How Hazardous Fuel Treatments Helped Save the Middle Piney Summer Homes from the Fontenelle Fire

U.S. Forest Service
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Photo by Valerie Blair

The burnout operation (shown here)—implemented by firefighters between the fuels treatment area around homes and main wildfire—successfully consumed all the fuels in this boundary area. Thus, this suppression action, assisted by the previous fuels treatment work, helped to save 12 homes from the Fontenelle Fire. (Source: Travis Chamberlain)

"These treatments helped firefighters protect the homes. They absolutely allowed for firefighter safety."

Tyler Monroe, Division Supervisor, Middle Piney Summer Homes

"People were definitely celebrating. We were all happy to see that our houses were still there."

Launa Taylor, Resident Middle Piney Summer Homes

Contents

1. The Fontenelle Fire: High Potential for Rapid Growth……..... 3
2. Type 3 Incident Command Team Ordered……...……..……. 4
3. Fire Complexity Increases – Homes and Businesses Now Threatened…..…… 4
4. Previous Hazardous Fuel Treatment Work Helps Home Protection…….…..…… 5
5. Extreme Fire Behavior Pushes Fontenelle Fire Closer to Homes……..…..….. 6
6. Burnout Operations Begin at Top of Fuel Treatment Area Above Homes……. 7
7. Before and After Photos Tell the Fuel Treatment Success Story.…… 9
8. Initial Planning: Hazardous Fuel Reduction Efforts Started in Mid-1990s…….. 11
9. Post Fire: Middle Piney Fuel Treatments Prove Successful at Reducing Risk to Homes…….……...…….. 13

"Summer Homes" are homes built and leased under a special agreement on U.S. Forest Service lands. The intent is that these residences be used as "vacation" homes. Under the terms of the contract, permanent residency is not allowed.

