

Wildland Urban Interface: Fire-Adapted Communities — Strategies for Developing a Fire-Adapted Community, Course II

WUI: FAC — SDFAC-Student Manual

1st Edition, 1st Printing-May 2015



FEMA

FEMA/USFA/NFA
WUI: FAC — SDFAC-SM
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Communities — Strategies for Developing a
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All materials in this course may be used and distributed by individual states for the purpose of delivering National Fire Academy (NFA) state-sponsored courses. All students must submit [**FEMA Form 119-25-2**](#) (General Admissions Application Short Form) to receive a (DHS) FEMA/NFA training certificate. NOTE: Any other use of these materials that does not result in the receipt of a (DHS) FEMA/NFA training certificate is prohibited.

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Glossary/Acronyms

ACKNOWLEDGMENTS

The development of any National Fire Academy (NFA) course is a complex process aimed at providing students with the best possible learning opportunity we can deliver.

There are many players in course development, each of whom plays an equally important part in its success. We want to acknowledge their participation and contribution to this effort and extend our heartfelt thanks for making this quality product.

The following people participated in the creation of this course:

Woodrow Stratton
Training Specialist, Fire Prevention Technical Curriculum
U.S. Fire Administration, National Fire Academy
Emmitsburg, Maryland

Stacey Harmon
Instructional Systems Specialist, Contracting Officer's Representative
U.S. Fire Administration, National Fire Academy
Emmitsburg, Maryland

Mike Weller
Instructional Systems Project Manager
Advanced Technical and Educational Consultants
Emmitsburg, Maryland

Kate Dargan
Subject Matter Expert
Sacramento, California

Sam Mazza
Subject Matter Expert
Salinas, California

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COURSE GOAL

The goal of the course is to empower students with the ability to create and sustain a fire-adapted community (FAC) located within a wildland urban interface (WUI). Students will learn how to convene a community coalition that will suggest the use of broad-based fire mitigation strategies, resulting in the development of a Community Wildfire Protection Plan (CWPP).

AUDIENCE, SCOPE AND COURSE PURPOSE

The target audience for this course includes, but is not limited to, the following:

- Fire and emergency service representatives.
- Community leaders/decision-makers.
- Commissioners, elected officials and other local policymakers.
- Code officials: building, planning, etc.
- Environmental groups.
- Land managers and foresters.
- Other key local stakeholders.

Students should have an understanding of how wildland fire is impacting both the nation and their local community. They should also have knowledge of partners that their agency is currently working with to address fire risk in the local WUI environment.

The purpose of this course is to provide students with the ability to work with local stakeholders and design strategies that support development of an FAC.

GRADING METHODOLOGY

Each two-day course will be assessed by a 25-question examination (100 points).

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**WILDLAND URBAN INTERFACE: FIRE-ADAPTED COMMUNITIES — STRATEGIES FOR DEVELOPING A
FIRE-ADAPTED COMMUNITY**

SCHEDULE

TIME	DAY 1	TIME	DAY 2
8:00 - 9:00	Introduction, Welcome and Administrative Unit 1: Mitigation Strategies	8:00 - 9:30	Activity 1.4: Putting It All Together — Wildland Urban Interface Mitigation Strategies
9:00 - 9:10	<i>Break</i>	9:30 - 9:40	<i>Break</i>
9:10 - 10:20	Unit 1: Mitigation Strategies (cont'd) Activity 1.1: Mitigation Strategies for the Natural Environment	9:40 - 10:10	Unit 2: Technical Tools to Support Fire-Adapted Communities
10:20 - 10:30	<i>Break</i>	10:10 - 10:20	<i>Break</i>
10:30 - 12:15	Unit 1: Mitigation Strategies (cont'd) Activity 1.2: Mitigation Strategies for the Built Environment	10:20 - 12:05	Activity 2.1: Using Building and Planning Codes Unit 2: Technical Tools to Support Fire-Adapted Communities (cont'd)
12:15 - 1:15	<i>Lunch</i>	12:05 - 1:05	<i>Lunch</i>
1:15 - 2:00	Unit 1: Mitigation Strategies (cont'd)	1:05 - 2:15	Activity 2.2: Use of Wildland Fire Preplans Unit 2: Technical Tools to Support Fire-Adapted Communities (cont'd)
2:00 - 2:15	<i>Break</i>	2:15 - 2:30	<i>Break</i>
2:15 - 5:15	Unit 1: Mitigation Strategies (cont'd) Activity 1.3: Mitigation Strategies for the Social Environment	2:30 - 5:00	Unit 2: Technical Tools to Support Fire-Adapted Communities (cont'd) Administer Exam Course Evaluation

Day 1 Homework:
Read “Lessons Learned from Waldo Canyon” in Appendix B of Unit 1.
Each group is assigned a mitigation environment to report on as part of Activity 1.4.

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FIREFIGHTER CODE OF ETHICS

Background

The Fire Service is a noble calling, one which is founded on mutual respect and trust between firefighters and the citizens they serve. To ensure the continuing integrity of the Fire Service, the highest standards of ethical conduct must be maintained at all times.

Developed in response to the publication of the Fire Service Reputation Management White Paper, the purpose of this National Firefighter Code of Ethics is to establish criteria that encourages fire service personnel to promote a culture of ethical integrity and high standards of professionalism in our field. The broad scope of this recommended Code of Ethics is intended to mitigate and negate situations that may result in embarrassment and waning of public support for what has historically been a highly respected profession.

Ethics comes from the Greek word ethos, meaning character. Character is not necessarily defined by how a person behaves when conditions are optimal and life is good. It is easy to take the high road when the path is paved and obstacles are few or non-existent. Character is also defined by decisions made under pressure, when no one is looking, when the road contains land mines, and the way is obscured. As members of the Fire Service, we share a responsibility to project an ethical character of professionalism, integrity, compassion, loyalty and honesty in all that we do, all of the time.

We need to accept this ethics challenge and be truly willing to maintain a culture that is consistent with the expectations outlined in this document. By doing so, we can create a legacy that validates and sustains the distinguished Fire Service institution, and at the same time ensure that we leave the Fire Service in better condition than when we arrived.



FIREFIGHTER CODE OF ETHICS

I understand that I have the responsibility to conduct myself in a manner that reflects proper ethical behavior and integrity. In so doing, I will help foster a continuing positive public perception of the fire service. Therefore, I pledge the following...

- Always conduct myself, on and off duty, in a manner that reflects positively on myself, my department and the fire service in general.
- Accept responsibility for my actions and for the consequences of my actions.
- Support the concept of fairness and the value of diverse thoughts and opinions.
- Avoid situations that would adversely affect the credibility or public perception of the fire service profession.
- Be truthful and honest at all times and report instances of cheating or other dishonest acts that compromise the integrity of the fire service.
- Conduct my personal affairs in a manner that does not improperly influence the performance of my duties, or bring discredit to my organization.
- Be respectful and conscious of each member's safety and welfare.
- Recognize that I serve in a position of public trust that requires stewardship in the honest and efficient use of publicly owned resources, including uniforms, facilities, vehicles and equipment and that these are protected from misuse and theft.
- Exercise professionalism, competence, respect and loyalty in the performance of my duties and use information, confidential or otherwise, gained by virtue of my position, only to benefit those I am entrusted to serve.
- Avoid financial investments, outside employment, outside business interests or activities that conflict with or are enhanced by my official position or have the potential to create the perception of impropriety.
- Never propose or accept personal rewards, special privileges, benefits, advancement, honors or gifts that may create a conflict of interest, or the appearance thereof.
- Never engage in activities involving alcohol or other substance use or abuse that can impair my mental state or the performance of my duties and compromise safety.
- Never discriminate on the basis of race, religion, color, creed, age, marital status, national origin, ancestry, gender, sexual preference, medical condition or handicap.
- Never harass, intimidate or threaten fellow members of the service or the public and stop or report the actions of other firefighters who engage in such behaviors.
- Responsibly use social networking, electronic communications, or other media technology opportunities in a manner that does not discredit, dishonor or embarrass my organization, the fire service and the public. I also understand that failure to resolve or report inappropriate use of this media equates to condoning this behavior.

Developed by the National Society of Executive Fire Officers

A Student Guide to End-of-course Evaluations

**Say What
You Mean ...**

Ten Things You Can Do to Improve the National Fire Academy

The National Fire Academy takes its course evaluations very seriously. Your comments and suggestions enable us to improve your learning experience.

Unfortunately, we often get end-of-course comments like these that are vague and, therefore, not actionable. We know you are trying to keep your answers short, but the more specific you can be, the better we can respond.

Actual quotes from student evaluations:	Examples of specific, actionable comments that would help us improve the course:
1 "Update the materials."	- The (ABC) fire video is out-of-date because of the dangerous tactics it demonstrates. The available (XYZ) video shows current practices. - The student manual references building codes that are 12 years old.
2 "We want an advanced class in (fill in the blank)."	- We would like a class that enables us to calculate energy transfer rates resulting from exposure fires. - We would like a class that provides one-on-one workplace harassment counseling practice exercises.
3 "More activities."	- An activity where students can physically measure the area of sprinkler coverage would improve understanding of the concept. - Not all students were able to fill all ICS positions in the exercises. Add more exercises so all students can participate.
4 "A longer course."	- The class should be increased by one hour per day to enable all students to participate in exercises. - The class should be increased by two days so that all group presentations can be peer evaluated and have written abstracts.
5 "Readable plans."	- The plans should be enlarged to 11 by 17 and provided with an accurate scale. - My plan set was blurry, which caused the dotted lines to be interpreted as solid lines.
6 "Better student guide organization," "manual did not coincide with slides."	- The slide sequence in Unit 4 did not align with the content in the student manual from slides 4-16 through 4-21. - The instructor added slides in Unit 4 that were not in my student manual.
7 "Dry in spots."	- The instructor/activity should have used student group activities rather than lecture to explain Maslow's Hierarchy. - Create a pre-course reading on symbiotic personal relationships rather than trying to lecture on them in class.
8 "More visual aids."	- The text description of V-patterns did not provide three-dimensional views. More photographs or drawings would help me imagine the pattern. - There was a video clip on NBC News (date) that summarized the topic very well.
9 "Re-evaluate pre-course assignments."	- The pre-course assignments were not discussed or referenced in class. Either connect them to the course content or delete them. - The pre-course assignments on ICS could be reduced to a one-page job aid rather than a 25-page reading.
10 "A better understanding of NIMS."	- The instructor did not explain the connection between NIMS and ICS. - The student manual needs an illustrated guide to NIMS.

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UNIT 1:

MITIGATION STRATEGIES

TERMINAL OBJECTIVE

The students will be able to:

- 1.1 *Select applicable fire-adapted community (FAC) mitigation strategies to include in a Community Wildfire Protection Plan (CWPP) for the local community.*

ENABLING OBJECTIVES

The students will be able to:

- 1.1 *Describe how a CWPP supports the primary elements of an FAC.*
 - 1.2 *Categorize the five types of mitigation strategies.*
 - 1.3 *Suggest mitigation strategies that may be integrated into a CWPP.*
-

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UNIT 1: MITIGATION STRATEGIES

Slide 1-1

ENABLING OBJECTIVES

- Describe how a Community Wildfire Protection Plan (CWPP) supports the primary elements of a fire-adapted community (FAC).
- Categorize the five types of mitigation strategies.
- Suggest mitigation strategies that may be integrated into a CWPP.

Slide 1-2

I. FIRE-ADAPTED COMMUNITY REVIEW

COMMUNITY WILDLAND FIRE PROTECTION PLAN OVERVIEW

What are the primary elements of an FAC?



Slide 1-3

ELEMENTS OF A FIRE-ADAPTED COMMUNITY

- An informed and active community that shares responsibility for mitigation practices.
- A collaboratively developed and implemented CWPP.
- Structures hardened to fire and including adequate defensible space practices.

Slide 1-4

Nine primary elements of a fire-adapted community (FAC):

- A. An informed and active community that shares responsibility for mitigation practices.
- B. A collaboratively developed and implemented Community Wildfire Protection Plan (CWPP).
- C. Structures hardened to fire and including adequate defensible space practices.

ELEMENTS OF A FIRE-ADAPTED COMMUNITY (cont'd)

- Local response organizations with the capability to help the community prepare for and the capability to respond to wildland fires.
- Local response organizations with up-to-date agreements with others who play a role in mitigation and response.

Slide 1-5

- D. Local response organizations with the capability to help the community prepare for and the capability to respond to wildland fires.
- E. Local response organizations with up-to-date agreements with others who play a role in mitigation and response.

**ELEMENTS OF A FIRE-
ADAPTED COMMUNITY (cont'd)**

- Wildland urban interface (WUI) codes, standards or ordinances, where appropriate, which guide development.
- A visible wildland fire reduction/prevention program that educates the public about the importance of a communitywide approach and the role of individual homeowners.

Slide 1-6

- F. Wildland urban interface (WUI) codes, standards or ordinances, where appropriate, which guide development.
- G. A visible wildland fire reduction/prevention program that educates the public about the importance of a communitywide approach and the role of individual homeowners.

