YOUTH AS CHANGE AGENTS IN WILDFIRE PREPAREDNESS:
Findings to Guide NFPA Outreach Strategy

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IT'S A BIG WORLD.
LET'S PROTECT IT TOGETHER.*
ACKNOWLEDGMENTS

NFPA would like to acknowledge many partners for their contributions to this report. Their invaluable assistance helped us better understand what youth know about wildfire and how they want to learn to be better prepared and make a difference in the wildfire safety of their communities.

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EXECUTIVE SUMMARY

This report presents findings from surveys and focus groups conducted between June 2017 and April 2018 in wildfire-prone states with the ultimate purpose of guiding the development of a teen outreach strategy for the National Fire Protection Association (NFPA). NFPA’s Wildfire Division originally explored wildfire safety education for middle and high school students after discovering that, while this demographic is underserved by information and resources, teens did have the interest and desire to take steps to protect themselves and their families. Students in this age group can make many of their own decisions about safety actions and can become agents of change in their communities.

NFPA held community conversations and workshops in 2012 with students and parents in Texas and Colorado, and developed a collection of materials to address workshop findings. As a five-year follow-up to these workshops, NFPA’s Wildfire Division designed a second data collection approach to learn more from middle and high school students, teachers, and parents to improve its resources for youth. Data collection for this research was conducted in two phases: the first involved online surveys for teachers and students; in the second, focus groups were conducted with middle and high school students in California, New Mexico, and Florida.

Key findings concern the kinds of wildfire information students have been receiving at school, what they would be interested in learning more about, their preferences for methods of receiving such information, and whether they had wildfire preparedness and evacuation plans at school as well as at home with their families. The most widespread understanding about wildfires was that they can happen anywhere, at any time, and that once they start, wildfires spread fast. Overall, however, the students did not indicate substantial knowledge of the causes and effects of wildfires. Many students in the focus groups had firsthand experiences with wildfires, but few participants in the focus groups or survey had plans established with their parents about what to do in the event of wildfire or a threat of evacuation.

Similar to the findings from the 2012 workshops, data from the 2017–2018 focus groups with students point to the important role teenagers could play in sharing information they learn about wildfire safety and preparedness with their families. Few students were aware of the free
resources that NFPA offers to help youth and other community members become involved in wildfire safety, but most students expressed a desire to learn more about wildfire and how they can better safeguard themselves, their families, and their pets. Additionally, few students had helped their families or neighbors prepare for a wildfire, but many expressed interest in participating in a community wildfire preparedness project. Receiving community service credits for the neighborhood wildfire preparedness projects was a desirable incentive for some of the students, although many noted that they would be motivated to participate just to improve the safety of their communities.

For activities both inside and outside the classroom, student responses indicated that one of the most significant elements for their engagement was to be at the center of the experience. Students noted that they would be interested in having fire professionals come into the classroom to present and teach about wildfires; however, students in all four schools sampled for focus groups showed great enthusiasm for learning about wildfire safety and preparedness by taking field trips to fire departments or through virtual reality games or simulations.

Ultimately, the key findings presented in this paper offer guidance on how NFPA can develop an enhanced teen wildfire outreach strategy that centers students in their learning experiences and empowers them to be change agents for the future. The outreach strategy could cut across the following four major categories:

1. Raising awareness of wildfire risk and risk reduction actions
2. Reducing vulnerability to wildfire loss
3. Reaching others through youth
4. Reinforcing collaborative efforts with youth and community leaders to address place-specific wildfire risks proactively

BACKGROUND AND OBJECTIVES

At the time NFPA published the 2013 report, “Engaging Youth in Reducing Wildfire Risk: Community Conversation Workshop Findings and Research,” few wildland fire safety materials, curricula, or programming existed that specifically targeted youth. For emergency preparedness and planning in general, however, research showed that youth could be critical messengers and
translators for communicating valuable information to their friends and family, particularly when language or cultural barriers existed for their family members (FEMA 2010). In terms of community preparedness for, and resilience to, natural disasters, studies had found youth to be important agents alongside families, school, and other community organizations (Wisner 2006). Together, this collection of evidence indicated that there is both great potential value and need for more robust youth-oriented resources on wildfire safety and preparedness.

In the summer of 2012, Firewise Program staff held six workshops throughout Texas and Colorado to obtain input from middle and high school students and their parents that would help guide wildfire resource development. Through interactive conversations, the staff gained insight into the kinds of information youth wanted and needed regarding wildfire safety, where they typically received their wildfire information, and where and how they would like to receive information and messaging going forward. The staff also asked about the types of information the youth thought would be important to know about wildfire and what would motivate them to search for and act on wildfire safety information. Overall, the students expressed a great deal of interest in participating in wildfire safety programs and a willingness to share the information they received with their families. On the whole, the parents who participated in the workshops also believed that their children were effective messengers when bringing home information about safety issues. However, many parents shared the feeling that the wildfire safety information their children received at school was very limited and there was a need for teachers to have additional education on the topic.

Since receiving this feedback from students and parents living in wildfire-prone communities, NFPA has developed numerous resources for youth related to wildfire safety and preparedness, which are posted on NFPA’s TakeAction website (https://www.nfpa.org/Public-Education/Campaigns/TakeAction). The resources include the following:

- Three virtual field trips with accompanying lesson plans
- Downloadable videos
- Pet preparedness information
- Community service project ideas
- A go bag (also known as an evacuation bag or kit) tip sheet
In a five-year follow-up to the 2012 workshops with students and parents, NFPA’s Wildfire Division designed a second data collection strategy to learn more from middle and high school students, teachers, and parents to improve its resources for youth. This report presents the findings from surveys and focus groups conducted in wildfire-prone states between June 2017 and April 2018, with the ultimate purpose of guiding development of a new teen wildfire outreach strategy for NFPA.

Through the surveys and discussions with study participants, it became evident to the NFPA that the youth wanted to be part of a local project that would reduce their community’s risk of wildfire loss. The participants wanted information and resources to help drive change in their communities. NFPA sees these young citizens as agents of change, not only within the context of their families, but also as potential leaders and developers of wildfire safety solutions. It is NFPA’s goal to provide them with the tools they need to increase their knowledge about wildfires, reduce their vulnerability to loss, and engage with others in their communities to plan and implement solutions that will create safer neighborhoods.