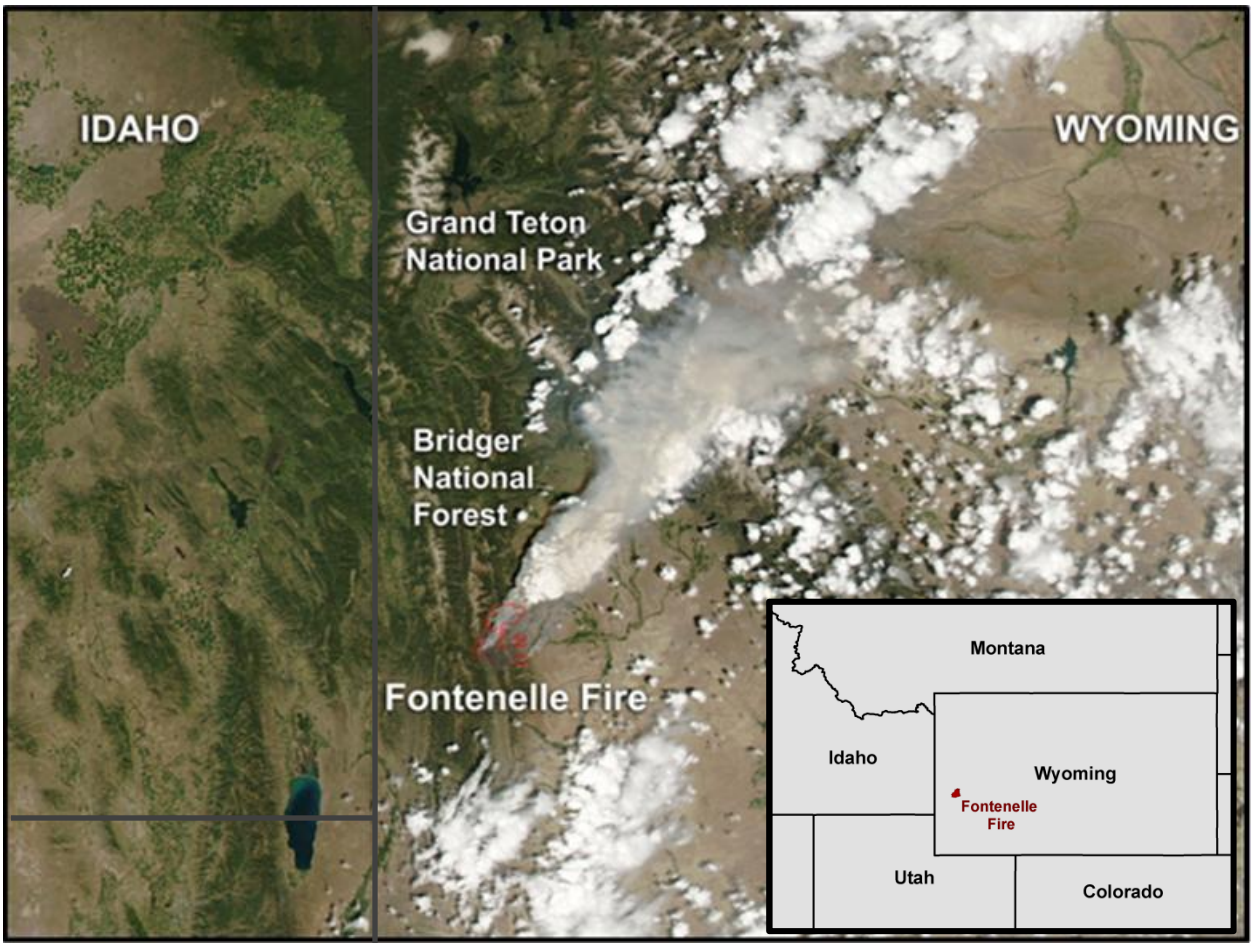


Figure 1 – Location of the Fontenelle Fire. (Source: NASA Satellite Imagery from July 1st 2012.)

1. The Fontenelle Fire: High Potential for Rapid Growth

The Fontenelle Fire started in a mixed-conifer forest on Sunday, June 24, 2012. It was located approximately 18 miles west of Big Piney, Wyoming, on the Bridger-Teton National Forest. The cause is unknown and is still being investigated.

Figure 2 – The start of the Fontenelle Fire on June 24, 2012. (Source: USFS.)

The fire was first reported to the Teton Interagency Dispatch Center at 4:21 p.m. by an aircraft carrying smokejumpers en-route to another wildfire. About 20 minutes later, the fire was approximately 30 to 50 acres (100 acres including spotting) in size. It was burning in heavy dead and fallen timber, accompanied by strong gusty winds under very dry conditions. Therefore, the Fontenelle Fire had a high potential for rapid growth. Smokejumpers landed near

the wildfire at approximately 5:05 p.m.—44 minutes after the fire was reported—and quickly begin suppression actions.

2. Type 3 Incident Command Team Ordered

Do to the heavy fuels, high winds, and the erratic nature of fire, additional attack resources (heavy air tanker, helicopters, engines, and crews) were ordered to protect structures in the immediate area of the fire. By 8 p.m., firefighters realized the fire was growing too quickly for the available initial attack resources. A Type 3 Incident Command Team was ordered.

Over the next several days, the fire grew quickly due to strong winds (20 to 30 mph) with gusts over 30 mph; low minimum relative humidity (8 to 13 percent); heavy fuel loads, including beetle-killed trees, other standing dead trees, and fallen dead trees; and steep topography.