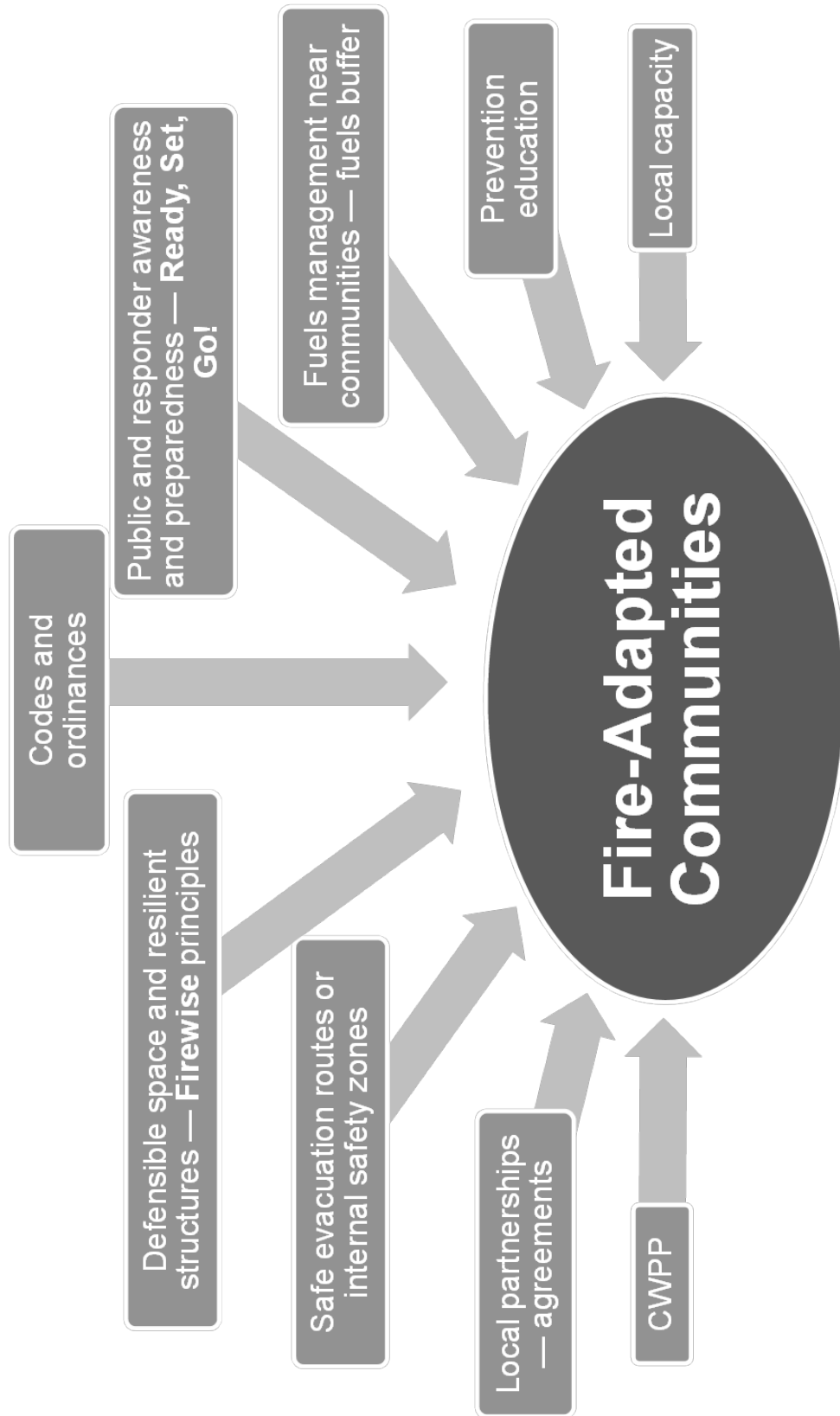
**ELEMENTS OF A FIRE-
ADAPTED COMMUNITY (cont'd)**

- Adequate fuels treatments conducted in and near the community, including development and maintenance of a fuels buffer or firebreak around the community.
- Established and well-known evacuation procedures and routes.

Slide 1-7

- H. Adequate fuels treatments conducted in and near the community, including development and maintenance of a fuels buffer or firebreak around the community.
- I. Established and well-known evacuation procedures and routes.





II. COMMUNITY WILDFIRE PROTECTION PLAN OVERVIEW

COMMUNITY WILDFIRE PROTECTION PLANS

- A CWPP is a plan developed in the collaborative framework and agreed to by state, tribal and local government; local fire department; other stakeholders; and federal land management agencies managing land in the vicinity of the planning area.

Slide 1-9

A. CWPP definition.

1. A CWPP is a plan developed in the collaborative framework and agreed to by state, tribal and local government; local fire department; other stakeholders; and federal land management agencies managing land in the vicinity of the planning area.

COMMUNITY WILDFIRE PROTECTION PLANS (cont'd)

- Identifies and prioritizes areas for hazardous fuel reduction treatments to protect one or more at-risk communities.
- Recommends measures to reduce structural ignitability throughout the at-risk community.

Slide 1-10

2. A CWPP identifies and prioritizes areas for hazardous fuel reduction treatments to protect one or more at-risk communities and recommends measures to reduce structural ignitability throughout the at-risk community.

COMMUNITY WILDFIRE PROTECTION PLANS (cont'd)

- Key purpose of a CWPP is to help communities understand their role in:
 - Supporting healthy forests.
 - Assisting with wildland fire preparedness.
 - Developing community-based priorities.
 - Creating FACs.

Slide 1-11

B. CWPP purpose.

A key purpose of a CWPP is to help communities understand and define their roles in the following:

1. Supporting healthy forests and rangelands. (Criteria for a healthy forest ecosystem will vary by region.)
2. Helping with community preparedness for wildland fire.
3. Assisting in developing community-based priorities in partnership with other agencies and landowners.
4. Creating FACs.

C. A CWPP may address issues such as wildland fire response, hazard mitigation, community preparedness, or structure protection — or all of the above.

COMMUNITY WILDFIRE PROTECTION PLANS (cont'd)

- A CWPP is a **community-based** planning tool that includes:
 - Assessment of local wildland fire risks.
 - Strategies to reduce or mitigate wildland fire risk.
 - Long-term plan for implementing those strategies.

Slide 1-12

- D. In general, a CWPP is a community-based wildland fire planning tool that includes:
1. An assessment of local wildland fire risks.
 2. A set of strategies to reduce or mitigate local wildland fire risk.
 3. A long-term plan for implementing the strategies.

**COMMUNITY WILDFIRE
PROTECTION PLANS (cont'd)**

- CWPP can be the foundation for strategic and tactical suppression decisions.
 - To establish overall suppression objectives and priorities.
 - To frame incident messaging.
 - As an incident preplanning tool.

Slide 1-13

- E. A CWPP can also be the foundation for strategic and tactical suppression decisions in the event of a wildland fire.
1. To establish overall suppression objectives and priorities.
 2. To frame incident messaging (e.g., value to mitigation measures).
 3. As an incident preplanning tool.
- F. CWPPs will include common elements because, in general, fire burns in predictable ways and the strategies for mitigating risk are often similar.

III. OVERVIEW OF GENERAL RISK-REDUCTION STRATEGIES

A. General risk-reduction strategies.

MITIGATION STRATEGIES

- The most effective community risk-reduction measures (mitigations) are those that employ a broad-based integrated approach using a combination of mitigation strategies.

Slide 1-14

1. The most effective community risk-reduction measures (mitigations) are those that employ a broad-based integrated approach using a combination of mitigation strategies.
 - a. Education.
 - b. Engineering.
 - c. Enactment/Enforcement.
 - d. Economic incentives.
 - e. Emergency response.

MITIGATION STRATEGIES (cont'd)

- **Objective** — a desired goal or end-state.
- **Strategy** — a general plan or direction selected to achieve an objective.
- **Tactics** — the detailed deployment and direction of resources to accomplish the objective by means of the designated strategy.

Slide 1-15

2. **Objective** — a desired goal or end-state.

3. **Strategy** — a general plan or direction selected to achieve an objective.
4. **Tactics** — the detailed deployment and direction of resources to accomplish the objective by means of the designated strategy.

MITIGATION STRATEGIES (cont'd)

- Goal of using multiple strategies is twofold:
 - Prevent incidents from occurring.
 - When prevention fails, reduce (mitigate) the impacts of an incident.

Slide 1-16

5. The goal of using multiple strategies in parallel is twofold:
 - a. If possible, prevent incidents from occurring.
 - b. When prevention fails, reduce (mitigate) the impacts of an incident.
 - c. These are the same for all risk-reduction efforts, not just wildland fires.

MITIGATION STRATEGIES (cont'd)

- Prevention of all wildland fires is impossible.
 - Mitigation measures must be implemented to reduce the resultant adverse impacts of those that do occur.
 - Only a small percentage become large, damaging fires.
 - So preventing these will not sufficiently address the nationwide WUI fire problem.

Slide 1-17

6. In the context of the wildland fire problem, preventing incidents from occurring is obviously not always possible.

- a. Many efforts are still appropriate in terms of preventing ignitions that result in wildland fires, but the focus in this class is that not all WUI fires be prevented, and therefore mitigation measures must be implemented to reduce the resultant adverse impacts of those that do occur.
- b. On a national scale, only a small percentage of incidents statistically become large, damaging or conflagration type fires, so preventing these incidents will not sufficiently address the nationwide WUI fire problem.
- c. For that reason, this course focuses primarily on **mitigation** strategies.

MITIGATION STRATEGIES
(cont'd)

- Creating an FAC is not a linear process.
 - Holistic approach addressing the problem through multiple strategies is best.
 - The goal of the mitigation is not to prevent all wildland fire losses from occurring in the community, but to reduce the severity of fire spread, ember-based structural ignitions, flame length, and heat to:
 - Enhance effectiveness of suppression efforts.
 - Reduce injuries and loss of life.
 - Reduce property damage/loss.

Slide 1-18

- 7. Creating an FAC is not a linear process.
 - a. A holistic approach addressing the problem through multiple strategies is best.
 - b. The goal of mitigation is not to prevent all wildland fire losses from occurring in the community, but to reduce the severity of fire spread, ember-based structural ignitions, flame length, and heat to:
 - Enhance effectiveness of suppression efforts.
 - Reduce injuries and loss of life.
 - Reduce property damage/loss.

MITIGATION STRATEGIES (cont'd)

- Every successful mitigation measure — even one house and one person — builds toward an FAC.

Slide 1-19

- c. Every successful mitigation — even one house and one person — builds toward an FAC!

GENERAL MITIGATION STRATEGIES

- Five general risk-reduction strategies (five E's):
 - Education.
 - Engineering.
 - Enactment/Enforcement.
 - Economic incentives.
 - Emergency response.

Slide 1-20

- B. Five general risk-reduction strategies (five E's):

1. Education.

GENERAL MITIGATION STRATEGIES (cont'd)

Why is education a foundation of risk-reduction interventions?



Slide 1-21

GENERAL MITIGATION STRATEGIES (cont'd)

- Risk-reduction education programs:
 - Support all levels of mitigation strategies.
 - Build a foundation for use of five E's.
 - Educate stakeholders.
 - Can create sense of urgency.
 - Foster safer, healthier and more resilient communities.

Slide 1-22

- a. Educational programs should be used to support all levels of mitigation strategies.
- b. It is important to understand that effective public education can help build a foundation for the use of combined mitigation strategies.
- c. Educating decision-makers, policymakers, stakeholders, the general public, allied agencies, and first responders of the local wildland fire situation (including fire ecology and history) as well as WUI fire risks that are impacting or have potential to threaten the local community is usually an important first step.
- d. Teach stakeholders how the WUI fire risk develops and what they can do to help prevent and/or mitigate its impact.

- e. Create a sense of urgency through use of a fact-based rationale (results of a community risk assessment) that explains why the WUI fire risk is serious and must be addressed in a strategic manner.
- f. Demonstrate the advantages of using a multifaceted approach to prevention and mitigation that ultimately results in a safer, healthier and more resilient community.

GENERAL MITIGATION STRATEGIES (cont'd)

How can public education be used to mitigate the impact of fire in the WUI?



Slide 1-23

GENERAL MITIGATION STRATEGIES (cont'd)

- Public education programs can help mitigate the impacts of a WUI fire by:
 - Facilitating community awareness of the WUI fire problem.
 - Facilitating community engagement to mitigate the WUI fire problem.
 - Facilitating awareness of the various WUI mitigation strategies.
 - Helping facilitate a sense of urgency to act.

Slide 1-24

- g. Public education programs can be used to mitigate the impacts of fire in the WUI by:
 - Facilitating community awareness of the WUI fire problem.
 - Facilitating community engagement to mitigate the WUI fire problem.

- Facilitating awareness of the various WUI mitigation strategies.
- Helping facilitate a sense of urgency to act.

GENERAL MITIGATION STRATEGIES (cont'd)

- Arming individuals with the knowledge and tools to reduce the impacts of a WUI fire on their property.
- Forging relationships between the community and response agencies.
- Engaging the community in the WUI risk issue.

Slide 1-25

- Arming individuals with the knowledge and tools to reduce the impacts of a WUI fire on their property.
- Forging relationships between the community and local response agencies.

h. Community education relative to the WUI fire problem is **best** achieved as a multidirectional communication (i.e., as a community dialogue versus talking at audience).

- One of the key **goals** with WUI educational programs is community engagement.

GENERAL MITIGATION STRATEGIES (cont'd)

- **Internal** education promotes:
 - A better understanding of our role and responsibility in facilitating creation of an FAC.
 - Informed responders who understand and can promote the components of an FAC.

Slide 1-26

- i. **Internal** (response agency) education promotes:
 - A better understanding of our role and responsibility in facilitating creation of an FAC.
 - Informed responders who understand and can promote the components of an FAC.

GENERAL MITIGATION STRATEGIES (cont'd)

- Engineering.
 - Just as important as education strategies.
 - Integrates use of technology.
 - Investigates how the WUI environment(s) can be modified.

Slide 1-27

2. Engineering.

- a. Engineering strategies are as important as education strategies in terms of affecting risk reduction.
- b. Integrating the use of technology to help mitigate targeted risks can be a powerful tool in a CWPP.
- c. Investigating how the WUI environment surrounding the community could be modified so fire mitigation is accomplished is an important (yet sometimes overlooked) strategy.

GENERAL MITIGATION STRATEGIES (cont'd)

How can engineering strategies be used to mitigate the impact of fire in the WUI?



Slide 1-28

GENERAL MITIGATION STRATEGIES (cont'd)

- Engineering strategy examples:
 - Use of remote sensing technology to identify high-hazard fuels.
 - Use of ignition-resistant building materials.
 - Water cannon system as a perimeter fire defense.
 - Ingress/Egress routes designed to facilitate concurrent emergency access and evacuation.

Slide 1-29

d. Examples of engineering strategies include:

- Use of remote sensing to identify high-hazard fuels.
- Building materials that are ignition-resistant.
- Water cannon systems that serve as community defense from wildland fire.
- Ingress/Egress routes designed to facilitate concurrent emergency access and evacuation.
- Investigating how human behavior during emergencies, such as evacuation, affects incident outcomes.

GENERAL MITIGATION STRATEGIES (cont'd)

- Enactment and enforcement.
 - Public policy that requires specific actions is one of the most powerful mitigation strategies.
 - Often the most controversial.
 - Facilitates consistent implementation and application.
 - Consistent enforcement is key.

Slide 1-30

3. Enactment/Enforcement.

- a. Enacting laws, ordinances, codes, regulations, covenants, reviews and inspection requirements are a common strategy to facilitate safe, reliable, insurable and predictable communities.
- b. Enacting and enforcing public policy that requires specific actions is one of the most powerful mitigation strategies.
- c. It has the advantage of the swiftest and most consistent implementation and application.
- d. Unfortunately, it has the disadvantage of usually being the most controversial.
- e. Public policy is a valuable tool and should be considered in collaboration with the community.
- f. If considered, it must follow the community's designated process of proposal, issue resolution, adoption and application.
- g. When applied, public policy must follow consistent enforcement practices that reflect positively on the local authority having jurisdiction (AHJ) over the WUI environment.