**RESEARCH DESIGN**

Data collection for this research was conducted in two phases: the first involved online surveys for teachers and students; the second, focus groups were conducted with middle and high school students in three states. Between September and October 2017, online surveys were distributed to environmental science and general science teachers in middle and high schools in 13 states. NFPA selected states known to be prone to wildfires — Arizona, California, Colorado, Florida, Kansas, North Carolina, New Mexico, Nevada, South Carolina, Tennessee, Texas, Utah, and Washington — and worked with the organization Young Minds Inspired (YMI) to distribute the surveys to its network of more than 500 teachers in these states.

Only 13 teachers from five states (Arizona, California, Florida, Texas, and New Mexico) responded to the survey, a number that did not offer a large enough sample size for identifying major trends in teacher experiences with wildfire safety and preparedness curricula or
programming. Any statistics provided from the teacher survey represent only this small sample and may not reflect the population of science teachers in these wildfire-prone states.

The student survey, however, yielded 663 respondents, with 481 middle and 182 high school students completing it online. This survey was administered by seven teachers who participated in the teacher survey, representing seven schools in Arizona, California, Florida, Texas, and New Mexico. The following is respondent representation by state out of the total sample:

- Arizona: 132 respondents (19.9%)
- California: 97 respondents (14.6%)
- Florida: 187 respondents (28.2%)
- New Mexico: 110 respondents (16.6%)
- Texas: 137 respondents (20.7%)

Similar questions were asked both teachers and students to evaluate the kinds of wildfire information students had been receiving at school, what they would be interested in learning more about, and their preferences for methods of receiving such information. Teachers were also asked about the kinds of curriculum resources that would be helpful for teaching students about wildfire and whether they would be interested in partnering with other teachers to learn how to engage students in wildfire preparedness educational activities. Students were also asked whether they had wildfire preparedness and evacuation plans at school as well as at home with their families. Most of the questions were closed-ended; a few offered teachers and students the opportunity to provide additional information or describe an “Other” response option. (See Appendix A for the student survey questions.)

The survey questions were developed by members of NFPA’s Wildfire Division and vetted by NFPA’s research team and by YMI, which specializes in developing curricula and materials for teachers. Members of NFPA’s Public Education team, which produces outreach materials for children on fire safety, also provided feedback on the questions during the survey development.

The four in-person focus groups were conducted by NFPA’s Program Manager for Wildfire Education (corresponding author) between June 2017 and April 2018. Three schools were
selected to be the sites for these focus groups through purposive and convenience sampling. The sample was purposive because the schools needed to meet certain criteria, including being (a) in a wildfire-prone area, (b) in either a city suburb or rural community, and (c) a middle school, high school, or combination middle and high. Convenience sampling was also used to select the schools for the study; the corresponding author identified them and was allowed access through either a personal or a professional connection.

For a more inclusive view of the needs of the young people, NFPA strove to interview children from lower socioeconomic backgrounds and planned its focus groups in communities that had diverse populations. The questionnaire used in the focus groups was translated into Spanish and a volunteer translator assisted at one of the focus groups for students and parents not proficient in English. Table 1 provides a general overview of the selected schools’ location, grade level(s), community type, area median household income relative to the state, percentage of racial-ethnic minority student enrollment, and the largest minority representation in the student body.
Table 1: General Overview of Communities, Schools, and Socioeconomic and Racial-Ethnic Demographics

<table>
<thead>
<tr>
<th>School Location</th>
<th>Grade Level(s)</th>
<th>Community Type</th>
<th>Area Median Household Income Relative to State*</th>
<th>Racial-Ethnic Minority Student Enrollment**</th>
<th>Largest Minority Representation in Student Enrollment**</th>
</tr>
</thead>
<tbody>
<tr>
<td>School 1: Southern California</td>
<td>Middle/High</td>
<td>Rural</td>
<td>Higher</td>
<td>30%</td>
<td>Hispanic/Latino</td>
</tr>
<tr>
<td>School 2: Central Florida</td>
<td>Middle</td>
<td>Suburban</td>
<td>Lower</td>
<td>64%</td>
<td>Hispanic/Latino and Black/African American</td>
</tr>
<tr>
<td>School 3: Central New Mexico</td>
<td>Middle/High</td>
<td>Rural</td>
<td>Higher</td>
<td>31%</td>
<td>Hispanic/Latino</td>
</tr>
</tbody>
</table>

*Source: www.city-data.com (U.S. Census Bureau 2016 Estimates)

**Source: Self-reported by school contacts.

The focus groups were led by the corresponding author, with assistance from two classroom teachers in each school. Each child who participated in the focus group discussion submitted a signed parental consent form, developed by NFPA’s legal counsel (see Appendix B for the Consent Form). Along with the consent form, NFPA sent an informational letter to the parents to provide background on the purpose of the focus groups discussions (see Appendix C for the School Parent Letter). At the beginning of each session, the corresponding author allowed time to introduce herself and explain her purpose for being there, as well as to let the students share a little bit about themselves, if they wanted to, to feel comfortable speaking with her and in front of the group. On average, the focus group sessions lasted 45 minutes each. (See Appendix D for the list of focus group questions.)

During the sessions, one classroom teacher helped keep the students engaged, while the other teacher took notes on student responses to the questions. The notes recorded during the sessions were later typed, and they serve as the primary qualitative data source for this paper. In the southern California charter high school, all of the students who participated in the focus group also provided written responses to the questions. These responses offered a supplemental data source alongside the notes from their focus group session.
KEY FINDINGS

To gauge students’ knowledge about different aspects of wildfire, the survey began by asking respondents to state whether statements were true, false, or that they did not know the correct answer. Among the students surveyed, the most common understanding about wildfires was that “Wildfires can happen anywhere, at any time.” As Table 2 shows, approximately two-thirds (64.9%) of the students surveyed were aware of this fact. About half (49.5%) of the students surveyed also knew that it is possible to protect a home from wildfire.