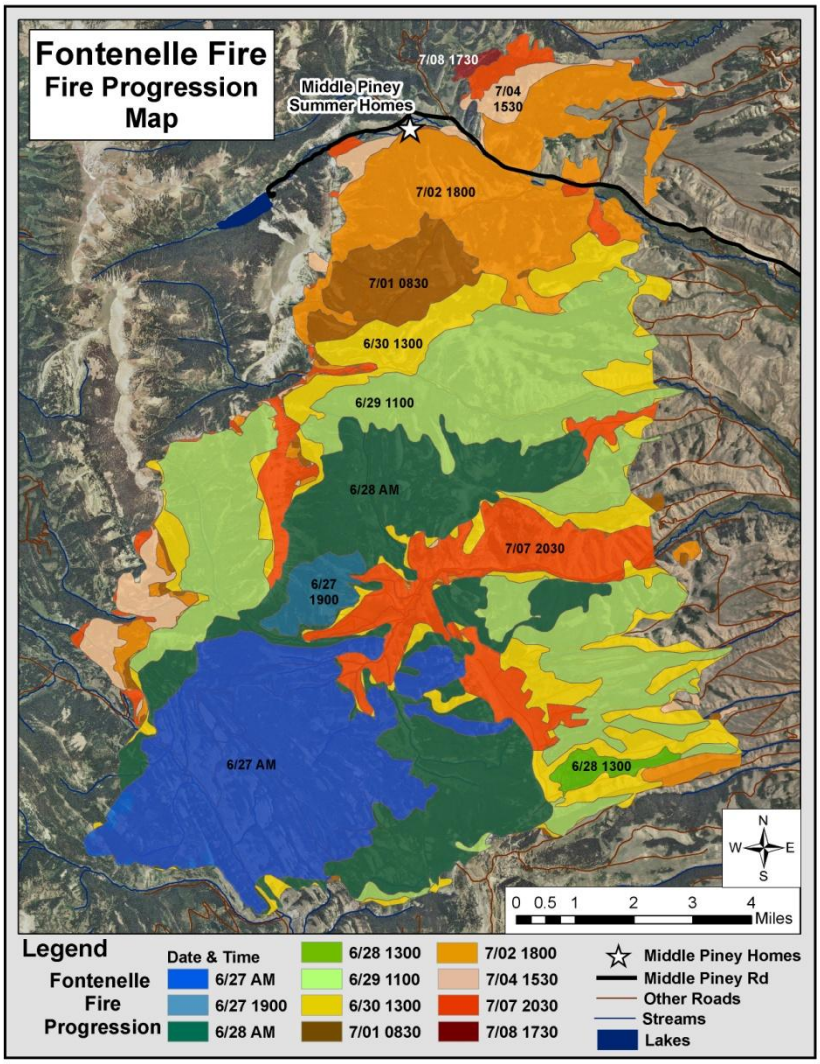


Figure 3 – Fontenelle Fire progression map.

Fire behavior was extreme, with rates of spread exceeding a ½ mile per hour and as high as 3 miles per hour in certain areas. The fire behavior included torching, crowning, and prolific spotting, with spotting distances of up to ½ mile. Tyler Monroe, Division Supervisor at Middle Piney summer home area, remarked that this fire behavior was *"not what we would expect this time of year."*

3. Fire Complexity Increases – Homes and Businesses Now at Risk

As the fire continued to escalate, a Type 2 Incident Management Team was requested on Tuesday, June 26. Two days later, this request was followed with a request for a National Incident Management Organization (NIMO) Team due to the increasing complexity of the fire and the high monetary values of home and business structures at risk in the area—including the 350 million dollar Denbury helium processing plant and oil and gas wells. By the end of that day, the fire was more than 22,000 acres. By that Sunday, July 1, the fire had grown to more than 45,000 acres, with more than 400 firefighters and support personnel on the scene—and more coming.

Middle Piney is located approximately 22 miles west of Big Piney, with 12 summer homes. Fortunately for homeowners and fire fighters, a structure protection project around these summer homes had been implemented 10 years prior, with a hazardous fuel reduction treatment designed to protect these homes from a wildfire by selective understory thinning to open the forest canopy, remove the ladder fuels that can cause crown fires, and remove dead trees and other fuels around the homes.

Figure 4 – The Denbury helium processing plant. (Source: Jim Menakis.)

4. Previous Hazardous Fuel Treatment Work Helps Home Protection

On Wednesday, June 27, additional structure protection work started around Middle Piney summer homes by building on the U.S. Forest Service's 2004-2005 hazardous fuel treatment implementation project. Over the next couple days, fire crews first focused on improving the fuel treatment by: opening up the canopy another 10 to 20 percent, cutting trees recently killed by beetles, and removing the underbrush. In addition, fire crews worked on structure protection by

Figure 5 – Middle Piney summer homes before the Fontenelle Fire. (Source: Nan Stinson, USFS 2004.)

clearing brush around the structures, laying hoses and putting up sprinklers systems around the homes, as well as wrapping fireproof material around some of the structures. Tyler Monroe, Division Supervisor at Middle Piney, said that the 2004-2005 hazardous fuel treatments *"allowed for the structure protection process to go quicker than it would have and required fewer resources."*

Figure 6 – Firefighters lay hoses and put up sprinklers around Middle Piney summer homes before the advancing Fontenelle Fire enters the area. (Source: Ken Metzler.)