GENERAL MITIGATION STRATEGIES (cont'd)

How can public policy enactment and enforcement strategies be used to mitigate the impact of fire in the WUI?



Slide 1-31

GENERAL MITIGATION STRATEGIES (cont'd)

- Enactment and enforcement examples:
 - Local building codes.
 - State building codes.
 - National standards.
 - General planning guidelines.
 - Zoning and subdivision laws.
 - Development guidelines or regulations.
 - Defensible space laws or ordinances.

Slide 1-32

h. Examples of WUI enactments and enforcement include:

- Local building codes — these are generally adopted at either the state or local level and are built from the national “model” codes.
- State building and fire codes.
- National standards.
- General planning guides.
- Zoning and subdivision laws.
- Development guidelines or regulations.
- Defensible space laws or ordinances.

GENERAL MITIGATION STRATEGIES (cont'd)

- Economic incentives.
 - Encourage support of mitigation strategies.
 - Positive incentives support or reward actions.
 - Negative incentives penalize for nonconformance.
 - Generally require a funding source.

Slide 1-33

4. Economic incentives.
 - a. These incentives can be used to encourage support of the mitigation strategies developed as part of a CWPP.
 - b. Positive incentives reward constituents for proactive behavior or provide free/low-cost services to support life safety.
 - c. Negative incentives penalize people for nonconformance with adopted public policies and may include civil and criminal sanctions.
 - d. These types of incentives can be more difficult to enact immediately since they generally require a funding source in order to create the incentive fund.

GENERAL MITIGATION STRATEGIES (cont'd)

How can economic incentives enhance interventions intended to mitigate the impact of fire in the WUI?



Slide 1-34

GENERAL MITIGATION STRATEGIES (cont'd)

- Economic incentive examples.
 - Free wood chipping programs.
 - Ignition-resistant roofing grants.
 - Financial assistance to create/maintain defensible space.
 - Cost-shared WUI mitigation measures.

Slide 1-35

- e. Examples include:
- Free wood chipping programs.
 - Ignition-resistant roofing grants.
 - Financial assistance for targeted populations to create and maintain defensible space.
 - Cost-sharing to implement and maintain targeted WUI mitigation measures.

**GENERAL MITIGATION
STRATEGIES (cont'd)**

- Emergency response.
 - Cannot prevent all WUI fire events.
 - An effective response strategy and capability is a critical element of an FAC.

Slide 1-36

5. Emergency response.
- a. An important component of risk reduction is the anticipation that events will occur even when there are effective prevention and mitigation programs in place.
 - b. Having an effective response strategy and capability is critical for an FAC.
 - c. FACs support the existence of an adequately staffed, equipped and trained group of emergency responders who can respond to WUI fire incidents in a timely manner.
 - d. It is the responsibility of the local fire AHJ over the WUI environment to work collaboratively with the local community to identify risk and response priorities and address them in a strategic manner.

GENERAL MITIGATION STRATEGIES (cont'd)

How can emergency response strategies mitigate the impacts of WUI fires?



Slide 1-37

GENERAL MITIGATION STRATEGIES (cont'd)

- Emergency response strategy examples:
 - Keeping smaller WUI fires from becoming large, damaging fires.
 - Facilitating enhanced cooperation and operational efficiency among local and regional response agencies.

Slide 1-38

e. Examples include:

- Keeping small WUI fires from becoming large, damaging fires.
- Facilitating enhanced cooperation operational efficiency among local and regional response agencies.

IV. MITIGATION STRATEGIES SPECIFIC TO THE WILDLAND URBAN INTERFACE FIRE PROBLEM

**WILDLAND URBAN INTERFACE
MITIGATION STRATEGIES**

- WUI hazard attribute environments.
 - Natural.
 - Built.
 - Social (human).
 - Response.

Slide 1-39

- A. In the first two-day course, Wildland Urban Interface: Fire-Adapted Communities — Introduction and Leadership, Course I (WUI: FAC — IL), we discussed basic fire mitigation strategies as they applied to the four WUI hazard attribute environments (natural, built, social and response).

**WILDLAND URBAN INTERFACE
MITIGATION STRATEGIES (cont'd)**

- Natural environment.
 - Includes those features composed of naturally growing or occurring physical landscapes.

Slide 1-40

- B. The natural environment.

1. This WUI hazard attribute category includes those features that are primarily composed of naturally growing or occurring physical landscapes.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

What are some examples of WUI attributes that would be part of the natural environment?



Slide 1-41

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- Examples of WUI natural environment attributes:
 - Vegetation types.
 - Fuel types.
 - Fuel breaks.
 - Topography/Slope/Aspect.
 - Weather patterns (wind/lightning).
 - Fire history.
 - Fire behavior.

Slide 1-42

2. Examples of WUI natural environment attributes include:

- a. Vegetation types.
- b. Fuel types.
- c. Fuel breaks.
- d. Topography/Slope/Aspect.
- e. Weather patterns (wind/lightning).
- f. Fire history.
- g. Fire behavior.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- Built environment.
 - Includes those attributes (objects or features) constructed and maintained by people.

Slide 1-43

C. The built environment.

1. This category includes those attributes (objects or features) constructed and maintained by people.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

What are some examples of WUI attributes that would be part of the built environment?



Slide 1-44

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- Examples of WUI built environment attributes:
 - Buildings and type of construction.
 - Housing/Building density.
 - Transportation network (access/egress).
 - Water supply/infrastructure.
 - Defensible space/Home ignition zones.

Slide 1-45

2. Examples of WUI attributes in the built environment include:
- Buildings and type of construction.
 - Housing/Building density.
 - Transportation network (access/egress).
 - Water supply/infrastructure.
 - Defensible space/Home ignition zones.

**WILDLAND URBAN INTERFACE
MITIGATION STRATEGIES (cont'd)**

- Addressing.
- Utilities (electric and gas lines).
- Zoning, homeowner covenants.
- Building codes.

Slide 1-46

- Addressing.
- Utilities (electric and gas lines).
- Zoning, homeowner covenants.
- Building codes.

DVD PRESENTATION

**"INSURANCE INSTITUTE FOR
BUSINESS AND HOME SAFETY:
EMBER STORM DEMO"**



Slide 1-47

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- Social (human) environment.
 - Encompasses how people think, feel and act in a human manner.

Slide 1-48

D. The social environment.

1. This attribute category encompasses how people think, feel and act in a human manner.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

What are some examples of WUI attributes that would apply to the social environment?



Slide 1-49

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- WUI attribute examples in the social environment include:
 - Community understanding of WUI risk.
 - Absentee homeownership.
 - Part-time/Transient residents.
 - Population density.
 - Population demographics.

Slide 1-50

2. Examples of WUI attributes in the social environment include:
 - a. Community understanding of WUI risk.
 - b. Absentee homeownership.
 - c. Absentee owners.
 - d. Part-time/Transient residents.
 - e. Population density.
 - f. Population demographics.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

- Response environment.
 - Relates to community preparedness and effectiveness of responder actions in a WUI incident.

Slide 1-51

E. The response environment.

1. This category relates to community preparedness and the effectiveness of first responder actions when a WUI incident occurs.

WILDLAND URBAN INTERFACE MITIGATION STRATEGIES (cont'd)

What are some examples of WUI attributes that would be part of the response environment?



Slide 1-52

**WILDLAND URBAN INTERFACE
MITIGATION STRATEGIES (cont'd)**

- WUI attributes in the response environment include:
 - Wildland fire apparatus and equipment.
 - Wildland firefighter training.
 - Interoperable communications.
 - Community emergency preparedness plans.
 - Preincident response plans.
 - Cooperative response agreements.

Slide 1-53

2. Examples of WUI attributes in the response environment include:

- a. Wildland fire apparatus and equipment.
- b. Wildland firefighter training.
- c. Interoperable communications.
- d. Community emergency preparedness plans.
- e. Preincident response plans.
- f. Cooperative response agreements.

F. Exploring the community's built, natural, social and response WUI attribute environments also works well when considering specific types of mitigation strategies that may be most appropriate and feasible.

**WILDLAND URBAN INTERFACE
MITIGATION STRATEGIES (cont'd)**

- An FAC will consider mitigation measures in all four WUI attribute environments.
- Community stakeholders may have strong preferences for what they are willing to change or not change.

Slide 1-54

1. An FAC will use most or all of the categories and types of mitigation strategies to enhance its resiliency and adaptation to wildland fire.
2. Community stakeholders may have strong preferences for what they are willing to change or not change.

V. MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT

**MITIGATION STRATEGIES FOR
THE NATURAL ENVIRONMENT**

- The natural environment is the group of WUI hazard attributes and mitigations that is usually considered part of “nature” or the “environment.”
 - Mitigation strategy options are often limited within this environment.
 - Modification of vegetative fuels is effective mitigation strategy.

Slide 1-55

- A. The natural environment is the group of WUI hazard attributes and mitigations that is usually considered part of “nature” or the “environment.”
 1. While there are often limitations on mitigation options within the natural environment, such as modifying vegetation, application of these types of mitigation strategies tends to be a key factor influencing reduction of wildland fire losses.
 2. Modifying vegetative fuels is often effective because it can help modify fire behavior and limit resultant fire spread.

MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT (cont'd)

What are some of the issues to be aware of as you consider mitigation strategies within the natural environment?



Slide 1-56

MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT (cont'd)

- Natural environment mitigation strategy issues:
 - Environmental protection concerns.
 - Public values and sentiment toward altering the natural environment.
 - Conflict with public/private land management policies.
 - Fuel treatment strategies are often controversial.

Slide 1-57

3. Some of the issues and concerns to be aware of when considering mitigation strategies in the natural environment include:

a. Concerns relating to protection of the environment such as:

- Fire severity.
- Natural fire regimes.
- Fuel types.
- Watersheds.
- Invasive species.
- Fuels build-up.
- Post-fire revegetation.

- Natural habitat.
 - Sensitive and endangered species.
 - Water quality.
 - Air quality.
 - Other issues that may surface in this category.
- b. Rural residents are often very focused on environmental protection and may exhibit strong values toward the subject.
- c. Conflict between proposed mitigation strategies and established public/private land management policies.
- d. Although fuels treatments can often be conducted in ways that have positive effects on ecosystems, much of the controversy with CWPPs comes from the debate about vegetation and fuel management strategies.
- e. As champions for an FAC, it is important to gain some familiarity with these issues so they can be addressed with knowledge and sensitivity.
- f. Fire service personnel tend to be focused on life, and property protection, safety of personnel and mitigations to the built environment.

**MITIGATION STRATEGIES FOR THE
NATURAL ENVIRONMENT (cont'd)**

- Champions for an FAC must be willing to collaborate with stakeholders.
- Champions must help stakeholders understand the benefits of fire in fire-adapted natural areas.

Slide 1-58

- g. Champions for an FAC must be aware, informed, respectful and willing to collaborate with stakeholders so an effective CWPP can be constructed.

- h. Champions of an FAC must be able to help stakeholders understand the myriad benefits of allowing fire to play a role in fire-adapted natural areas.

MITIGATION STRATEGIES FOR THE
NATURAL ENVIRONMENT (cont'd)

- Weather.
 - Primary factor influencing wildland fire behavior.
 - No mitigation can alter the weather.
 - Weather history **can** be used as a basis for consideration of other WUI mitigation strategies.
 - Also an element of WUI responders' situational awareness.

Slide 1-59

B. Weather.

1. Weather is the primary factor influencing wildland fire behavior.
2. No mitigation can alter weather.
3. Weather pattern history **can** be used as a basis for consideration of other WUI mitigation strategies.
4. Weather pattern history can also be used to enhance community awareness of potential wildland fire behavior.
5. The wildland firefighting community makes tactical decisions based on fire weather observations as part of its ongoing wildland fire situational awareness (e.g., fire weather-triggered response plan contingencies).
6. Consider how this information can be built into the community's situational awareness. Some examples are:
 - a. Wind patterns, speed and direction.
 - b. Weather-centric response plans.
 - c. Lightning occurrence.

MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT (cont'd)

- Topography.
 - Cannot be mitigated on a macroscale.
 - Topographic features influence fire behavior including:
 - Slope.
 - Saddles.
 - Chimneys/Chutes.
 - Box canyons.
 - Ridge tops.

Slide 1-60

C. Topography.

1. Relative to wildland fire behavior, topography does not change on a macro-scale such as slope, aspect, landforms, ridges, chimneys or saddles.
2. Various topographic features can have a profound effect on wildland fire behavior including:

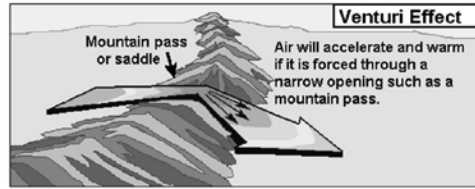
SLOPE > 50%



Slide 1-61

a. Slope.

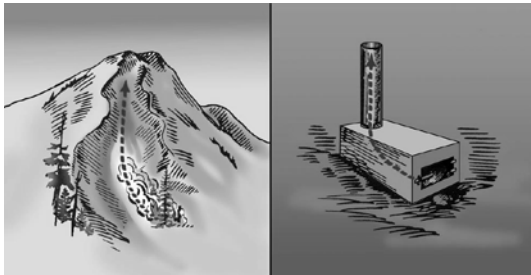
SADDLES



Slide 1-62

b. Saddles.

CHIMNEYS/CHUTES



Slide 1-63

c. Chimneys/Chutes.

BOX CANYONS



Slide 1-64

d. Box canyons.

RIDGE TOPS

Fire burning along lateral ridges may change direction.



Slide 1-65

e. Ridge tops.

MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT (cont'd)

- Topographic features can be used as the basis for effective mitigation measures:
 - Allowable building siting.
 - Ingress/Egress route locations.
 - Fuel breaks.
 - Safety zones.

Slide 1-66

3. Topographic features can be used as the basis for effective mitigation measures such as building siting, ingress/egress route locations, fuel breaks, and safety zones.