However, overall, the students did not indicate strong knowledge of the causes and effects of wildfires inquired about in the survey. Almost half (45.4%) of the students surveyed had the false perception that most wildfires are caused by lightning; another fifth (19.8%) of the students did not know whether this statement was true or false. In total, 51% of the students did not know that wildfires can help keep forests healthy, as 38.8% believed such statement to be false and another 12.2% did not know whether it was true or false. The majority (approximately 57%) of students were also not aware of the fact that wildfires can cause erosion.

<table>
<thead>
<tr>
<th>Statement</th>
<th>TRUE</th>
<th>FALSE</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most wildfires are caused by lightning.</td>
<td>45.4%</td>
<td>24.9%</td>
<td>19.8%</td>
</tr>
<tr>
<td>Wildfires can happen anywhere, at any time.</td>
<td>64.9%</td>
<td>17.8%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Wildfire can help keep forests healthy.</td>
<td>39.2%</td>
<td>38.8%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Wildfire can cause erosion.</td>
<td>32.7%</td>
<td>19.6%</td>
<td>37.3%</td>
</tr>
<tr>
<td>It is impossible to protect a home from wildfire.</td>
<td>22.0%</td>
<td>49.5%</td>
<td>18.6%</td>
</tr>
</tbody>
</table>

In the focus groups, the most common wildfire knowledge students expressed was that they knew wildfires spread fast once they start. Students from two groups also mentioned that they knew wildfires can be caused naturally as well as by human actions, like discarding cigarettes or having campfires. Several high school students from southern California indicated more sophisticated knowledge about wildfires, as one indicated an understanding of spotting, stating
that wildfires “can just start another flame feet away from the original.” Another student was aware that wildfires can be beneficial to the ecosystem.

**Sources of Information About Wildfire**

For students in the focus groups in southern California and central New Mexico, the most common source of information about wildfire was firsthand experience. Out of the southern California high schoolers, only one student had not had firsthand experience with wildfire. Among the middle and high schoolers in southern California, other sources of information included parents (some of whom were firefighters), local news, teachers, presentations, and family friends who were firefighters. When asked specifically whether they discussed wildfire-related issues with their parents, many of these students stated that they had and provided numerous examples of topics they discussed, such as packing an evacuation bag; creating a checklist of what to do in a wildfire event; making sure they have food and water should they need to evacuate; and cutting brush, weeding, and raking leaves on their property. On the other hand, students from the middle/high school in central New Mexico shared that they did not talk with their parents about wildfire enough and they hoped to gain more information so they could discuss it with their parents when they went home.

In the central Florida middle school, students in the focus group reported receiving most of their information about wildfire from the media, library books, and people they knew, but not very much from their parents. The students from this school reported that they did not talk about wildfire safety and preparedness with their parents. They also all agreed that they had not received formal education on the topic since early in elementary school when they had the Smokey Bear Program, which they remembered as centering on not playing with matches. In the middle/high school in central New Mexico, students reported that the only time wildfire was discussed at school was as part of their environmental science curriculum, which did not have to do with wildfire safety.

**Students’ Desire for More Wildfire Knowledge**

In each focus group, students stated that they would like to learn more about wildfire and how they can safeguard themselves and their families better. Most students who had some knowledge
about wildfire safety expressed a desire to learn more. In the middle/high school in rural New Mexico, none of the students believed that they had adequate knowledge about what to do if there was a wildfire in their neighborhood. The high school students in southern California, on the other hand, expressed the most confidence in their knowledge about how to prepare for a wildfire and what to do in the event of an evacuation.

Students surveyed expressed a desire to learn more about what to do in the event of a wildfire. As the chart below shows, 62.3% of the students wanted to know more about what to do when a wildfire approaches. Over half of the students also wanted to learn more about how to prevent wildfires and how to make homes and communities safer from wildfire (56.7% and 54.6%, respectively).

Overall, the students surveyed indicated that wildfire safety and prevention were the topics of most interest to them, more than the causes, effects, and behavior of wildfires. Just under half (49.3%) of the students wanted to learn more about how wildfires affect the ecosystem. Fewer were interested to know more about how firefighters put out wildfires (44%), how wildfires get started (39.1%), and how wildfires spread (30.8%).
How Would Teens Like to Learn More About Wildfires?

Students were asked in both the surveys and the focus groups how they would like to learn more about wildfire. As the chart below shows, over half of the students surveyed indicated that they would like to learn through classroom activities and discussion (52.5%) and by watching a video online (50.7%). About one-third (35.6%) of the students surveyed wanted to receive information from the fire department, 28.5% wanted to learn more about wildfire from TV news, and 26.4% wanted to learn through a school assembly. Fewer than one-fifth of the students surveyed ranked the following as their preferred methods for learning about wildfire: following social media (16.7%), TV ads with celebrities (16.4%), an afterschool group project (15.8%), and sharing information with family and friends (9.4%).

In all four focus groups, students said that they would like to learn more about wildfire through presentations or demonstrations from fire professionals, videos, and virtual reality. Students were interested in learning many aspects about wildfire from fire professionals, such as how to properly reduce fuel around one’s home (e.g., cutting bushes and trimming trees), how to put out fires, and how to make their families and their homes safer from wildfire in general. Students mentioned that YouTube®, Google®, and social media platforms can be used to access educational videos on wildfire-related issues. In particular, some noted that they would like to
see a “how-to” video showing how a family can pack for an evacuation and evacuate faster in a docudrama, or a type of video that might be on the Weather Channel® that provides information about wildfire science and wildfire behavior. Students in the focus groups talked about how virtual reality games or simulators could be used to show “what it is really like” to be near a wildfire, what to do in the event of a wildfire, and how houses burn.

What Media Do Teens Use Outside School to Get Information About Natural Disasters and Emergency Preparedness?

In the student survey, respondents were asked to mark their top five media sources of information about natural disasters and emergency preparedness. Their responses to this question offer additional evidence of the prominent role that videos and smartphone media play in teens’ lives. As the chart below shows, YouTube (53.8%) was the most frequently cited source of this kind of information, followed by news shows (40%), smartphone apps (37.1%), and Instagram® (33.6%). Just under one-third (32.1%) of the students marked radio as one of their top information sources. Perhaps surprising based on the popularity of these social media outlets, Snapchat®, Facebook®, and Twitter® were not ranked high for being teens’ sources of information about natural disasters and emergency preparedness.