The 2004-2005 fuel treatments allowed for the structure protection process to go quicker than it would have— using fewer resources.

Tyler Monroe, Division Supervisor, Middle Piney Summer Homes

5. Extreme Fire Behavior Pushes Fontenelle Fire Closer to Homes

Extreme fire behavior continued, driven by erratic winds and with spotting distances of ½ mile or more and 3- to 4-mile runs. On Thursday, June 28, the Fontenelle Fire progressed through the Fish Creek drainage into the Middle Piney Creek area, reaching approximately 2¾ miles from the Middle Piney summer homes. On Friday, June 29, the fire burned within approximately one mile south of Middle Piney Road. By Saturday, June 30, it was within 1.5 miles of the Middle Piney summer homes.

As the Fontenelle Fire moved closer to Middle Piney summer homes, it was obvious to firefighters that—because of extreme fire behavior—they would have to do a burnout operation to protect these homes. In fact, the spot weather forecast for Sunday called for winds 5 mph higher than the previous day's winds. These predicted winds could pose significant control problems. Under these conditions, rates of fire spread in timber could exceed ½ mile per hour, which could result in problematic single-tree torching and short-duration crown fire.

Figure 7 – Fire fighters start the burnout operation at the top of the fuel treatment area (away from the homes). (Source: Travis Chamberlain.)

A “burnout” is a fire intentionally ignited by firefighters in a fuel treatment or along a control line. The burnout’s goal is to consume fuel between the edge of a wildfire and the fuel treatment or control line by having the burnout fire the draw into wildfire. Thus, burnouts deprive a wildfire of fuel. In this situation, the burnout would be implemented to help prevent the wildfire fire from burning towards the Middle Piney summer homes.

6. Burnout Operations Begin at Top of Hazardous Fuel Treatment Area Above Homes

Around 2:30 p.m. on Sunday, July 1, as the Fontenelle Fire began moving down slope—when firefighters could feel the air being drawn toward the wildfire—fire crews started burnout operations near the Middle Piney summer homes. (See Figure 7 above.) Because firefighters were sheltered by the topography, crews started igniting the burnout from the top of the hazardous fuel treatment where winds were fairly light (4 to 8 mph with gusts of 10 mph).

Figure 8 – As the burnout operation transitioned into the trees' crowns, the flames are drawn toward the main wildfire front (located just off to the left of the photo). (Source: Travis Chamberlain.)

While the burnout started as a surface fire—as planned—it quickly transitioned into the crowns as it was drawn into the wildfire. Fire crews worked to protect the homes from embers and rolling flaming debris. They extinguished any spot fires that might have ignited in sagebrush and grassy meadows near the summer homes.

By 8 p.m., the firefighters had successfully defended the Middle Piney summer homes and transitioned to building firelines to secure the perimeter. Tyler Monroe, Division Supervisor at Middle Piney, said: *"We had a good plan and were able to execute without a hitch. We only had a few spot fires in meadow and a few around the homes."* Monroe explained that U.S. Forest Service's prior fuel treatments helped make the burnout a success. *"These treatments helped firefighters protect the homes,"* Monroe assured. In addition, he emphasized that the fuel treatments *"absolutely"* allowed for firefighter safety.

Launa Taylor, a Middle Piney summer home resident, said she was *"absolutely amazed how close the fire came and yet no damage occurred to houses and structures."* She said she was *"grateful for having green trees around her home."* Taylor affirmed that such sentiments were shared by the other Middle Piney homeowners. *"People were definitely celebrating. We were all happy to see that our houses were still there."*

7. Fontenelle Fire: Before and After Photos Tell the Fuel Treatment Success Story

Figure 9 – Middle Piney summer homes before the Fontenelle Fire. (Source: Google Earth Imagery 2011.)

Figure 10 – Middle Piney summer homes after Fontenelle Fire. The green trees surrounding the summer homes are located within the fuel treatment area. (Source: Jim Menakis, USFS.)

Figure 11 – Middle Piney summer homes before Fontenelle Fire. (Fuel treatment not visible from this camera angle.) (Source: Nan Stinson, USFS 2004.)