MITIGATION STRATEGIES FOR THE NATURAL ENVIRONMENT (cont'd)

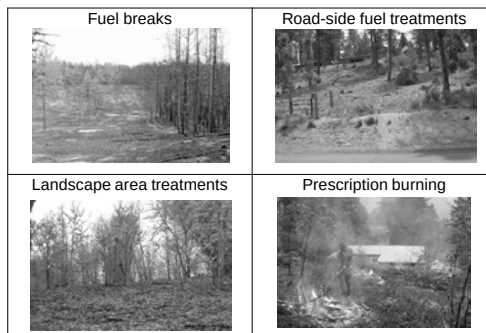
- Vegetative fuels treatments.
 - Widely deployed mitigation strategy.
 - Experts should be involved.
 - Requires understanding of:
 - Community expectations.
 - Local vegetative fuels and fire ecology.
 - Overall goal of the fuel treatment.

Slide 1-67

D. Vegetative fuels treatments.

1. The fuels treatment mitigation strategy is one of the most widely deployed interventions and is gaining acceptance throughout the country as a needed component to wildland fire safety.
2. Experts should be consulted when designing fuels treatments in order to avoid damaging the environment and to ensure treatments will be effective and cost-effective.
3. This strategy requires an understanding of the type of wildland fire behavior the community expects, the fuels and fire ecology of the local area, and the overall goal of the fuel treatment.
4. Such projects may occur on private or public land and are intended to act as a buffer between communities or assets and nonmaintained wildland fuels.

FUEL MANAGEMENT STRATEGIES



Slide 1-68

5. Examples of fuel management mitigation strategies include:
- a. **Fuel breaks:** intended to modify fire behavior and spread by altering fuel beds in a linear alignment, typically situated along ridge tops and may include retained trees (shaded fuel breaks).
 - b. **Road-side fuel treatments:** intended to reduce the likelihood of ignition sources along roadways and maintain ingress/egress capabilities.
 - c. **Landscape area treatments:** intended to modify fire behavior by treating fuels over large areas in strategic locations or historic fire corridors; these treatments are typically conducted on large expanses of federal or private land (e.g., strategically placed area treatments).
 - d. **Prescription burning:** intended to reduce fuel loading in key locations while considering vegetation-type characteristics and disturbance regimes.

FUEL MANAGEMENT PRESCRIPTION STRATEGIES

Vegetation thinning



Tree removal



Slide 1-69

6. Examples of fuel management prescription strategies:
- a. **Vegetation thinning.**
 - Thinning of vegetation involves an overall reduction or rearrangement of woody biomass to break up the horizontal and vertical continuity of fuels.
 - Site-specific conditions should dictate thinning percentages in relation to structures and will be heavily dependent on topography, vegetation type, and building construction characteristics.

- In cases where shrubs and/or trees require removal, root systems should be left intact where needed to maintain slope stability. In such cases, annual treatment of stump growth or resprouting may be needed to maintain reduced fuel load volumes.
- Thinning is often accomplished through mechanical means. Where feasible and ecologically appropriate, consider following mechanical thinning and tree removal treatments with controlled burns in order to reduce surface fuel levels. In some cases it's possible and less costly to accomplish thinning with fire alone.
- Refer to National Fire Protection Association (NFPA) 1144, *Standard for Reducing Structure Ignition Hazards from Wildland Fire* or WUI guidelines.

b. **Tree removal.**

- Removal of trees within the WUI should focus primarily on removing dead and dying trees; however, live tree removal may be necessary to improve vegetation spacing and reduce overall fuel continuity.

FUEL MANAGEMENT PRESCRIPTION STRATEGIES (cont'd)

Dead/Dying plant removal



Exotic/Invasive plant removal



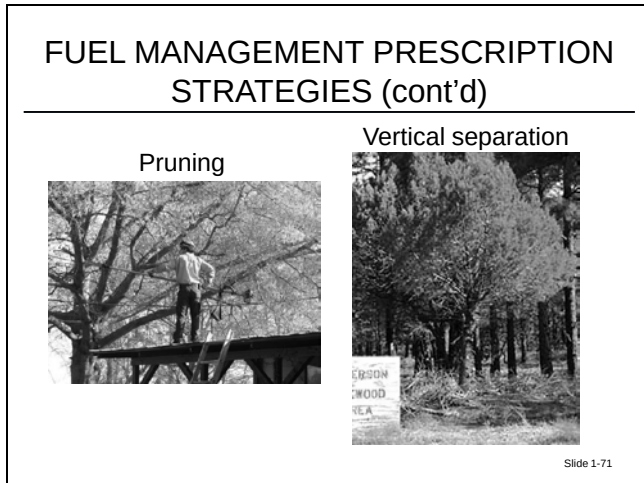
Slide 1-70

c. **Dead/Dying plant removal.**

- Removal of dead and dying plant material from the WUI helps reduce low fuel moisture biomass. This practice should also be conducted in combination with vegetation thinning efforts and may help reach or completely satisfy thinning objectives in some areas. Within the WUI, the goal is to reduce flame length to less than 4 feet.

d. **Exotic/Invasive plant removal.**

- Removal of non-native and invasive plants from the WUI defensible space zone will help reduce the presence of undesirable species and enhance thinning efforts aimed at reducing overall biomass levels.



e. **Tree and shrub pruning.**

- Trees or large tree-form shrubs (reaching 4 feet or taller at maturity) that are to be retained in the WUI defensible space zone should be trimmed or pruned to reduce both vertical and horizontal fuel continuity.

f. **Vertical separation.**

- Pruning of tree branches to provide vertical clearance from understory vegetation.
- Limits ladder fuels to reduce the potential for fire spread from ground fuels and low shrubs to higher trees and structures.
- Tree pruning should not exceed 25 percent of total height.

FUEL MANAGEMENT PRESCRIPTION STRATEGIES (cont'd)

Horizontal separation



Vegetation grouping



Slide 1-72

g. **Horizontal separation.**

- Pruning/Removal of vegetation to provide increased horizontal clearance between plants to reduce potential fire intensity and spread.
- Ideal is three times the height of the plant.
- Horizontal separation serves to minimize fire spread from plant to plant and from plant to structure.

h. **Vegetation grouping.**

- Maintaining groups of shrubs is recommended to provide a mosaic pattern in the landscape.
- However, shrub groups should be separated from other shrub groups according to the horizontal separation criteria discussed above.

FUEL MANAGEMENT PRESCRIPTION
STRATEGIES (cont'd)

Mowing



Chipping



Slide 1-73

i. **Mowing.**

- Mowing of native, non-native grasses and exotic weeds should be conducted to maintain grass heights at 4 inches or lower.
- The focus should be primarily on invasive weed prevention, suppression and monitoring; focus should also be on properly timed and implemented grassland management (e.g., mowing, grazing) that promotes the establishment of less volatile native perennial grasses.
- Mowing should take place before 10 a.m. to reduce the risk of wildland fire resulting from mowing activities.

j. **Chipping.**

- Chipping and spreading of existing dead biomass or debris resulting from fuel-reduction treatments within the WUI is an effective method for weed suppression. However, chip or mulch depth should not exceed 6 inches.
- Some jurisdictions use the standard of 4 inches or less. It might not be possible to generalize across the country.

FUEL MANAGEMENT PRESCRIPTION STRATEGIES (cont'd)

Grazing



Mastication



Slide 1-74

k. **Grazing.**

- Livestock (including goats) have proven to be an effective method for reducing fuel volumes in WUI areas.
- Management, maintenance, public safety and environmental permitting issues should be considered prior to use of grazing as a mitigation strategy.

l. **Mastication.**

- Mastication is the operation of reducing vegetation volume by grinding, shredding or chopping material. This treatment can lower fuel bed depth, raise crown base height, increase fuel-ground contact to promote decomposition, and generate more fine materials.

FUEL MANAGEMENT PRESCRIPTION STRATEGIES (cont'd)

Prescribed burning



Slide 1-75

m. **Prescribed burning.**

- Intended to reduce fuel loads in key locations while considering vegetation-type characteristics and disturbance regimes.

**FUEL MANAGEMENT PRESCRIPTION
STRATEGIES (cont'd)**

- Key fuels treatment considerations.
 - Select fuel modification locations strategically.
 - Plan for ongoing maintenance.
 - Consider whether proposed fuel modification will actually reduce WUI risk or just rearrange the fuels.
 - Coordinate with all involved landowners and managers.
 - Consider environmental trade-offs.

Slide 1-76

n. Key considerations for fuels treatment strategies include:

- Locate fuel breaks/modifications in strategic firefighting locations.
- Plan for ongoing maintenance of treated areas.
- Consider whether you are actually removing/reducing fuels (e.g., via controlled burning) or just rearranging their distribution.
- Coordinate with the many landowners and agencies that will be involved.
- Be prepared to demonstrate fire behavior changes through fire modeling as a result of fuel modifications.
- Consider the environmental trade-offs — what firefighters consider as flammable, high-risk fuels may be valued as unique and diverse habitat by another stakeholder group. The fire safety perspective is only one of the viewpoints at play here.

DVD PRESENTATION

“PRESCRIBED FIRE: MAINTAINING
THE BALANCE”



Slide 1-77

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ACTIVITY 1.1

Mitigation Strategies for the Natural Environment

Purpose

Given a neighborhood from the Lakeshore community case study, identify a group of natural environment mitigation strategies that could be integrated into a CWPP for that neighborhood.

Directions

1. You are to work within your small table group for this activity.
2. Refer to the Lakeshore Case Study, which is found in the appendix of your Student Manuals (SMs).
3. The instructor will assign a specific Lakeshore neighborhood to each table group.
4. Within your small group, reflect on the general information about Lakeshore and the information pertinent to your assigned neighborhood as you complete the activity.
5. As a group, identify, discuss and select at least five mitigation **strategies** pertinent to the natural environment for your assigned Lakeshore neighborhood. Prioritize the selected strategies in preferred order to achieve the greatest degree of mitigation.
6. List your selected mitigation strategies on an easel pad and be prepared to explain and justify your choices.
7. Complete this portion of the activity within 20 minutes.
8. Select a group representative to present the group's choices to the class.
9. The entire activity should be completed within 30 minutes.

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VI. MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT

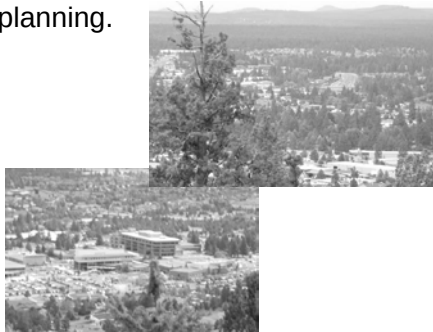
- Modifying a physical (or built) environment to reduce susceptibility to wildland fire is generally a very effective and long-lasting mitigation strategy.
- Generally require less maintenance than other mitigation strategies.

Slide 1-79

- Modifying a physical (or built) environment to reduce susceptibility to wildland fire is generally a very effective and long-lasting mitigation strategy.
- Once these features are built and maintained as part of the community's infrastructure, they require less maintenance than mitigations like vegetation management.
- The following represent example mitigation strategies for the built environment.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Land use planning.
 - Zoning.



Slide 1-80

- Land use planning.
 - Zoning — categorizing land use can acknowledge the WUI threat and describe or zone land according to its WUI fire risk.

Examples:

- The Farm Bill requires each state to designate wildland fire threats.
- It is likely that the state forestry agency in your state has undertaken or participated in this effort.
- California designates all state forestry-protected wildland fire lands (public and private) as fire hazard severity zones.

**MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)**

- Development densities — the pattern of buildings constructed in the WUI can reduce or exacerbate risk.

Slide 1-81

- b. Development densities — the pattern of buildings constructed in the WUI can reduce or exacerbate risk.

**MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)**

- A WUI is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.



Slide 1-82

- A WUI is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (definition approved by National Wildfire Coordinating Group (NWCG)).

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- A **wildland urban intermix** is an area where homes (structures) and infrastructure are intermingled among wildland vegetative fuels.



Slide 1-83

- A **wildland urban intermix** is an area where homes (structures) and infrastructure are intermingled among wildland vegetative fuels.
- These two terms are often used interchangeably.

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- General land use plans.
 - Communities often describe their overall development goals, housing, zoning, transportation, safety and economic development goals in terms of broad land use plans.
 - Can complement a CWPP.

Slide 1-84

c. General land use plans.

- Communities often describe their overall development goals, housing, zoning, transportation, safety and economic development goals in terms of broad land use plans.
- See how local general plans can be used to complement a CWPP and vice versa.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Specific land use plans.
 - More detailed plans often required for specific neighborhood or subdivision developments.
 - Can be made to be consistent with CWPP goals.

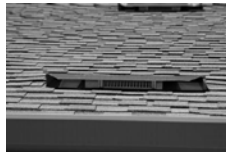
Slide 1-85

d. Specific land use plans.

- Many communities require more detailed plans for specific subdivisions or development projects.
- See how local specific development plans can be made consistent with CWPP goals.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Building codes that address ignition-resistant construction materials and methods.
 - Roofs and vents.



Slide 1-86

2. Building codes.

- a. Can reduce WUI fire risk by requiring ignition-resistant construction materials and methods.
- b. Examples.
 - Roofs.
 - Roof covering (Roof Class A/B/C).

- Roof assembly.
- Roofing vulnerabilities such as tile bird stops, drip edges, hips and valley protections.
- **Key point** — roofs and vents are the most vulnerable to embers.

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- Walls and decks.
 - Wood.
 - Composite.
 - Concrete.
 - Masonry.



Slide 1-87

- Walls.
 - Siding types.
 - Fire ratings (one hour versus ignition-resistant).
- Eaves and unenclosed spaces.
- Decks.
 - Wood.
 - Composite.
 - Concrete/Noncombustible.
- **Key point** — decks and walls are generally the most vulnerable to the flammable landscape or homeowner products that are in close proximity.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Energy systems that use aboveground storage containers.



Slide 1-88

- Consideration should also be given to energy systems such as propane that may use aboveground storage containers.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Defensible space.
 - Building construction without defensible space is not effective and vice versa.
- Survivable space.
 - Goal is to prevent building damage without any suppression interventions.



Slide 1-89

3. Defensible space — this topic is included in the built environment section because it is part of the building “envelope.”
 - a. Building construction without defensible space is not effective and vice versa.
 - Recognizing this potential disparity is **critical**.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Defensible space examples.