![Chart showing media sources for information about natural disasters and emergency preparedness](chart.png)
A study conducted by Steelman et al. (2015) revealed that adults also considered radio to be a trusted source of information about wildfire. Additionally, the study noted that less than 10% of respondents deemed social media outlets such as Facebook and Twitter to be reliable sources of such information.

**Evacuation Experiences and Preparedness**

Questions about students’ firsthand experiences with wildfire, evacuations, and family preparedness were asked in the online surveys and in the focus groups. Just 6.8% of the students surveyed had ever been evacuated during a wildfire. Of those few, half reported that their families had a plan to evacuate ahead of time; the other half did not. Overall, only one-fifth (20.7%) of the students surveyed had a family wildfire preparedness plan for when they are home alone. Even fewer (16.3%) had a wildfire preparedness plan for when they are at school. Furthermore, very few students surveyed could state with certainty that they had a wildfire evacuation kit/backpack ready at home or at school (10.3% and 4.8%, respectively).

In the focus groups, on the other hand, many students indicated that they had firsthand experience with wildfire and shared stories about having to evacuate with their families. Among the middle schoolers in southern California, nine of the 12 students (75%) had personal experience with wildfire. In five of those cases, the students’ families had mandatory evacuations. The class could recall three wildfire events in the area, two of which had been during the previous year and a third that they experienced at a very young age in 2007. Likewise, most high school students from this community also had firsthand experience with wildfire. One student recalled being trapped by a fire and having to be rescued. Most middle and high schoolers from this community thought that their families had not been very prepared before their experiences with wildfire but that they were more prepared now. Many of the high school students reported that they had evacuation bags ready at their homes, but others did not and were not sure what an evacuation bag was. Some of the middle schoolers also said they had evacuation bags ready at home and two students said they had bags ready with food and supplies for pets.
Overall, most of the students from the community in southern California said that they had discussions with their parents about wildfires; however, fewer had a concrete plan for what to do if the students were at school or at home when their parents were away. The students’ most common responses about their plan of action involved asking neighbors for help or driving away from the house, although the middle schoolers and some of the high schoolers did not have their driver’s licenses.

In the middle/high school in central New Mexico, every student who participated in the focus group had a firsthand experience with wildfire. For some, the event occurred when they were very young, and they had limited memory of it. Others recalled having to evacuate late at night, that it was smoky and scary, and that the worst part of it was leaving their animals behind. All the students agreed that their parents did not seem prepared for this kind of emergency. Each of the students shared their concerns that they do not have what they would consider an adequate plan for what to do if there were a wildfire when they are at school or at home when their parents are not there. About three-quarters of the students did report, though, that they had some belongings packed and ready at home or in their parents’ cars in case they needed to evacuate.

Similarly, middle schoolers in central Florida had experiences with wildfire for which their families were not prepared. One student shared that his/her family members had not ever discussed the wildfire experience together. Another mentioned that his/her family had still not prepared for a wildfire emergency because they did not have money to do so. Of the nine students in the focus group, none had an evacuation bag ready. Although none of these middle school students were of legal age to drive, some said that their plan if their parents were away would be to drive themselves and younger siblings away from the house. Many students from the other sampled schools mentioned that they would ask neighbors for help in a wildfire emergency, but students from this school stated that they would not do so because they were afraid of strangers in their neighborhood, the police, and people in authority.

**Teens’ Responsibility for the Care of Younger Children**

In the surveys and focus groups, questions were asked to ascertain whether the teenagers were responsible for the care of younger children and, if so, would they be prepared to take care of
themselves and the children in the event of a wildfire. More than half (57.9%) of the students surveyed reported that they were sometimes responsible for the care of children younger than they were. About half (52.9%) of these students believed that they knew what to do to keep the children safe in the event of a wildfire, while under one-fifth (18.8%) did not think they would know what to do, and about a quarter (26.3%) were not sure if they would know what to do. The majority (76.3%) of students who were sometimes responsible for the care of younger children had not planned with adults how to keep children safe in wildfire emergencies. About a third (31.5%) of the students who care for younger children would be able to drive the children to safety in such an event, but only about half (49.2%) of those students had access to a vehicle.

**Students’ Concerns About Family, Friends, and Pets**

In the focus groups, students were asked what their biggest concern would be if a wildfire were to occur in their community. The most widespread concern across the four schools was the safety of the students’ family, friends, and pets. Students in each of the schools talked about the importance of getting themselves and their loved ones away from danger. They shared concerns that their homes and belongings would be lost to the fire, but there was greater worry that people or animals would be trapped inside the homes. Students were also concerned that they would not know what or where to evacuate in a wildfire emergency, and that the fire would spread so fast that they would have to leave their pets behind.

**Teens’ Roles in Helping Prepare for Wildfire**

Overall, just 13.3% of students surveyed indicated that they had helped their family prepare for a wildfire. Of those who had helped their families prepare, the kinds of activities most cited involved mitigation work around the home. About half of these students had helped their families by raking leaves (52.3%), clearing dead branches (51.1%), trimming trees and shrubs (47.7%), or cleaning up trash and debris (47.7%).

Very few (5.7%) of the students surveyed had ever helped their neighbors with wildfire preparedness, but a number of students provided commentary about their willingness to participate in a community wildfire preparedness project. Fifteen students noted that they would not need any external incentive to participate in such a project; that they would be motivated just
by knowing that they were helping their community. If incentives were to be offered, though, the students indicated that the biggest motivators would be receiving community service credit at school or recognition by the local fire department (42.1% and 35.4% of students surveyed, respectively). As the chart shows, fewer said that they would be motivated by recognition on social media (27%), some local award (25.6%), a monetary award (24.6%), or a school certificate (19.6%).

In three of the four focus groups, all or almost all of the students indicated that they would be interested in participating in a project that could make their communities safer from wildfire. While most of these students said that they would not want recognition or reward for this work, high schoolers in one of the groups expressed their desire to be recognized or somehow compensated for their participation. These students noted that they were preparing for college and that earning money would help with college expenses. Receiving credits for community service hours or a civic award would also be helpful for earning college scholarships, some said.