Figure 12 – Middle Piney summer homes after Fontenelle Fire. The green trees around the summer homes were within the fuel treatment that helped protect these homes. (Source: Jim Menakis, USFS.)

8. Initial Planning: Hazardous Fuel Reduction Efforts Started in the Mid-1990s

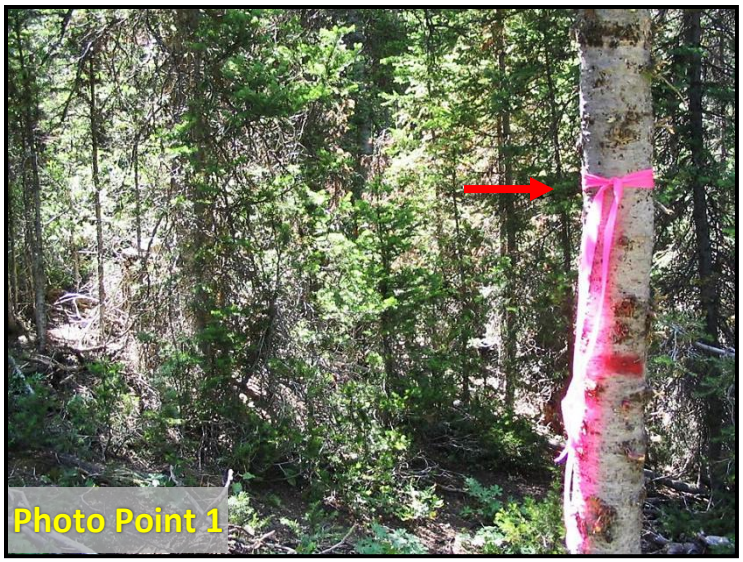
The success of saving homes in Middle Piney started more than 15 years ago with advance planning by the Forest Service, State of Wyoming, and local government. T.J. Hunt, Sublette County Fire Warden, said it begins by *"working together before the smoke is in the air. The work starts with them (U.S. Forest Service), then we can follow up."*

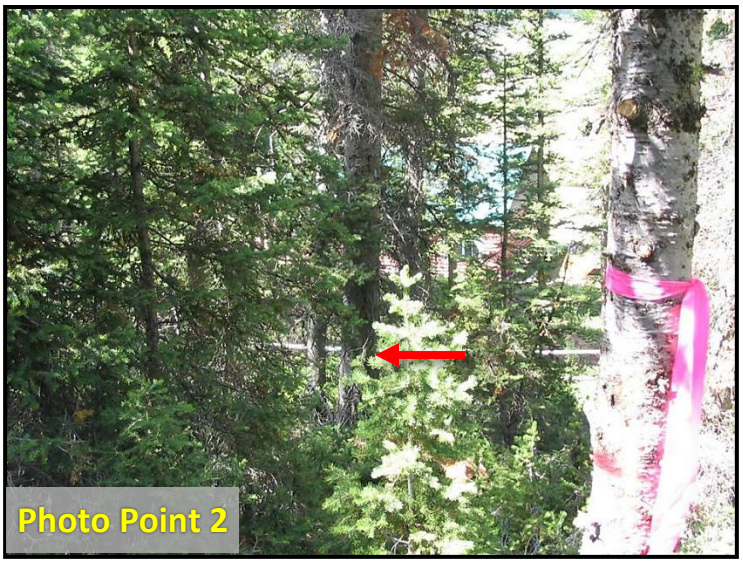
In the mid-1990s, dense mixed-conifer stands surrounding the summer homes were raising concerns regarding the risk from wildfire. The U.S. Forest Service began to scope out a project to reduce these hazardous fuels around the homes. This led to the completion of an Environmental Assessment in the spring of 1998 that included several projects that would reduce the risk of wildfire in that area. This Environmental Assessment considered the following issues relating to the summer homes: 1) Because of their density, the conifer stands around the summer homes are vulnerable to crown fire; 2) The threat of a wildfire starting in the area is significant; 3) The summer homes are not adequately protected from wildfire; and 4) There are concerns and dangers of fire escaping an untended campfire from the campground near the summer homes.

Figure 13 – Dense conifer stands around the Middle Piney Homes before the fuel treatments. These stands are vulnerable to crown fires because of the continuous vegetation growing into the crowns and the high quantity of dead and down trees. (Source USFS.)