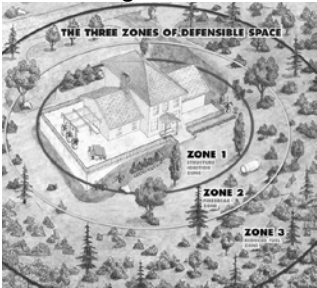


Slide 1-90

- b. “Defensible space” — the zone around a structure or infrastructure that has been modified to facilitate effective defensive wildland fire suppression strategies and tactics.
- “Survivable space” — the zone around a structure or infrastructure that has been modified to prevent property damage from a wildland fire without any suppression interventions.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

Home Ignition Zones



Slide 1-91

- c. The concept of defensible space is based on home ignition zone principles (NFPA’s Firewise):
- Zone 1 (structure ignition zone).
 - Zero to 30 feet from the home.
 - Plants should be carefully spaced, low growing and free of resins, oils and waxes that burn easily.

- Mow the lawn regularly. Prune trees up 6 to 10 feet from the ground.
- Space conifer trees 30 feet between crowns. Trim back trees that overhang the house.
- Create a “fire-free” area within 5 feet of the home, using nonflammable landscaping materials and/or high-moisture-content annuals and perennials.
- Remove dead vegetation from under deck and within 10 feet of house.
- Consider fire-resistant material for patio furniture, swing sets, etc.
- Remove firewood stacks and propane tanks; they should not be located in this zone.
- Water plants, trees and mulch regularly.
- Consider xeriscaping if you are affected by water-use restrictions.
- Zone 2 (firebreak zone).
 - 30 to 100 feet from the home.
 - Leave 30 feet between clusters of two to three trees, or 20 feet between individual trees.
 - Encourage a mixture of deciduous and coniferous trees.
 - Create “fuel breaks,” like driveways, gravel walkways and lawns.
 - Prune trees up 6 to 10 feet from the ground.
- Zone 3 (reduced fuel zone).
 - 100-200 feet beyond the home.
 - Remove smaller conifers that are growing between taller trees. Remove heavy accumulation of woody debris.

- Reduce the density of tall trees so canopies are not touching.

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Key considerations for a defensible space mitigation strategy:

- What type of educational and/or enforcement program will you have?



Slide 1-92

- d. Key considerations of a defensible space mitigation strategy include:

- What type of educational and/or enforcement program will you have?

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- What standards or requirements will there be?



Take a woodsy lot like this ... and make it **Firewise**.

Slide 1-93

- What standards or requirements will there be?

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- How will you support the clearing of defensible space fuels?



Slide 1-94

- How will you support the clearing of defensible space fuels?

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- Will there be an inspection process?



Slide 1-95

- Will there be an inspection process?

MITIGATION STRATEGIES FOR THE BUILT ENVIRONMENT (cont'd)

- How will the program be maintained?



Slide 1-96

-- How will the program be maintained?

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- Road/Transportation network.
 - Ingress and egress concerns.
 - Main arterials.
 - Secondary roads.
 - Driveways.
- Emergency evacuation capacity.

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4. Road/Transportation network — this part of the built environment is important because it directly affects the response and evacuation (access/egress) capability of the community.

a. Ingress and egress routes.

- Roads sufficiently wide to allow for two-way traffic in an emergency.
- Main arterial roads.
- Secondary roads; most codes require 18- to 24-foot width.
- Private driveways; most codes require 8- to 12-foot width with 13 feet 6 inches of vertical clearance.
- Communities must have ways to evacuate in the event of a wildland fire. This requires that thought be given to the volume of traffic, the time to exit the area safely, and whether critical roads have roadside fuel breaks to increase safety.

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- Addressing.
 - Individual buildings identifiable.
- Water supply.
 - Volume, pressure and duration of flow.
 - Reliability.
 - Distribution system.
 - Static water sources.

Slide 1-98

b. Addressing.

- Homes need to be identifiable for clear communications routing, key information, structure protection assignments, 911 tracking, etc.
- Proper addressing means that responders unfamiliar with the local community can still be effective at finding homes and citizens in need of protection.

c. Water supply.

Some type of community water supply is necessary to maintain the availability of firefighting water. These can take the form of:

- Standard hydrant systems.
- Rural hydrant systems.
- Rural water tanks to include community or home-based, buried or aboveground, portable or stationary, and water tenders.
- When developing a CWPP, contact the local water provider (if there is one) and determine the delivery, reliability and capability of the local water system.

MITIGATION STRATEGIES FOR
THE BUILT ENVIRONMENT (cont'd)

- Lifeline utilities.
 - Potable water.
 - Electrical power.
 - Natural gas/propane.
 - Sanitary sewer.

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d. Lifeline utilities.

- Water, electricity, gas, sewer.
- Electrical lines are usually a greater fire concern than gas lines since they are more exposed (as overhead wires) than buried gas lines.
- Electrical lines are often a source of fire ignition as well as a critical infrastructure feature.
- This requires a prevention plan for that risk in the CWPP.
- Discuss the following issues with local utility providers:
 - Location of high-voltage transmission lines.
 - Location of standard distribution lines.
 - Power pole vegetation clearances and identification of poles.

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ACTIVITY 1.2

Mitigation Strategies for the Built Environment

Purpose

Given a neighborhood from the Lakeshore community case study, identify a group of built environment mitigation strategies that could be integrated into a CWPP for that neighborhood.

Directions

1. You are to work within your small table group for this activity.
2. Refer to the Lakeshore Case Study.
3. The instructor will assign a specific Lakeshore neighborhood to each table group.
4. Within your small group, reflect on the general information about Lakeshore and the information pertinent to your assigned neighborhood as you complete the activity.
5. As a group, identify, discuss and select at least five mitigation **strategies** pertinent to the built environment for your assigned Lakeshore neighborhood. Prioritize the selected strategies in preferred order to achieve the greatest degree of mitigation.
6. List your selected mitigation strategies on an easel pad and be prepared to explain and justify your choices.
7. Complete this portion of the activity within 20 minutes.
8. Select a group representative to present the group's choices to the class.
9. The entire activity should be completed within 30 minutes.

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VII. MITIGATION STRATEGIES FOR THE SOCIAL ENVIRONMENT

MITIGATION STRATEGIES FOR THE SOCIAL ENVIRONMENT

- People's knowledge, assumptions and value systems play a key role in determining the success of a CWPP.

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- A. People's knowledge, assumptions and value systems play a key role in determining the success of a CWPP.

MITIGATION STRATEGIES FOR THE SOCIAL ENVIRONMENT (cont'd)

What are some WUI attributes that might apply to the social environment?



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MITIGATION STRATEGIES FOR THE SOCIAL ENVIRONMENT (cont'd)

- WUI attribute examples in the social environment:
 - Tolerance of change.
 - Political risk tolerance.
 - Willingness/Ability to support mitigation programs financially.
 - Collaboration/Turf wars.
 - Perception of acceptable risk.
 - Emergency preparedness participation.

Slide 1-103

1. WUI attribute examples in the social environment include:
 - a. Tolerance of change.
 - b. Political risk tolerance (e.g., for code adoption).
 - c. Willingness/Ability to support mitigation programs financially.
 - d. Collaboration or turf-building between agencies.
 - e. Perception of acceptable risk.
 - f. Emergency preparedness participation.

**MITIGATION STRATEGIES FOR THE
SOCIAL ENVIRONMENT (cont'd)**

- Ability to change the social fabric of a community may be limited.
- Goal is to understand the psychology of community thinking and how to influence it.

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2. As with the natural environment, the ability to change a community's social fabric and characteristics may be somewhat limited. However, the goal here is to understand the psychology of community thinking and determine how to best influence the process toward risk reduction.
3. Education and knowledge building.
 - a. Knowledge building is predictable. It often transitions from skepticism to awareness, and then ascends to acceptance and advocacy.
 - b. The process of finding champions for an FAC provides exposure to the range of human perceptions and attitudes about WUI issues.

- c. Pay attention to the research done on social behaviors about wildland fire. Consider partnering with local social scientists to survey your community so you can learn what they care about (and tailor your messages accordingly) and to help you gauge whether your efforts are being successful.
- d. The mitigation goal of education is the **change in human behavior**.
 - There are many programs that have gone beyond the effective educational campaigns such as Smokey Bear in an attempt to address the complexities of the WUI fire risk.
 - While Smokey Bear focused on prevention, many of the more recent/current programs focus on mitigation.

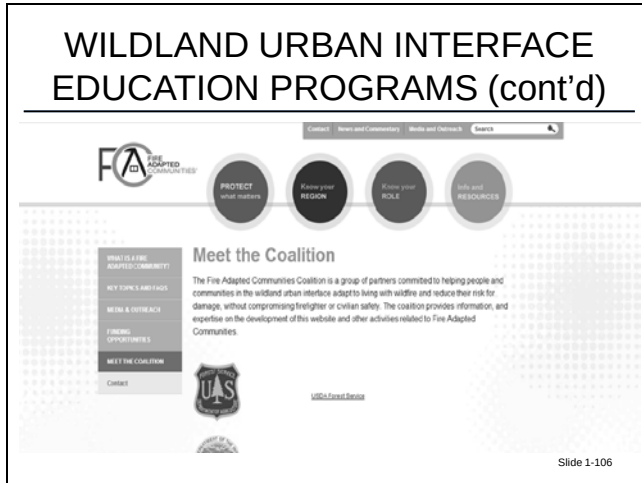
WILDLAND URBAN INTERFACE EDUCATION PROGRAMS

- WUI educational programs.
 - Knowledge-building often transitions from skepticism to awareness to acceptance and then advocacy.
 - Goal is behavioral change relative to WUI mitigations.
 - Many educational programs focus on mitigation rather than traditional prevention approach.

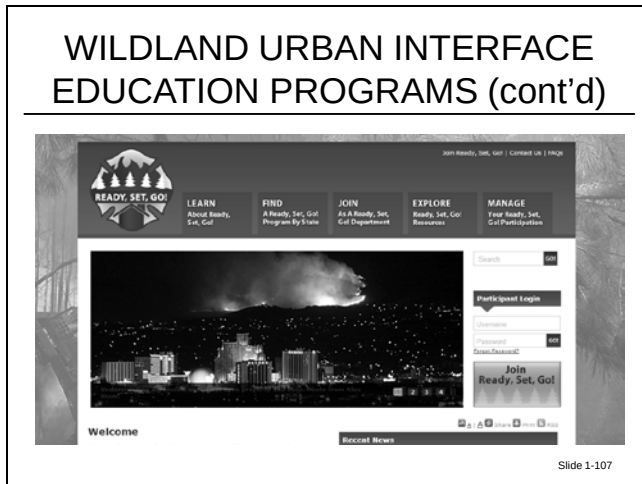
Slide 1-105

B. WUI community/public education programs.

There are many educational programs that support wildland fire prevention, planning, mitigation and preparedness. The following are examples that are in use nationally or regionally:

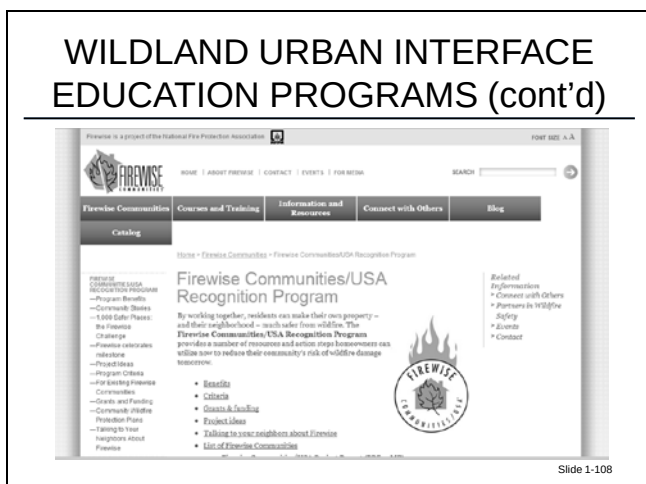


1. FACs (<http://www.fireadapted.org/>).
 - a. The Fire Adapted Communities Coalition is a group of partners committed to helping people and communities in the WUI adapt to living with wildland fire and reduce their risk for damage, without compromising firefighter or civilian safety.
 - b. The coalition provides information and expertise on the development of this website and other activities related to FACs.



2. International Association of Fire Chiefs (IAFC) — Ready, Set, Go! (<http://www.wildlandfirersg.org/Web Resources>).
 - a. The Ready, Set, Go! program, managed by the IAFC, seeks to develop and improve the dialogue between fire departments and the residents they serve.

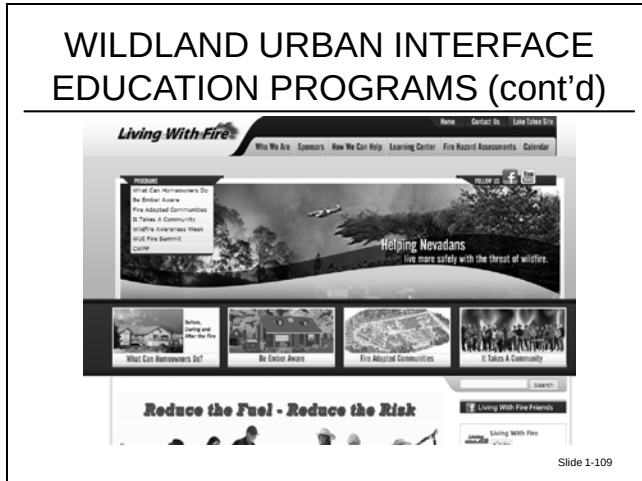
- b. Launched nationally in March 2011 at the Wildland-Urban Interface (WUI 2011) Conference, the program helps fire departments to teach individuals who live in high-risk wildland fire areas — and the WUI — how to best prepare themselves and their properties against fire threats.
- c. The Ready, Set, Go! program helps residents be “ready” with preparedness understanding, be “set” with situational awareness when fire threatens, and to “go,” acting early when a fire starts.
- d. Now in its second year nationally, the program has over 500 member departments and agencies representative of 46 states.
- e. It continues to work in complimentary and collaborative fashion with existing wildland fire public education efforts, like Firewise, and amplifies those messages to individuals to better achieve the common goal we all share of FACs.
- f. The Ready, Set, Go! program provides the implementation guidance, background knowledge, and presentation tools to assist fire departments in delivering the program message:
- g. **Ready** — be ready, be Firewise. Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and make sure all those residing within the home know the plan of action.
- h. **Set** — situational awareness. Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.
- i. **Go** — act early! Follow your personal wildland fire action plan. Doing so will not only support your safety, but it will allow firefighters to best maneuver resources to combat the fire.



3. NFPA's Firewise (<http://www.firewise.org/Web Resources>).

Interactive Firewise Communities Map (<http://www.firewise.org/communities/firewise-map.aspx>).