In central Florida, some of the middle school students indicated that they would be afraid to participate in a project in their community, but that they would like to help their parents, other family members, or family friends with a project. Some also mentioned that they would be
interested in doing a wildfire-related project at school. The students said that they would not want recognition or money for participating in these projects; rather, they would like to get involved in wildfire preparedness mainly for the safety of their family, pets, and homes.

Just one-fifth (20.1%) of the students surveyed were aware of the free resources that NFPA offers to help youth and other community members become involved in wildfire safety. About a third (31.7%) of the students surveyed indicated that they would be interested in free resources to help them participate in wildfire reduction activities. Another 42.4% indicated that they might be interested in these free resources.

**Teachers’ Perspectives for Consideration and Further Investigation**

With only 13 teachers responding to the online survey, there is not a large enough sample size to identify major trends in teacher experiences with wildfire safety and preparedness curricula or programming. However, the data offer a few patterns that may merit additional investigation.

Just over half (53.8%) of the teacher respondents indicated that they always teach their students about wildfire at some point during the year. One teacher noted that the lessons focus on how to put out a small fire and fire safety with campfires, but that there is no discussion about how to escape a wildfire. Approximately one quarter (23.1%) of the teacher respondents reported that they sometimes teach their students about wildfire at some point, while the remaining quarter (23.1%) never do.

For those who do not teach about wildfire and wildfire preparedness, the top reason cited was that the topic was not part of their curriculum. The second most cited reason was “lack of class time.” A small percentage of the teachers said that the available materials on wildfire and wildfire preparedness do not meet state curriculum requirements, while one teacher noted, “The available materials DO meet state curriculum requirements, but teaching about wildfire is not a required standard or benchmark.” Overall, only 15.4% of the teachers surveyed have curriculum or lesson plans for teaching students about wildfire and wildfire preparedness.
Interestingly, in contrast to what the students reported, most of the teachers who responded to the teacher survey indicated that they believed their students would be more interested in learning about the causes, effects, and behavior of wildfires than learning about what to do when a wildfire comes near or how to prevent wildfires. Like the student respondents, however, the teachers indicated that online videos, lesson plans for classroom activities and discussion, and virtual reality simulations (in particular, virtual field trips to wildfire locations) would be helpful in teaching about wildfire. In terms of what teachers would most like to have if free curriculum resources were available, these three kinds of resources far outranked other response options.

Relatively few (15.4%) teachers surveyed indicated that they would like to have online opportunities for students to talk to fire department experts or other students with experience of wildfire, and just a little over a third (38.5%) reported that they would like a student from an area that experienced wildfire to come to speak with their students. However, students’ responses from the surveys and focus groups showed interest in learning through these kinds of resources and others’ firsthand experiences. While they were less interested in having opportunities available for students to speak with people online, the majority of the teachers did indicate that they would like to have either a state forester (69.2%) or a member of the fire department (61.5%) come to their classroom to speak with students in person about wildfire.
None of the teacher respondents’ schools had organized student service projects to promote wildfire preparedness, and none of the teachers were aware of the free resources that NFPA offers to help youth and other community members become involved in wildfire safety. Most teachers surveyed indicated that they would be interested in partnering with other educators to learn how to engage students in wildfire preparedness educational activities. A few of these teachers noted, though, that they would only be interested if the activities met curriculum requirements. A few also noted that they would be interested in the activities only if they were at no cost.

Overall, due to the lack of teacher engagement in this survey with only 13 respondents, it would be worthwhile to conduct a future study of the interest educators have in wildfire-related materials and resources.

**DISCUSSION**

Across several topics, data from the 2017–2018 student and teacher surveys and focus groups reflect similar findings to those in NFPA’s 2013 report, as well as findings from other previous
studies on youth engagement in wildfire education. When speaking to parents in the workshops in 2012, NFPA found that many had not been proactive in talking to their children about wildfire before a wildfire event occurred in their communities. Parents from these workshops reported feeling unprepared or not educated enough to teach their children about wildfire safety; many also felt that the information shared at school was extremely limited. Teachers who participated in NFPA’s 2017 surveys also confirmed that the topic of wildfire was not typically a primary theme in their curriculum, as other studies have noted (e.g., Ballard et al. 2012; Jakes 2012a; Jakes 2012b). For example, wildfire prevention might be a subtopic within an environmental science standard, but issues like the science of home ignition usually would not be addressed.

Many students in the 2017–2018 focus groups reported that they had not had much discussion with their parents about wildfire. Some students in the focus groups, particularly those in southern California, felt that their parents had communicated important information about wildfire safety and preparedness to them; however, the majority of students surveyed and in the focus groups did not have plans with their families for what to do if a wildfire occurred while they were at school or at home alone. Other than some students’ perceptions that preparedness planning would be too costly for their families, our data lack deeper insights into families’ reasons for not preparing for, or talking to their children about, wildfire emergencies. To have a better understanding of the challenges faced in family wildfire preparedness planning, it would be useful to have further research that gathers information and perspectives from parents.

Similar to the findings from the 2012 workshops, data from the 2017–2018 focus groups with students point to the important role teenagers could play in sharing information about wildfire safety and preparedness with their families. Previous literature on disaster preparedness in general (e.g., Wisner 2006; FEMA 2010) and wildfire safety and preparedness in particular (e.g., Monroe and Oxarart 2012; Ballard and Evans 2012) have emphasized how students can act as messengers for their families and encourage their parents to be engaged in planning at home for wildfires and threats of evacuation, and many students in the 2018 focus groups expressed their willingness to do so. The students’ openness to discussing their fears and concerns also supports previous findings on children’s knowledge of wildfire risk (Towers et al. 2011 as cited in NFPA 2013) and experience of trauma from wildfire experiences (Pang et al. 2008). Together, these
findings suggest that teachers or other group facilitators can provide an environment in which students can have productive and meaningful conversations about their fears of natural disasters and what they and their families can do to protect themselves and their homes.

Data from the surveys and focus groups also support NFPA’s (2013) and Monroe and Oxarart’s (2012) findings that many students are eager and willing to participate in hands-on learning activities and community projects. Similar results have been found in other research, indicating that adults also want to engage in hands-on activities to improve the wildfire safety of their communities (McCaffrey and Olsen 2012). According to the teens who participated in this study, major incentives were not necessary to motivate them. Receiving community service credits for the neighborhood wildfire preparedness projects was a desirable incentive for some of the students, although many noted that they would be motivated to participate just to improve the safety of their community.