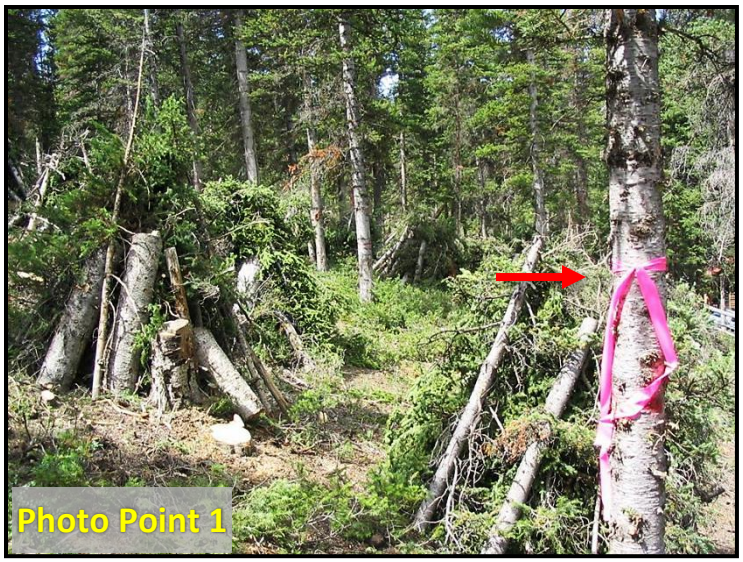
To address these issues, the Forest Service recommended a hazardous fuels reduction treatment to reduce the fire hazard and fuel buildup. This treatment included an overstory removal that would thin the trees to allow open space between the tree crowns. The thinning would remove approximately 100 saw-timber trees and 200 post-and-pole size trees per acre, leaving a spacing of approximately 20 feet between the trees (see photos on next page).

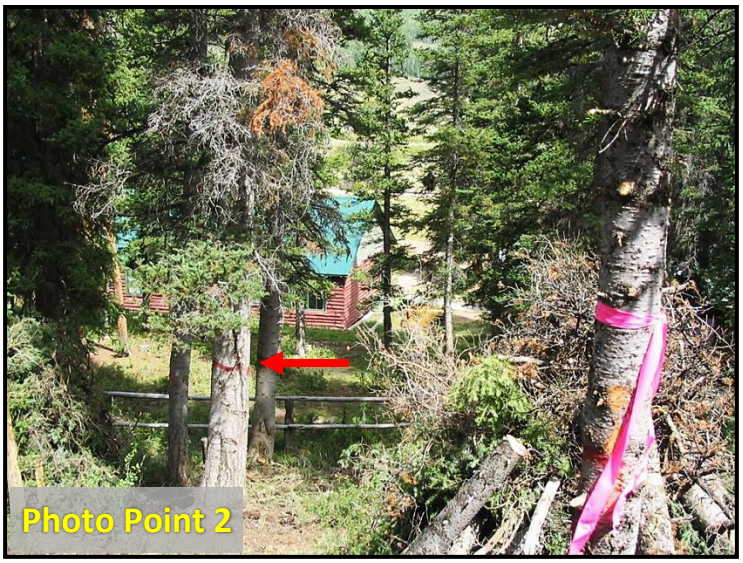
Pre Treatment





During Treatment – Thinning and Piling





Post Treatment and Fontenelle Fire

Figure 14 – Photos document the thinning activity that occurred as part of the hazardous fuels reduction project around the Middle Piney Homes. Top photos show the area before the fuel treatments, the middle photos show the area during the fuel treatments, and the bottom photos shows the area post treatment and after the Fontenelle Fire. Red arrows indicate the same tree for each of the photo point. (Source:Top and middle photos – USFS. Bottom photo — Jim Menakis.)