- a. NFPA's Firewise Communities program encourages local solutions for wildland fire safety by involving homeowners, community leaders, planners, developers, firefighters and others in the effort to protect people and property from wildland fire risks.
- b. Co-sponsored by the U.S. Department of Agriculture (USDA) Forest Service, the U.S. Department of the Interior, and the National Association of State Foresters (NASF).
- c. Teaches people how to adapt to living with wildland fire and encourages neighbors to work together and take action now to prevent losses. We all have a role to play in protecting ourselves and each other from the risk of wildland fire.
- d. Nearly 900 communities participate in 40 states, with more than 80 percent remaining active over 10 years.



4. University of Nevada at Reno — Living With Fire (<http://www.livingwithfire.info/>) (http://imedia.unr.edu/cooperative_extension/FireSafeBuildingMaterials.aspx).
 - a. The Living With Fire program began in 1997 when Ed Smith and Paul Tueller of University of Nevada, Reno and Fire Chief Loren Enstaad of the Sierra Front Wildfire Cooperators applied for and received a Nevada Agricultural Experiment Station/Nevada Cooperative Extension Joint Program grant.
 - b. Together with Nevada's firefighting organizations, they developed a set of consistent wildland fire threat reduction recommendations for Nevadans.
 - c. Since then, these recommendations have been shared with thousands of homeowners living in fire prone areas throughout the country.
 - d. Today, Living With Fire is a collaborative effort involving many organizations and is managed by University of Nevada Cooperative Extension. Visit our sponsors page for additional information about these partnering organizations.



5. Federal Emergency Management Agency (FEMA)/Department of Homeland Security (DHS) — Ready.gov (<http://www.ready.gov/wildfires>).

This is FEMA's all-hazards public preparedness website and program. It may be repeated at the local level such as <http://www.readyoc.org/>.



6. Insurance Institute for Business and Home Safety (IBHS) (<http://www.ibhs.org/>).

- a. The IBHS is a nonprofit institute funded by member insurance companies.
- b. IBHS focuses on mitigations that reduce structural losses from natural hazards and has designed a unique testing center.

- c. The IBHS research center is a full-scale laboratory that allows a full-size home to test for ember and heat wildland fire exposures. (See video for example of ember exposure test <http://vimeo.com/22751346>.)
- d. The IBHS also publishes regionally specific WUI informational materials for both the public and insurance companies to use.

WILDLAND URBAN INTERFACE EDUCATION PROGRAMS (cont'd)



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7. National Institute for Standards and Technology (NIST).

- a. NIST has developed several programs to support WUI efforts.
- b. NIST programs range from building and fire codes research to fire behavior modeling, damage assessment research programs, first responder safety, and community resiliency.

WILDLAND URBAN INTERFACE EDUCATION PROGRAMS (cont'd)



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- c. Step 1: Click and explore (<http://www.nist.gov/wildland-urban-interface-wui-fires.cfm>).

- d. Step 2: Click and show “With Its Dragon, NIST Aims to Reduce the Toll of Wildfires” video (http://www.nist.gov/el/fire_research/fire-051413.cfm).



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8. American Red Cross.
 - a. The American Red Cross is a national agency primarily responsible for sheltering people who have been displaced during an emergency event such as a wildland fire.
 - b. The agency has information specific to wildland fire events and a 2012-released “Wildfire App” (<http://www.redcross.org/news/article/New-Red-Cross-Wildfire-App-Brings-Safety-Information-to-Mobile-Devices>).
9. The Nature Conservancy (TNC).
 - a. TNC is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people.
 - b. In all 50 states and more than 30 countries — protecting habitats from forests to grasslands to coral reefs.
 - c. In the U.S., typically employ prescribed fire across more than 100,000 acres every year.
 - d. TNC staff follow NWCG standards and frequently work with federal, state and local partners on fire and restoration projects (<http://www.nature.org/>).

[illegible]

- [illegible]

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- [illegible]

Examples of key demographics include:

- a. Income and education levels.
 - b. Home ownership or renter and absentee ownership.
 - c. Commuter or local employment influences.
 - d. Family structures and school participation.
 - e. Age and gender.
2. Demographic data resource — U.S. Census Bureau (<https://www.census.gov/main/www/access.html>).

Online mapping tools (Geographic Information System (GIS)-compatible data files).

COMMUNITY CONVERSATION

- A continuous “conversation” with the community relative to WUI risk.
 - Essential to a successful FAC initiative.
 - Labor-intensive.
 - Should never stop once begun.
 - Involves personal contacts, relationship building and negotiation.
 - Set goals for social environment behaviors.

Slide 1-117

3. Community conversation.
- a. As your team pursues development of social mitigation strategies, one of the key commitments that must be made is the continuous “conversation” you will have with your community.
 - b. This dialogue, including key messaging, is most effective when tailored specifically to the intended audience.
 - “The key that fits the lock.”
 - Facilitates community engagement, compliance, etc.

- c. This “conversation” is labor-intensive and never stops once begun. However, it represents one of the **most important** strategies that will help advance a CWPP.
- d. Social mitigations require contact, conversation, relationship building, and negotiation with stakeholders.
- e. It is important to set goals for the social environment behaviors that will help advance a CWPP.

COMMUNITY CONVERSATION (cont'd)

What are some examples of indications that your CWPP is having an impact?



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DEMONSTRATING COMMUNITY WILDFIRE PROTECTION PLAN IMPACTS

- Examples that indicate CWPP impact is occurring:
 - Number of people attending CWPP-related meetings.
 - Increased number of people engaging the CWPP dialogue.
 - Hearing positive anecdotal comments.
 - Positive change in community survey results.
 - Participation in mitigation projects.

Slide 1-119

- f. Examples that indicate impact is occurring include:
 - Number of people attending CWPP-related meetings who are present to engage in dialogue about the plan.
 - Hearing people talk about the plan in a positive manner.

MITIGATION STRATEGIES

- Community/Neighborhood survey response changes from one year to the next on risk perceptions.
- Participation in mitigation projects.

ACTIVITY 1.3

Mitigation Strategies for the Social Environment

Purpose

Given a neighborhood from the Lakeshore community case study, identify a group of social environment mitigation strategies that could be integrated into a CWPP for that neighborhood.

Directions

1. You are to work within your small table group for this activity.
2. Refer to the Lakeshore Case Study.
3. The instructor will assign a specific Lakeshore neighborhood to each table group.
4. Within your small group, reflect on the general information about Lakeshore and the information pertinent to your assigned neighborhood as you complete the activity.
5. As a group, identify, discuss and prioritize at least five broad mitigation **strategies** pertinent to the social environment for your assigned Lakeshore neighborhood.
6. List your selected mitigation strategies on an easel pad and be prepared to explain and justify your choices.
7. Complete this portion of the activity within 20 minutes.
8. Select a group representative to present the group's choices to the class.
9. The entire activity should be completed within 30 minutes.

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VIII. MITIGATION STRATEGIES FOR THE RESPONSE ENVIRONMENT

**MITIGATION STRATEGIES FOR
THE RESPONSE ENVIRONMENT**

- Suppression/Response capability — integral element of the overall WUI mitigation strategy.
- Assessing WUI fire response capability is not an exact science.
 - National Fire Protection Association (NFPA) 1143, *Standard for Wildland Fire Management* provides guidelines.
 - Community risk tolerance.
 - Community fiscal capacity.
 - Type of fire department.

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- A. Suppression/Response capability — fire response capability is an integral element of the overall WUI mitigation strategy.
- B. This topic can also be included as part of the built environment because it is comprised of tangible resources that exist within the community infrastructure capabilities.
- C. Assessing a WUI fire response capability is not an exact science.
 1. National standards such as NFPA 1143, *Standard for Wildland Fire Management* provide guidelines for determining required suppression forces.
 2. This will often tie directly to other service levels the fire agency provides such as:
 - a. The community's level of risk tolerance.
 - b. Its financial capacity.
 - c. The type of fire department that exists.

MITIGATION STRATEGIES FOR THE RESPONSE ENVIRONMENT (cont'd)

What are some examples of potential elements of a WUI fire response capabilities assessment?



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RESPONSE CAPABILITIES

- Key components:
 - Staffing levels for WUI fires.
 - Equipment types and capabilities.
 - Wildland personal protective equipment (PPE).
 - Wildland fire training and competencies.
 - Cooperative response agreements.
 - Evacuation and sheltering training/drills.

Slide 1-123

D. Key components of assessing WUI fire response capabilities should include:

1. Staffing capability for small, medium and large fires.
2. Equipment types and capability.
3. Personal protective equipment (PPE).
4. Firefighter training and competency.
5. Cooperative response agreements.
6. Departmental/Regional response drills.
7. Community evacuation and sheltering training/drills.

RESPONSE CAPABILITIES (cont'd)

- Community emergency preparedness planning.
- Wildland fire preplans.
- Communications interoperability.
- Cooperator agency capabilities.
- Private local firefighting resources.
- All-hazards response planning with local, state and federal agencies.

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8. Community emergency preparedness planning.
9. Wildland fire preplans.
10. Communications systems such as:
 - a. Radio/Data interoperability.
 - b. Mapping systems.
 - c. Automatic Vehicle Locator (AVL) systems.
 - d. Community notification systems.
11. Cooperator agency capabilities.
12. Private local firefighting resources.
13. All-hazards disaster response and recovery planning with local, state and federal agencies.

RESPONSE CAPABILITIES (cont'd)

- What is your group's opinion of the response environment attributes within the greater Lakeshore region?
- What are its strengths?
- Where could enhancements be made?



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ACTIVITY 1.4

Putting It All Together — Wildland Urban Interface Mitigation Strategies

Purpose

To analyze the mitigation strategies implemented by the City of Colorado Springs prior to the 2012 Waldo Canyon fire, including the 2011 Colorado Springs CWPP, which could potentially be integrated into your CWPPs.

Directions

1. View the “Creating Fire Adapted Communities: A Case Study from Colorado Springs and the 2012 Waldo Canyon Fire” video (http://www.youtube.com/watch?feature=player_embedded&v=4p9VYKoq3qE).
2. Review the following documents that were assigned as homework the evening prior to this activity:
 - a. “Lessons Learned from Waldo Canyon.”
 - b. “City of Colorado Springs Community Wildfire Protection Plan” (2011).
 - c. “Waldo Canyon Fire Final After Action Report” (April 2013).
3. Complete the review within 30 minutes.
4. Each table group is assigned a WUI hazard attribute environment as follows:
 - a. Group 1: built environment.
 - b. Group 2: natural environment.
 - c. Group 3: social environment.
 - d. Group 4: response environment.
5. Within your small group, reflect on and discuss the key learning points, recommendations and useful information relative to your assigned environment that were evident in the Colorado Springs overview.

6. As a group, prepare a 10-minute presentation that addresses the following:
- a. What (in your opinion) was the level of WUI preparedness in Colorado Springs? Why and how was it orchestrated?

 - b. What key points did you discover related to the mitigation environment assigned to your group? How did Colorado Springs use the mitigations?

 - c. What tools, policies, philosophies and/or resources did Colorado Springs use that are important for overall WUI fire mitigation success?

 - d. What are the main things you learned as part of your review (i.e., learner “take-aways”)?

7. Complete Step 6 within 35 minutes.
8. Select a group representative to present your findings to the class.
9. The entire activity should be completed within 120 minutes.

IX. SUMMARY



SUMMARY

- Multiple elements required to create an FAC.
- A CWPP is a community-based wildland fire planning tool.
- General risk-reduction strategies (five E's).
- Mitigation strategies can be applied to the built, natural, social and response environments.

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APPENDIX A

NATIONAL WILDFIRE COORDINATING GROUP WILDLAND URBAN INTERFACE KEY MESSAGES PMS 476 MAY 2012

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National Wildfire Coordinating Group Wildland Urban Interface Key Messages

PMS 476

May 2012

	Key Messages	Customize
What	The wildland urban interface (WUI) is the area where structures and other human development meet with undeveloped land and/or vegetative fuels. Wildland fire happens, be ready. People who live in fire-prone areas assume a certain level of risk and responsibility. People can live compatibly with fire, if aware of and prepared for local fire conditions.	Describe areas of wildland urban interface in your community
Why	A principal reason for the escalating cost of wildland firefighting is the growing number of homes being built in the wildland urban interface.	Discuss fire history, fire danger, and community emergency response capability.
How	Successfully mitigating the consequences of fires in the wildland urban interface requires special attention to the issues of community development, social behavior, environmental consequences, and public safety policy.	- Social–human behavior. - Political–policy and decision making. - Ecological–natural environment. - Emergency Management–preparation and capability. - Community preparedness–fire resistant materials, defensible space.



National Wildfire Coordinating Group Wildland Urban Interface Key Messages

PMS 476

May 2012

Consider the following tips while communicating with your audience

- Provide additional, local detail to ensure the messages touch audiences in a relevant, credible way. (Example: In our community wildfires occur every year, annually wildfires burn xx homes in our area).
- Messages should motivate the audiences to act on what they learned. (Example: Research shows that how the house is built, the characteristics of the adjacent vegetation, and routine maintenance often determine which homes burn and which survive.)
- Categorizing the messages by what, why and how will help you recall the message. (Example: (What) Protect your home from wildfire. (Why) Take personal responsibility to reduce risk. (How) Fire resistant building materials, vegetation clearance, evacuation plan.)

Information Sources

Firewise

<http://www.firewise.org/>

Ready, Set, Go

<http://www.wildlandfirersg.org/>

Living With Fire

<http://www.livingwithfire.info/>

National Wildfire Coordinating Group

<http://www.nwcg.gov/>

Take Responsibility

<http://takeresponsibility.cafirealliance.com/>

National Interagency Fire Center, Prevention/ Education

http://www.nifc.gov/prevEdu/prevEdu_main.html

A publication of the National Wildfire Coordinating Group. Sponsored for publication by the Wildland Urban Interface Mitigation Committee. Available online at <http://www.nwcg.gov>

APPENDIX B

“LESSONS LEARNED FROM WALDO CANYON”

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Lessons Learned from Waldo Canyon

FIRE ADAPTED COMMUNITIES
MITIGATION ASSESSMENT TEAM FINDINGS



PREPARED BY:

Stephen Quarles, Ph.D.
Insurance Institute for Business & Home Safety

Pam Leschak
USDA Forest Service

Chief Rick Cowger
International Association of Fire Chiefs

Keith Worley
Regional Firewise Advisor, National Fire Protection Association

Remington Brown, P.E.
Insurance Institute for Business & Home Safety

Candace Iskowitz
Insurance Institute for Business & Home Safety

FIRE ADAPTED COMMUNITIES COALITION:

USDA Forest Service
Insurance Institute for Business & Home Safety
International Association of Fire Chiefs
National Fire Protection Association
The Nature Conservancy
U.S. Department of the Interior
National Association of State Foresters
National Volunteer Fire Council
U.S. Fire Administration
National Wildfire Coordinating Working Group–Wildland Urban
Interface Mitigation Committee

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Pam Leschak, Linda Hecker, Sheryl Page and Sarah McCaffrey, Ph.D.