For activities both inside and outside the classroom, student responses indicated that one of the most significant elements for their engagement was to be at the center of the experience. These findings echo previous studies (e.g., Ballard and Evans 2012) that have highlighted the importance of providing hands-on experiences in wildfire education. While survey respondents and focus group participants noted that they would be interested in having fire professionals come into the classroom to present and teach about wildfires, students in all four schools sampled for focus groups showed great enthusiasm for learning about wildfire safety and preparedness by taking field trips to fire departments or through virtual reality games or simulations.

Students’ responses about their desire to learn through virtual reality offer further support for NFPA’s (2013) finding that students believed technology, electronic games, smartphone apps, and different kinds of digital effects could help draw them into learning more about wildfire. Evaluations of other wildfire education programs for youth, such as Ballard and Evans’ (2012) case study of the Wildfire in the Foothills (WIF) Program in Butte County, California, have offered similar insights for ways to boost student engagement in the subject. Following their experience in the WIF program, for example, groups of students and teachers agreed that more
interactive teaching and learning resources could be incorporated. Videos, visual aids, digital media, and games were recommended over lectures, worksheets, or other traditional classroom teaching and learning techniques.

More than in the NFPA’s 2012 workshops, students who participated in the 2017–2018 surveys and focus groups suggested that virtual reality (VR) or augmented reality (AR) games or simulators would be an effective and desirable method for learning about wildfire. To differentiate the two, in AR, real-world environments are blended with simulated experiences, and VR produces fully simulated environments and experiences (Liou et al. 2017). Numerous studies on the educational applications of AR and VR have found that AR and VR technologies offer student-centered, engaging methods for teaching scientific concepts and supporting inquiry-based learning (for extensive literature reviews on the educational applications of AR and VR, see Psotka 2013; Antonioli et al. 2014; Bacca et al. 2014; Liou et al. 2017; Yoon et al. 2017). Furthermore, the increasing ability to access virtual worlds or augmented reality experiences through low-cost methods, such as with a smartphone or tablet, offers great potential for more teachers to incorporate these teaching methods in the classroom.

Notably, recurrent obstacles teachers face in teaching about wildfire safety and preparedness center on curriculum standards and costs of activities. In NFPA’s 2012 workshops, as well as in other studies (e.g., Monroe et al. 2015), teachers emphasized the importance of having monetary resources for the educational materials. A small percentage of teachers who participated in NFPA’s 2017 survey also noted that cost of materials is something that prevents them from teaching about wildfire and wildfire preparedness, while other teachers highlighted the fact that wildfire is not part of their curricula. The U.S. Department of Agriculture’s (USDA) Forest Service research series on wildfire education programs for youth (see Monroe et al. 2015) found teachers across the country struggling with curriculum standards. In their lessons learned from Boise, Idaho’s, Field Inquiry Research Experience (FIRE) Up program, for example, Sturtevant and Myer (2013) suggest finding “ways to move beyond boundaries imposed by curriculum and state academic standards” (p. 16), while working in the local educational system. As the students who participated in NFPA’s 2017–2018 survey and focus groups recognized, in addition to improving the safety of their communities, earning community service credits and recognition on
college applications are other benefits of wildfire education programs and projects that go beyond curriculum requirements.

RECOMMENDATIONS

Key findings presented in this report offer guidance on how NFPA can develop an improved teen wildfire outreach strategy, which may offer strategic components that cut across other areas of NFPA’s public education spectrum. Recommendations for a new outreach strategy have been categorized into the following four major areas:

1. Raising awareness of wildfire risk and risk reduction actions
2. Reducing vulnerability to wildfire loss
3. Reaching others through youth
4. Reinforcing collaborative efforts with youth and community leaders to address place-specific wildfire risks proactively

As many teens expressed a desire to learn more about wildfire and how to better safeguard themselves and their loved ones, raising awareness and reducing vulnerability should be two major components of NFPA’s outreach strategy. When developing educational materials, considerations should be made for the teens’ most desired methods for learning about wildfire safety and preparedness. Informational videos, learning opportunities inside and outside of the classroom, games, and interactive experiences for teens could be particularly effective. For example:

- Many teens expressed concerns about not knowing what to do to safeguard pets. A video or podcast could be produced that features someone who successfully evacuated their pets during a wildfire emergency.
- Smoke jumpers could be featured in a video, showing how they pack their backpack before a jump and talking about how youth (and adults) can create their own go bag in evacuation situations.
- An online story could be created in which students are presented with different scenarios and asked to make choices about wildfire safety.
- Interactive experiences using virtual reality (VR) could be developed for teens to simulate a wildfire event. For example:
o A VR experience could situate teens with the vantage point of a wildland firefighter and integrate messaging from the firefighter about the actions teens should take in given scenarios.

o Virtual field trips to fire departments or scenes of wildfire events could also be developed.

• A smartphone app or game using augmented reality (AR), which incorporates simulated experiences and objects into a real-life setting, could be created for teens to identify areas in a yard and around a home where they could help with wildfire mitigation activities and reduce the vulnerability of the property.

Effective outlets for receiving information should also be considered. For example:

• Videos could be posted on YouTube, the media platform where teens said they were most likely to get information about natural disasters and emergency preparedness.

• Other online videos could be available via links provided in curriculum materials for teachers.

• Paid advertising about wildfire safety products could be placed on smartphone apps.

The findings from this study illuminate several major safety issues that would be worthwhile to consider. Most students did not have wildfire emergency plans with their families, and many reported that they had not discussed this issue with their parents. Many teens in the focus groups (as well as parents in the 2012 study) expressed a lack of confidence in knowing what to do in the event of a wildfire emergency. Notably, others did express confidence with their plan of action to drive themselves and younger children out of the wildfire threatened area, which, considering many were not of legal age to drive, presents a dangerous scenario in itself. This suggests a key place for improved outreach. The challenges of safe evacuation or alternatives to evacuation for families could therefore be an issue area that NFPA devotes more substantial attention to than it has in the past. Additional resources and materials could be provided to teens, guardians, and schools to craft emergency plans. For example:

• Discussion tip sheets could be created for teens and guardians to use to prepare at home and at school before, during, and after a wildfire.
• Discussion tip sheets can also be created for parents that explain how to talk with children about the risk of wildfire and how they can be better prepared.