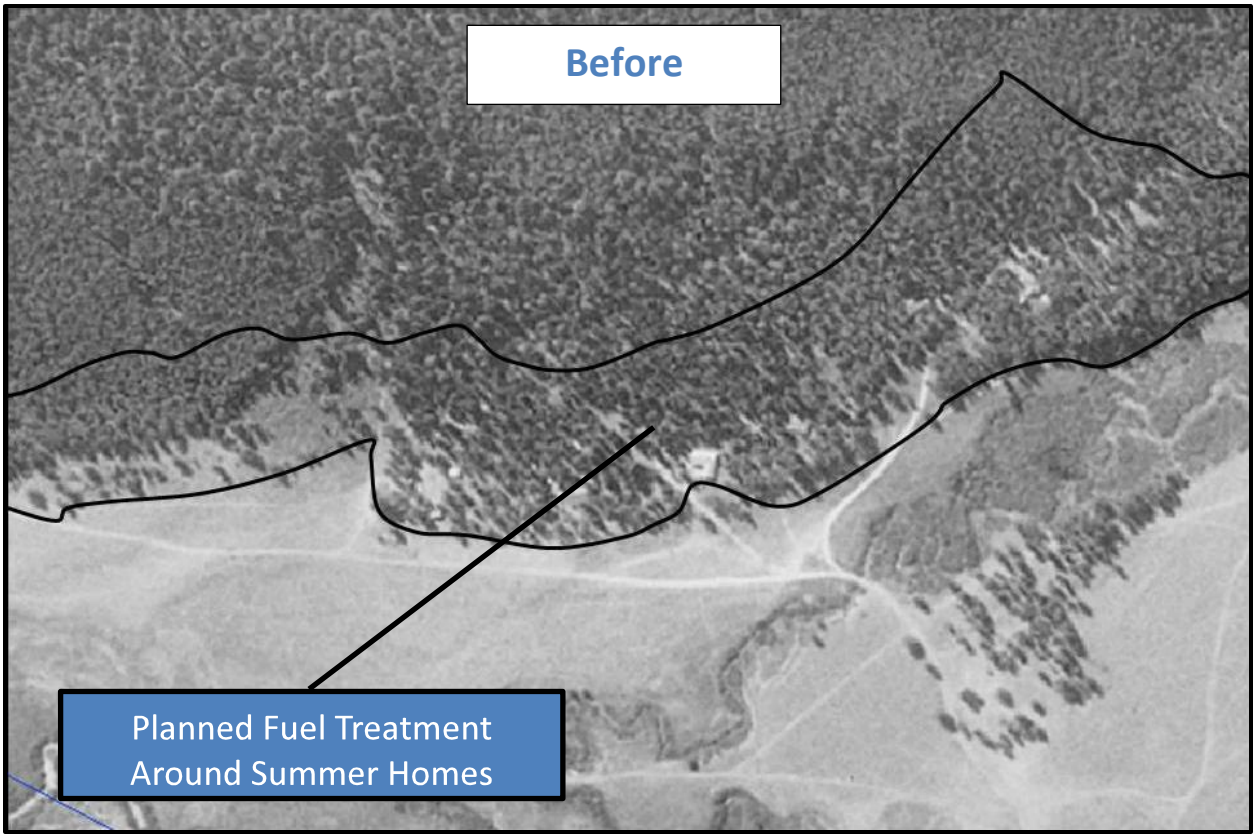


Figure 15 – Middle Piney summer homes before the fuel treatment. (Source: Digital Orthophoto Quadrangle, 1974.)