National Fire Protection Association:
Molly Mowery, Cathy Prudhomme, Keith Worley and Fred Durso

Insurance Institute for Business & Home Safety:
Steve Quarles, Ph.D. and Remington Brown, P.E.

International Association of Fire Chiefs:
Chief Rick Cowger

The Nature Conservancy:
Wendy Fulks

Colorado Spring's Office of Fire Marshal:
Fire Marshal Brett Lacey, Christina Randall and Andrew Notbohm

Colorado State Forest Service:
State District Forester Larry Long

Coalition for the Upper South Platte:
Forester Marti Campbell

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FIRE ADAPTED COMMUNITIES MITIGATION ASSESSMENT TEAM FINDINGS: LESSONS LEARNED FROM WALDO CANYON

Introduction & Background

The Waldo Canyon Fire started the afternoon of June 23, 2012 near Colorado Springs, Colorado. The fire threatened the Cedar Heights community in the early hours of June 24, however no homes were lost. Two days later, the fire entered the Mountain Shadows neighborhood, where 346 homes were eventually destroyed on June 26.

Considered the worst fire in Colorado state history, Waldo Canyon forced more than 30,000 people to evacuate, scorched 18,247 acres, killed two residents, and took firefighters 18 days to fully contain. The fire burned through brush, mountain shrub, grass, and trees including oak, Pinyon-juniper, ponderosa pine, Douglas-fir, spruce and limber pine. In addition to disrupting thousands of lives and destroying hundreds of properties, the wildfire left the scarred landscapes vulnerable to flooding and/or debris slides that will pose long-term problems.

The Waldo Canyon fire presented the first opportunity for partners in the national Fire Adapted Communities (FAC) Coalition to collectively assess the performance of mitigation practices in Colorado Springs in a post-fire environment and to compare the results to the mitigation strategy recommended by the Fire Adapted Communities program. The assessment was conducted from July 18-20, 2012, by a FAC Wildfire Mitigation Assessment Team, which included two sets of researchers: structural assessment and forestry experts and social science and public education experts, accompanied by staff from the Colorado Springs Division of the Fire Marshal and the State of Colorado. The structural assessment team surveyed 40 homes that were damaged, undamaged and destroyed during the fire, toured fuels management projects, and examined a variety of mitigation initiatives including creation of defensible space, Wildland Urban Interface (WUI) Codes and Ordinances, wildfire preparedness information and awareness efforts. The team of social science and public education experts talked with local officials, homeowners and community leaders and also toured the above-mentioned areas. The

FAC Mitigation Assessment Team included representatives from the USDA Forest Service, Insurance Institute for Business & Home Safety (IBHS), International Association of Fire Chiefs, National Fire Protection Association (NFPA) and The Nature Conservancy.

OVERVIEW OF FIRE ADAPTED COMMUNITIES STRATEGY

The USDA Forest Service developed the Fire Adapted Communities program in 2009. It is based on the Quadrennial Fire Review's recommendation that creating fire adapted communities is the best alternative to escalating wildfire in the Wildland Urban Interface. The strategy promotes multi-jurisdictional use of a suite of mitigation tools focused on helping communities live successfully with wildfire through mitigation and preparation, rather than depending upon suppression and protection resources that are not always available.

PRIMARY ELEMENTS OF A FIRE ADAPTED COMMUNITY:

1. An informed and active community that shares responsibility for mitigation practices.
2. A collaboratively developed and implemented Community Wildfire Protection Plan (CWPP).
3. Structures hardened to fire and including adequate defensible space practices; advocated by Firewise Communities, IBHS and others.
4. Local response organizations with the capability to help the community prepare and can respond to wildfire; advocated by Ready, Set, Go!
5. Local response organizations with up-to-date agreements with others who play a role in mitigation and response.
6. WUI Codes, Standards or Ordinances, where appropriate, which guide development
7. A visible wildfire reduction prevention program that educates the public about the importance of a communitywide approach and the role of individual homeowners.
8. Adequate fuels treatments conducted in and near the community, including development and maintenance of a fuels buffer or firebreak around the community.
9. Established and well-known evacuation procedures and routes.



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OVERVIEW OF COLORADO SPRINGS MITIGATION

Colorado Springs metro area has about 650,000 people living in an area roughly 195 square miles. About 24 percent of the metro area's population resides in the 28,000 acres of WUI, which runs from the Air Force Academy south to Cheyenne Mountain Air Force Station. Much of the WUI is in forested/vegetated foothills on alluvial fans along narrow drainages and ridgelines with slopes up to 45 percent. Average annual precipitation is about 17 inches and summer temperatures can reach 100 degrees.

Colorado Springs Wildfire Mitigation Section has an annual budget of about \$300,000 and two full-time employees. Additional grant funding for mitigation projects is often sought through public and private sources. See Appendix A for a brief overview of the mitigation measures Colorado Springs Fire Department has put into place since creating the Wildfire Mitigation Section in 1993.

Community Education and Outreach

The Colorado Springs Fire Department Wildfire Mitigation Section developed a strong community education effort early in the process and has built on its success. Outreach included development of the "Sharing the Responsibility" campaign, active engagement with residents and homeowners' associations, community and neighborhood meetings, development of homeowner guides, education about evacuation, on-site risk assessments and consultations, on-line resources, brochures and other educational tools. The effort has evolved into a community lecture series that discusses wildfire risk mitigation, wildfire behavior and forest health and arbor care. The community also has a Wildfire Mitigation Season kick-off each spring to alert residents of the need for action prior to the official start of wildfire season.

A series of stakeholders meetings began in 2000 and a Core Advisory Group was formed. Grants from the U.S. Forest Service and the U. S. Fire Administration Assistance to Firefighters propelled the program in 2001 with the production of wildfire risk materials, including a video for public access cable channel. Voters approved the Public Safety Sales Tax, which helped fund the mitigation program.

The Colorado Springs Firewise program, patterned after the national Firewise Communities Program, became part of homeowner mitigation and outreach messaging in 2001. A Firewise Program Coordinator was hired and began a series of community Firewise meetings to discuss risk, mitigation, and evacuation. In 2002 Colorado Springs launched an interactive Firewise website which combined mitigation messages aimed at the homeowner and each property's hazard rating which encouraged a sense of community competition among neighbors.

It should be noted that the Colorado Springs Wildfire Mitigation Firewise program is substantially different from the national Firewise program in regards to scope, regulation and size. With 36,485 addresses and 28,800 acres identified in the Colorado Springs WUI, the fire department is actively engaged with 87 neighborhoods by providing:

- a wildfire risk assessment down to the lot level through aerial photographs and windshield drive-by methods;
- development review process that involves progressive code requirements for new construction and rebuilding post-fire;
- education and outreach to homeowners and neighborhood organizations;
- a fuels mitigation program that addresses neighborhood chipping; residential properties and adjacent common areas and open spaces;
- champion recognition;
- grant funding and administration;
- fire danger monitoring, and
- oversight of a self-regulating process that is performed by the citizens in partnership with the fire department to "Share the Responsibility" without an enforcement posture.

The Mitigation Assessment Team found that regular, consistent and open communication with targeted neighborhoods about services offered by the fire department and the need for individual responsibility on the part of homeowners helped the community understand both the need for and how to implement mitigation work. The Colorado Springs Firewise effort is the core of the education and outreach effort. Colorado Springs Fire Department made residents partners in the process by sharing risk information and helping them conduct mitigation efforts. It also identified Firewise Champions in WUI neighborhoods and

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recognized them during both state Wildfire Awareness Weeks and official city-sponsored Firewise Weeks. Many more Firewise Communities were created by promoting champions each year and highlighting the successes of individuals and their neighborhoods.

Codes and Ordinances

Colorado Springs passed its first wildfire-related ordinance in 1993 and has since continued to work with the city council and with local developers and residents to address WUI issues through regulation. The office of the Fire Marshall provides free Hazard Risk Assessments for developments planned in the WUI. The review includes vegetation and landscape design as well as building components. All building permits must be processed through city offices.

The city's fire code is based on the International Fire Code and defines the WUI and at-risk areas. The code does not allow new construction with wood shake roofs; pre-existing cedar shake roofs are "grandfathered" in until homeowners replace roofs due to routine maintenance, at which time roof replacement cannot be with wood shakes. Additionally, the code now restricts development on slopes in the WUI, requires a Class "A" roof for all residential occupancies, [has requirements for other exterior-use materials] and fuels management measures such as creating defensible space, and many other measures intended to reduce wildfire risk.

The Mitigation Assessment Team found that Colorado Springs existing ordinances had been effective in reducing risk. See additional information in the section, "Assessment Findings Reinforce Need for Mitigation." Replacement of 55,000 cedar shake roofs over the last six years had a significant impact on ember starts as did use of fire resistant materials, home design and placement, and landscaping. Mitigation measures, building siting or location, fuels reductions, and building materials all were addressed. The Waldo Canyon Fire was responsible for igniting homes in close proximity to the blaze and igniting combustible building materials on or near other homes that ultimately resulted in the homes being damaged or destroyed.

As a result of post fire inspection the Colorado Springs Fire Marshal's office worked closely with the city council, the local builders associations, and residents to amend the city's fire code to provide more guidance on exterior-use

materials, soffit screening size, and other factors intended to reduce risk. The effort to amend the ordinance was successful. The full text of the amended ordinance is available at [http://www.springsgov.com/SIB/files/Ordinance_No__12-111\[1\]\(2\).pdf](http://www.springsgov.com/SIB/files/Ordinance_No__12-111[1](2).pdf).

Community Wildfire Protection Plan (CWPP)

Colorado Springs Community Wildfire Protection Plan (CWPP) is an active one that is implemented and is updated on a regular basis, the last time in 2011. Partners in the plan include Colorado Springs Utilities, Cheyenne Mountain Zoo, University of Colorado, USDA Forest Service, the City of Colorado Springs, Palmer Land Trust, Colorado State Forest Service, Colorado State Parks, El Paso County, Coalition for the Upper South Platte, U.S. Air Force Academy, Mount St. Francis, the Development Review Enterprise, and a host of residents representing homeowners associations.

The 48-page plan addresses a wide array of pertinent issues affecting wildfire impact on Colorado Springs and has served as the community's guide to mitigation and preparedness. The goals of the plan are to reduce risk to residents, firefighters, property, infrastructure and natural resources by educating residents about minimizing risk by reducing natural hazardous fuels around and adjacent to buildings and infrastructure, improving structural characteristics around new and existing construction through ordinances, development reviews, and individual consultations and to manage common areas and open spaces wild respecting natural characteristics and protecting habitat.

The plan calls for a minimum of 10 feet of clearance around structures and 30 feet of mitigated vegetation. Adjacent areas and open spaces calls for reduced stand density, removal of ladder fuels, separation between oak clumps by at least 10 feet, a minimum of two snags per acre for wildlife habitat, and a thinned understory in mixed conifer and mature pine.

The Colorado Springs Fire Department Wildfire Mitigation Section used the Wildfire Hazard Risk Assessment (WHINFOE) tool to determine risk ratings from low to extreme. Nearly 36,000 homes were identified as at-risk in the interface in 63 neighborhoods. Property owners can access their risk ratings on line at any time and compare

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them to those of their neighbors, thus using peer pressure to encourage mitigation. The risk information is updated as property owners make modifications or upgrades. A full update of the hazard risk map is done every 10 years; view the information at <http://csfd.springsgov.com>.

The Mitigation Assessment Team found that the CWPP was a living document that resulted from a wide collaborative effort, including many stakeholders at the federal, state, and local level, as well as residents and homeowner associations. This broad-based support and collaboration provided credibility to the CWPP as a community-developed and accepted document. The community was invested through participation and better understood the issues involved, which fostered support for the plan's implementation, according to local officials and community leads. The CWPP outlines the community's wildfire risk issues and ways to address or mitigate them. In fact, the document goes into detail to describe mitigation practices and programs. The document is updated regularly and serves as the action plan for mitigation and risk reduction. Download the CWPP at: http://www.springsgov.com/units/fire/wildfire/COS_CWPP_2011.pdf.

The Stewardship Program Agreements and Fuels Management

The Wildfire Mitigation Section gets fuels management work done through stewardship agreements with private and public property owners. Those agreements, which outline fire department and property owner responsibility and liability, are signed and in place before any mitigation work is undertaken.

Colorado Springs fuels management projects are anticipated to result in a savings of \$12 to \$24 for every \$1 invested in mitigation. The Wildfire Mitigation Section treats nearly 1,000 acres annually through maintenance, prescribed burning, volunteer projects and neighborhood chipping. The fire department also works on cross-boundary projects with the USDA Forest Service, Air Force Academy, El Paso County, and Colorado Springs Utilities.

Colorado Springs conducts about 900 acres of fuel treatments annually. Roughly 300 acres are treated in parks, open spaces and common areas and 600 acres are treated

on private property through the neighborhood chipping program. Treatments cost \$800 to \$2,500 per acre and can have multiple objectives. Aesthetics are important to nearby residents. City licensing requirements limit the pool of contractors, while city ordinances limit types of treatments. The city does not currently conduct broadcast burning.

In general, continuous fuel layers are broken up into clumps; small trees are thinned out and ladder fuels are removed. The hope is, these treatments will moderate the behavior of any wildfires and allow firefighters to extinguish fires before they damage structures.

More than 60 City neighborhoods/ homeowner associations participate annually in the CSFD community chipping program, which is funded by the Public Safety Sales Tax. This keeps a two-person crew busy eight months out of the year. Homeowners qualify for chipping by having a free wildfire risk assessment at their home or by attending a CSFD Wildfire Mitigation Meeting. If stacked according to CSFD guidelines, woody material is removed free of charge during a designated week. Mitigation efforts are not enforced.

Treatments also are conducted in residential common areas, parks and open spaces where the city has fire suppression responsibilities. Priority is given to forested areas adjacent to neighborhoods with high fire risk. Project area limitations include economic and contracting feasibility and ownership. The city has a seasonal five-person fuel mitigation crew and also hires contractors through an RFP process to conduct mitigation projects. Vegetation is not physically removed from treatment areas; rather, it is cut, chipped and spread across the ground to a depth of no more than 4 inches. The goal is to re-treat areas every two to four years depending upon regeneration.