In NFPA’s outreach strategy, youth should be considered as messengers for reaching others and agents of change for the future. Previous literature (e.g., Wisner 2006; FEMA 2010; Monroe and Oxarart 2012; Ballard and Evans 2012), as mentioned above, has also emphasized the important role teens can play in bringing information home to their families and having impact among their peers. Short videos or animated production could be created about how teens can initiate conversations with their parents about wildfire risk, safety, and preparedness. An issue that NFPA could also explore more deeply is how to help develop the networks and peer-learning opportunities for teens to reach each other. Existing organizations where youth come together outside of schools, such as 4-H Clubs, Boys & Girls Clubs, and Girl and Boy Scout troops, could also be considered as forums for wildfire education and disseminating materials and resources that teens can share with their families and networks.

Reaching others through youth goes hand-in-hand with a fourth strategic component: reinforcing collaborative efforts by engaging youth in opportunities to connect with their peers, community leaders, professionals in fire safety and related industries, and the NFPA itself. Just as youth desire to be at the center of their learning experiences, opportunities need to be provided for them be active and engaged agents of change in their communities. Training in wildfire safety could be incorporated into various activities for teens that can give them confidence in their own ability to act appropriately in emergencies, as well as in their ability to teach others about what they can do. For example:

• Teens could be taught how to teach younger children about fire safety concepts, such as “stop, drop, and roll,” “stay low and go,” and how to call 911 in emergencies.

• Teens could be taught how to teach elders in their lives how to program their cell phones for making emergency calls, or to teach their peers about pet safety.

To reinforce collaborative efforts with youth and community leaders to address place-specific wildfire risks proactively, NFPA should consider new ways to engage teens in community risk reduction activities. For example:
• A short video could be produced that shows a wildland firefighter cutting line to slow the spread of fire and talking about how youth can help make their homes and communities safer, for example, by raking up pine needles and leaves.

• NFPA could also create a tip sheet for how community leaders can facilitate community wildfire mitigation projects, as well as a tip sheet for teens describing how to get involved in such projects and receive community service credits.

It is important to note that not all places with wildfire risk have equal resources to reduce their vulnerability. As students in the central Florida focus group noted, acquiring provisions to be prepared for a wildfire emergency seemed to them like it would be too financially costly for their families. A component of NFPA’s outreach strategy could be to explore how to provide direct assistance to schools or work with existing local organizations in economically disadvantaged areas. For example, go-bags and supplies could be given to students in these districts. Giveaways of these valuable items could also be tied to students’ participation in community service projects.

In this youth outreach strategy for wildfire safety and preparedness, many activities, opportunities, and materials would address multiple categories of what could be referred to as the “4Rs”: Raise awareness, Reduce vulnerability, Reach others, and Reinforce collaboration. For example:

• NFPA could explore ways to facilitate networking and learning opportunities through creating its own teen membership program, and introduce teens to other outlets like Federal Emergency Management Agency’s (FEMA) Community Emergency Response Teams (CERT) and affirmers groups.

• Considerations should also be made for connecting teens’ training in wildfire safety to skills and knowledge that can be applied to jobs and careers.

• Relatedly, a jobs board could be created for teens that would be available through NFPA’s teen membership and be replicable by local groups.

Ultimately, NFPA’s outreach strategy should be directed toward providing teens with concrete ways to improve the wildfire safety of their family, pets, and communities, and give them skills
and information that will decrease their current wildfire vulnerability and continue into adulthood.

REFERENCES


Appendix A

Student Wildfire Awareness Survey

Thank you for participating in this National Fire Protection Association (NFPA) research project. We are gathering information from students across the nation to help us improve youth engagement in wildfire preparedness. Please answer each question in this survey and return the completed form to your teacher.

1. How much do you know about wildfire? Check the correct answers.
   a. Most wildfires are caused by lightning.  🗼 1. true  🗼 2. false  🗼 3. don’t know
   b. Wildfires can happen anywhere, at any time.  🗼 1. true  🗼 2. false  🗼 3. don’t know
   c. Wildfire can help keep forests healthy.  🗼 1. true  🗼 2. false  🗼 3. don’t know
   d. Wildfire can cause erosion.  🗼 1. true  🗼 2. false  🗼 3. don’t know
   e. It is impossible to protect a home from wildfire.  🗼 1. true  🗼 2. false  🗼 3. don’t know

2. What more do you want to learn about wildfire? Check all that apply.
   ☐ a. How wildfires get started.
   ☐ b. How wildfires spread.
   ☐ c. How wildfires affect the ecosystem.
   ☐ d. How firefighters put out wildfires.
   ☐ e. What to do when a wildfire comes near.
   ☐ f. How to make homes and communities safer from wildfire.
   ☐ g. How to prevent wildfires.

3. How would you like to learn more about wildfire? Check your top 3 choices.
   ☐ a. Classroom activities and discussion
   ☐ b. School assembly
   ☐ c. Afterschool group project
   ☐ d. Watch a video online
   ☐ e. Follow social media
   ☐ f. Share information with family and friends
   ☐ g. Get information from the fire department
   ☐ h. TV news
   ☐ i. TV ads with celebrities

☐ Other (please explain):  ____________________________

4. What media do you use outside school to get information about natural disasters and emergency preparedness? Check your top 5 information sources.
   ☐ a. Apps
   ☐ b. Community events/activities
   ☐ c. Facebook
   ☐ d. Friends
   ☐ e. Instagram
   ☐ f. Local library
   ☐ g. Local officials (police, fire, etc.)
   ☐ h. News shows
   ☐ i. Newspaper
   ☐ j. Online videos
   ☐ k. Parents/Guardians/Family
   ☐ l. Radio
   ☐ m. Snapchat
   ☐ n. Songs
   ☐ o. Texting
   ☐ p. TV shows
   ☐ q. Twitter
   ☐ r. Video games
   ☐ s. Youtube