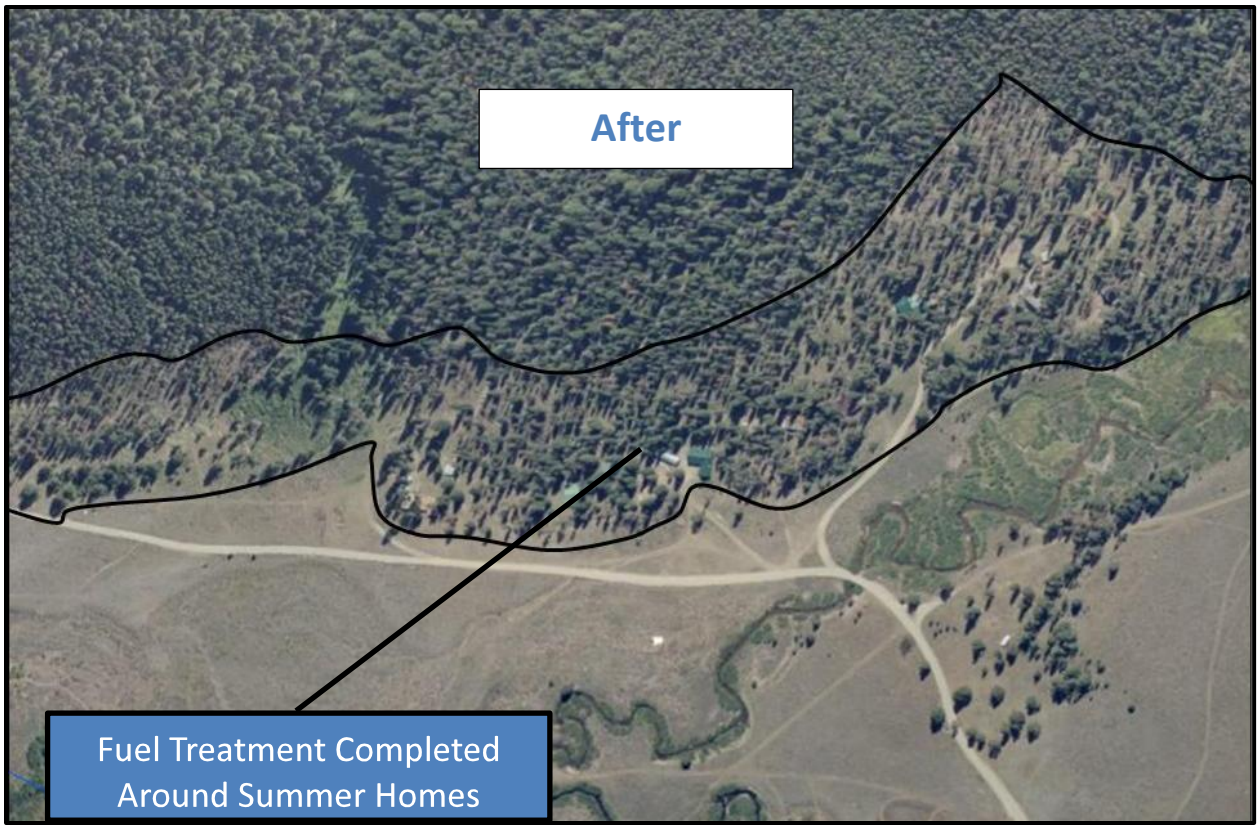


Figure 16 – Middle Piney summer homes after fuel treatment.
(Source: Remote Sensing Application Center – 0.5 meter imagery, 2007.)

"Having the hazardous fuel treatment allowed firefighters to stay longer and do a burnout and be successful in saving the summer homes of Middle Piney."

Paul Hutta, East Zone Fire Management Officer
Bridger-Teton National Forest

9. Post Fire: Middle Piney Fuel Treatments Prove Successful at Reducing Risk to Homes

This hazardous fuels treatment project also included a total understory removal that removed all of the ladder fuels (vertically continuous fuels that enable surface fires to transition into forest crown fires). This encompassed cutting understory subalpine firs as tall as 15 to 20 feet, which would then be hand piled and burned during the fall or winter. Lastly, the treatment included removing dead and dying vegetation and down surface fuels around the homes. The goal was to keep the surface fuel loads fairly light for this type of ecosystem (around 10 tons per acre or less).

The hazardous fuel treatment work started in the fall of 2003, with thinning and hand-piling completed by the fall of 2004. Hand piles were burned over the 2004-2005 winter. Approximately 30 acres were treated, with the southern interior edge of the treatment stopping where the slope became too steep. The total treatment cost was approximately $10,500 dollars—or $350 dollars per acre.

Over the next 2 years, after the fuel treatment was completed, bark beetles began to hit the area, creating additional dead and down trees. To help guarantee success in protecting the summer homes from the Fontenelle fire, these additional fuels were removed by fire crews a few days before the Fontenelle Fire's burnout operation.

Overall, the fuel treatment around the Middle Piney summer homes was very successful at meeting the objective of reducing the risk to the summer homes by helping protect them from a crown fire. The fuel treatment also provided a safe environment in which firefighters could successfully implement and complete their suppression duties.

To learn more about the fuel treatment
that successfully saved the Middle Piney Summer Homes
from the 2012 Fontenelle Fire, please contact:

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