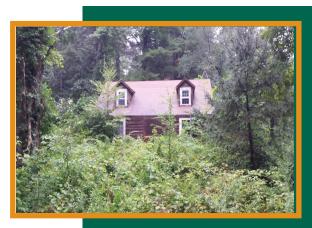


Figure 22: This building has a high risk of burning during a wildfire. Modifying the fuels around a home is critical to reduce the risk of losing structures during a wildfire. Photo: RIDEM-DFE