☐ Other (please explain):  ____________________________

1 32
5. Have you and your family ever been evacuated during a wildfire?
   □ Yes    □ No

   If YES, did your family have a plan to evacuate ahead of time?
   □ Yes    □ No

6. Have you helped your family prepare for a wildfire?
   □ Yes    □ No

   If YES, what kind of preparations have you helped with? Check all that apply.
   □ a. Raking leaves  □ f. Stacking firewood in a safe place
   □ b. Cleaning dead branches  □ g. Working on home improvement projects
   □ c. Trimming trees and shrubs  □ h. Packing a family evacuation kit
   □ d. Cleaning up trash and debris  □ i. Packing a personal evacuation kit
   □ e. Cleaning out gutters  □ j. Packing an evacuation kit for a pet/pets
   □ Other (please describe): ______________________________________________________

7. Do you and your family have a wildfire preparedness plan for when you are home alone?
   □ Yes    □ No

8. Do you and your family have a wildfire preparedness plan for when you are at school?
   □ Yes    □ No

9. Do you have a wildfire evacuation kit/backpack ready at home?
   □ Yes    □ No    □ Not sure

10. Do you have a wildfire evacuation kit/backpack ready at school?
    □ Yes    □ No    □ Not sure

11. Are you ever responsible for the care of children younger than yourself?
    □ Yes    □ No

    If YES —
    Do you know what to do to keep the children safe if there is a wildfire?
    □ Yes    □ No    □ Not sure

    Have you planned with adults how to keep the children safe if there is a wildfire?
    □ Yes    □ No

    Are you able to drive the children to safety if there is a wildfire?
    □ Yes    □ No

    If you could drive the children to safety, do you have access to a vehicle?
    □ Yes    □ No
12. How important is the safety of your pet(s) during a wildfire?
   □ a. Very important
   □ b. Somewhat important
   □ c. Not important
   □ d. I don't have a pet

13. Have you prepared an evacuation kit for your pet(s) in the event of a wildfire?
   □ Yes
   □ No
   □ I don't have a pet

14. Have you ever helped neighbors with wildfire preparedness?
   □ Yes
   □ No

15. What would motivate you to participate in a community wildfire preparedness project? Check all that apply.
   □ a. Recognition on social media
   □ b. Some local award
   □ c. A school certificate
   □ d. Community service credit at school
   □ e. A monetary award
   □ f. Recognition by local fire department

Other (please describe):

16. Would you be interested in free resources that would help you participate in wildfire reduction activities?
   □ Yes
   □ No
   □ Maybe

17. Are you aware of the free resources that NFPA offers to help youth and other community members become involved in wildfire safety?
   □ Yes
   □ No
Appendix B

CONSENT FORM

Dear Families,

The National Fire Protection Association (NFPA) is a nonprofit organization working to prepare communities for risk of wildfire and is interested in developing tools and resources to educate children about wildfire preparedness.

Together with your local school, NFPA will hold focus groups of about 10-15 students to learn more from children about what they know, believe and want to know about wildfires. The focus groups will be led by your child’s teacher and will include survey questions developed by NFPA and another nonprofit safety organization, Young Minds Inspired (YMI). The focus group will meet during the school day and last 45 minutes with pizza or snacks provided afterwards. All ideas, concepts, suggestions offered in connection with the focus groups will be considered the property of NFPA.

Your child’s input is an important to developing effective educational resources.

Wildfires can occur anywhere and at any time and we encourage you to talk to your child about your family’s plan. Research has shown that children who learn about preparedness are empowered to take safety steps when emergencies occur. To get more information about NFPA’s wildfire website and resources for youth please visit NFPA’s TakeAction page at www.nfpa.org/takeaction. It provides free resources, tips and tools. We hope you will use them with your family to be better prepared.

If you consent to your child’s participation in the NFPA wildfire safety focus group as described in this letter, please sign below and return to your child’s teacher.

Name of Student: ________________________________

Printed Parent or Guardian Name: ________________________________

Relationship to Student: ________________________________

Parent Signature: ________________________________ Date: ________________________________

For more information, go to www.nfpa.org/takeaction

Brought to you by:

TakeAction

NFPA
Learning from our children

LESSONS ABOUT WILDFIRE SAFETY

The NFPA (National Fire Protection Association) and your local school want to hear your child’s story about how they would like to learn to be prepared for wildfire.

Your child will be participating in a focus group forum held in his/her school. The focus group questions were developed by NFPA— a nonprofit organization involved in safety education—to ask them what they know, believe and want to know about wildfires. Teachers in your child’s school will be helping to run the focus group forum.

Wildfires can occur anywhere and at any time. We encourage you to talk to your child about your family’s plan. You can find more information at NFPA’s TakeAction page for youth at www.nfpa.org/takeaction. It provides free resources, tips and tools. We hope you will use them with your family to be better prepared.

We are looking forward to learning from your child and local teachers about how we can develop more tools and resources to help you be safer from wildfire.

For more information, go to www.nfpa.org/takeaction

Brought to you by:
Appendix D

For Students:

1. What do you know about wildfire? Where have you gotten your information? (first-hand experience, word of mouth, news, internet, social media)

2. Do you feel that you understand enough about wildfire and how to prepare for a wildfire? Do you talk about wildfire related issues with your parents? Do you learn about wildfire related issues at school?

3. If you are away from your parents at school, home or with others do you have a plan with your parents about what to do? Are you alone with children younger than yourself? If so what would you do?

4. What is your biggest concern if a wildfire occurs in your community?

5. If you had first-hand experience about wildfire did you feel that you and your family were prepared? Are you better prepared now? Do you have an evacuation bag ready in case you need one?

6. Would you like to learn more about how you and your family can be safer from wildfire? How would you like to learn about this?

7. Would you like to participate in a project that can make your community safer from wildfire?

8. If so what kind of activity would you like to participate in? (Helping around your home with your family, helping seniors, helping with other students your age, doing something on social media)

9. What would motivate you to work on a community wildfire preparedness project? (Recognition on social media, an award, a certificate I got at school, money, recognition from a fire department)

10. If you are working on a project do you know about safety gear and feel comfortable using it?