Specific treatment prescriptions are based on the vegetation types and condition and terrain. In areas dominated by Gambel oak and similar shrubby species, hazard mitigation objectives focus on breaking up fuel continuity. According to Jester et al,¹ "spacing requirements between clumps of brush and/or shrubs are 2½ times the height of the vegetation. The maximum diameter of clumps is 2 times the height of the vegetation." In mixed conifer and ponderosa pine stands, thinning from below treatments are the norm. Mature trees are retained and the more flammable understory trees are cut, as are limbs that serve as ladder fuels.

¹N. Jester, K. Rogers, and F.C. Dennis (2012). "Gambel Oak Management," Natural Resources Series, No. 6.311, Colorado State University Extension, 115 General Services Building, Fort Collins, CO.

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The Mitigation Assessment Team found the most significant fuel treatment “story” played out at Solitude Park on June 24. The area known as Solitude Park lies above the neighborhood of Cedar Heights and covers approximately 300 acres. It is located between the residential neighborhoods and the national forest. Fuel treatments were conducted in 2010 across approximately 300 acres of the area. Vegetation types in the treated areas are primarily Gambel oak shrubland, ponderosa pine woodland, mixed conifer forest, and pinyon-juniper woodland. The treatments were funded by the city through a FEMA grant and carried out primarily by contractors as described in the above section.

In places where there had been a continuous layer of dry, shrubby fuels (decadent Gambel oak), the treatment broke the layer into clumps (Figure 1).



Figure 1: Solitude Park parcel dominated by Gambel oak, where the results of the fuel treatment by breaking up a continuous layer of shrubby fuels, are still obvious. The Waldo Canyon Fire spread to this treated area. It was extinguished before it spread to homes. Source: USDA Forest Service.

When the wildfire approached on June 24, this alteration of the fuel structure allowed firefighters to anchor in a safe zone and create a dozer line, which was instrumental in fighting the fire there and protecting the Cedar Heights community adjacent to the treatment area. It was also easier for firefighters to address spot fires in areas where the fuels were discontinuous (Figure 2). Water and retardant drops near the fuels treatment reinforced its effectiveness. Ultimately no homes were lost in the Cedar Heights neighborhood which is adjacent to the treatment area, partially due to the fuels treatment, firefighters anchored in the safe zone that put out spot fires, and changes in fire behavior.



Figure 2: The wildfire stopped or was extinguished in the middle of this treated area. Source: USDA Forest Service.

OVERVIEW OF HOME ASSESSMENT SURVEYS AND LOCATIONS

Following are the detailed findings of the FAC Wildfire Mitigation Assessment Team surveys regarding structural performance, with particular emphasis on construction details that can increase the vulnerability of homes to wildfire exposures. It is intended to highlight the importance of choosing the right types of building materials and following proper installation and maintenance practices for properties located in wildfire-prone areas.

Home and buildings that were damaged and destroyed were located in the area to the west of Centennial Boulevard and to the north of N. 30th Street. The homes and other buildings in this area were represented on a preliminary damage assessment survey map published July 2, 2012 by the Colorado Springs Division of the Fire Marshal, shown in Figure 3, and included approximately 1,525 buildings. Of these, 346 were destroyed and 38 were damaged; all were located on streets accessed by Flying W Ranch Road.

Introduction & Background



Figure 3: The red circles indicate areas in the Mountain Shadows neighborhood where home assessments were conducted. Source: Colorado Springs Division of the Fire Marshal and IBHS.

Introduction & Background

Forty homes were included in the FAC Wildfire Mitigation Assessment Team survey; 38 were located in the Mountain Shadows neighborhood and two were located in the Cedar Heights neighborhood. All homes within the nominal fire perimeter were not examined.

The relative location of the Mountain Shadows and Cedar Heights neighborhoods are shown in Figure 4. Of the 38 homes included in the survey from the Mountain Shadows neighborhood, 26 homes were destroyed, 10 homes were damaged, and two homes were not damaged. The areas within the Mountain Shadows neighborhood where assessments were conducted are shown in Figure 3. The damage assessment survey form used for the home assessments is shown in Appendix A. This form was based on the NIST/USDA FS WUI-1 Damage Assessment Report form, but was modified for use in this survey. Some general observations about the role of landscape vegetation and landscaping during the fire are in Appendix B.

Home Assessment Focus

When conducting the field inspections, the FAC Wildfire Mitigation Assessment Team examined the types of building materials and construction techniques used in damaged and undamaged homes and looked for vulnerabilities that could be responsible for damage to homes and buildings. For destroyed homes, the team surveyed debris for evidence of the type of building materials used and examined landscaping vegetation and features to determine whether and how the fire might have reached and ignited the houses. As with prior post-wildfire field investigations,

there was evidence of several types of possible ignition scenarios, including wildfire-to-building and house-to-house fire spread. Wildfire-to-building fire spread could occur from wind-blown embers or the flaming front or flank of the fire. By its very nature, wildfire is a fast-moving natural hazard that leaves little time for preparation when a fire is threatening. This fact, combined with the potential for multiple causes of ignition that can result in wildfire damage, further reinforces the need for a communitywide approach to wildfire mitigation to complement the role of individual responsibility among homeowners.

Approximately 90 percent of homes ignited by the Waldo Canyon Fire were completely destroyed. Of those that were damaged, firefighter intervention was the likely reason the house was saved. This pattern is similar to other wildfires where a large number of homes were destroyed and few are damaged, as indicated by many prior post-fire surveys. This report provides examples of situations where firefighter intervention was reported, and confirmed by Colorado Springs Fire Marshal's personnel, and examples where intervention did not likely occur.

How Homes Ignite during Wildfires

Wildland fire-to-building ignition resulting in damage or loss during wildfires occurs if the fire can burn directly to the building; directly or indirectly from wind-blown embers (also known as firebrands) or from exposure to embers generated by the burning wildland vegetation. An example of loss due to indirect exposure is ember ignition

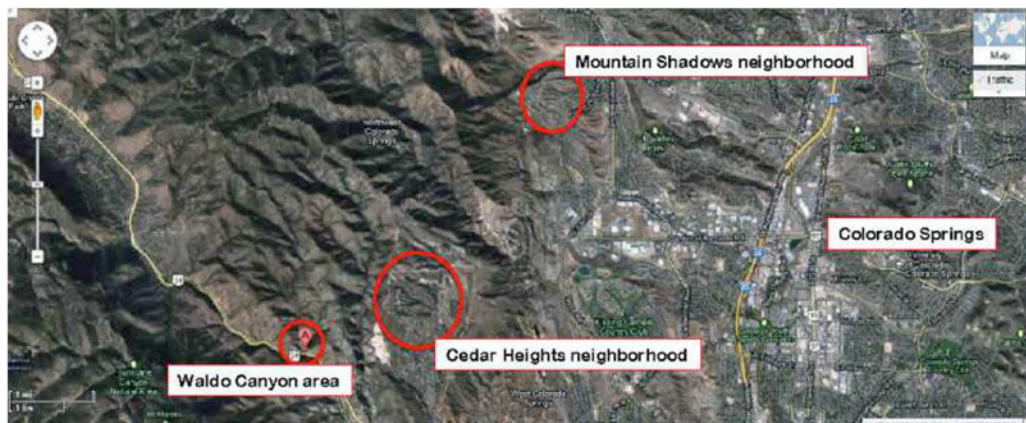


Figure 4: Relative locations of the Cedar Heights and Mountain Shadows neighborhoods in Colorado Springs. Source: Google Maps.

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of vegetation or other combustible materials located near the building resulting in subsequent ignition of a building component from a radiant and/or direct flame contact exposure. Depending on the extent and duration of a radiant heat exposure, pre-heating or ignition of a material can occur, or the glass in a window or door can break. An example of loss due to direct ember exposure would be ember entry through a vent or open window with subsequent ignition of combustible materials inside the building. Direct ignition by embers also can occur through ember accumulation on combustible materials, such as a wood shake roof or combustible decking or immediately adjacent to combustible materials, such as siding.

Once homes and other buildings ignite and burn, they also become a source of embers and threaten other homes and buildings – this report will not distinguish between vegetation and buildings as the sources of embers. Once an initial wildland fire-to-building ignition has occurred, depending upon building-to-building spacing and other topography features, additional building ignitions can occur via building-to-building fire spread. It was reported that during the 2007 Witch Creek Fire, building-to-building fire spread was more likely if between-building spacing was less than 15 feet². The role of proximity between houses also was present in Waldo Canyon, where many of the destroyed houses were spaced 12 feet to 20 feet apart.

In the report on the 2007 Witch Creek Fire, Maranghides and Mell³ described three categories for building ignition: 1) uninterrupted vegetative or ember ignition, 2) vegetation fire or ember ignition and 3) ember ignition. As indicated in this report, ignition by uninterrupted vegetative fire spread would be limited to buildings located on the perimeter of a community of neighborhood since roads would provide a fuel break that would preclude vegetative fire spread. Ember ignition is included in category one because, without an eyewitness account, it would be difficult to exclude the possibility of direct ember ignition, even in cases where there is an uninterrupted vegetative path between an oncoming wildfire and a building. Loss from direct or indirect ember exposure would be included in categories two and three, with direct exposure in category three being determined either by the lack of near-building vegetation or the lack of damage to near-building vegetation.

Examples of building-to-building fire spread and the three categories of wildland fire-to-building fire spread described by Maranghides and Mell were observed during the FAC Wildfire Home Assessment Team's on-site surveys. Examples of these wildfire risks are described in the following sections, along with mitigation strategies that could minimize property damage associated with the various risks.

²Insurance Institute for Business & Home Safety (2008). *Megafires: The Case for Mitigation*. IBHS field investigation: Witch Creek Wildfire, San Diego, CA, Insurance Institute for Business & Home Safety, Tampa, FL.

³Maranghides, Alexander and William Mell (2009). *A Case Study of a Community Affected by the Witch and Guejito Fires*. NIST Technical Note 1635. National Institute of Standards and Technology, Gaithersburg, MD.

Observed Wildfire Risks and Mitigation Strategies

MOUNTAIN SHADOWS

Most of the homes in Mountain Shadows that were included in this survey were single-family detached houses, with the exception of one townhome/duplex. All of the survey homes had basements with windows and window-wells. A combination of materials, including wood-lined, stone, and metal-lined window-well retaining walls were observed. On newer homes or homes, where the window-well retaining wall had been replaced, stone or metal-lined window wells were present. Wood-lined enclosures consisted of 4 x 4 (or greater dimension) vertical support members and nominal 2x horizontal planking. The accumulation of vegetative debris in window wells was common. In general, the fire consumed wood-lined enclosures on homes that were destroyed, but it was not clear if they were a cause of ignition or whether they were ignited by the burning home.



Figure 5: Five homes on Talleson Court were destroyed (red circled). These homes were located at the top of a slope and each had overhanging decks. One home suffered minor damage (blue circled).

Wildfire-to-Home: Uninterrupted Vegetative or Ember

Area Focus: Talleson Court

Although some perimeter homes were included in the assessment survey, none provided clear evidence of uninterrupted vegetation fire spread from the main body of the wildfire. The destroyed homes on Talleson Court represented an example of wildfire-to-home spread, with embers

first igniting a wooded area within the community with a subsequent direct flame contact exposure to the home (Figure 5). These homes were located at the top of a steep slope (> 30%) and were rated as being in an “extreme” hazard zone by the Colorado Springs Division of the Fire Marshal.

RISK: WOODED SLOPE

Each home had a deck overhanging the slope. Figure 6 shows a view from the top of slope where the deck was located, looking down slope. The spot fire in the wooded area crowned and separation from homes to the trees was insufficient to avoid a direct flame contact to the overhanging decks. Fire then spread from the deck to the interior of the homes. An interview with a homeowner, who was present during the site visit and whose house was destroyed told members of the assessment team that the house had a lower and upper deck, and that one deck was constructed using wood, while the other deck was built using a wood-plastic composite decking product.



Figure 6: View down slope from a Talleson Court home. Note the lack of needle vegetation on the trees, indicating the fire crowned in these trees. Source: IBHS.

MITIGATION STRATEGIES

Mitigation strategies for this threat would include thinning trees and removing ladder fuels. Building a cross-slope retaining wall using noncombustible materials down-slope from the homes could also be an effective strategy for shorter brush-type vegetation⁴. However, this would not work in a wooded area with taller trees since a crown fire would burn over top a typical retaining wall. This mitigation strategy is an example of where a communitywide effort would produce the most effective results.

⁴NFPA (2008). NFPA 1144, Standard for Reducing Structure Ignition Hazards from Wildland Fire (Appendix A). National Fire Protection Association, Quincy, MA.

FIRE ADAPTED COMMUNITIES MITIGATION ASSESSMENT TEAM FINDINGS: LESSONS LEARNED FROM WALDO CANYON

Observed Wildfire Risks and Mitigation Strategies

RISK: WINDOWS

Figure 7 depicts a home that suffered minor damage from radiant heat. This home was located approximately 30 feet from the home that was destroyed. Damage consisted of deformed vinyl frames in two windows and cracked outer glass panes in the same windows. A near-home pine tree showed signs of needle scorch. No damage was observed on the stucco-type exterior cladding. In this case, because of the limited damage to the vinyl frame windows, and because the damage was caused by the radiant heat exposure from the adjacent home, human intervention wasn't likely. Because the glass in the windows did not completely fail (i.e., the outer glass pane remained intact and the frame did not ignite), ember entry into the home did not occur.

It should be noted that, with the exception of the pine tree located near the home and a small bush in the interior corner, the defensible space on this side of the house was good (Figure 7). A noncombustible gravel product was used within 10 feet of the house. Any ember deposition and accumulation would have been on this material.

MITIGATION STRATEGIES

Mitigation strategies for this threat would include installing multi-pane windows that incorporate tempered glass. Studies have shown that the glass is the most vulnerable component of window in terms of complete failure. When glass breaks, it creates openings large enough for fire or embers to enter the home. Tempered glass is several times stronger than annealed glass (the type of glass most commonly used in windows) and therefore will require a radiant heat exposure that is higher than that required to break annealed glass. Because of this difference, tempered glass is recommended for use in these applications.

As already noted, the vinyl window frames deformed when subjected to the radiant heat exposure from the adjacent destroyed homes. To avoid these aesthetic types of damage, shutters or other coverings that could be deployed when wildfire threatens could be used. Use of shutters or coverings, and minimally multi-pane tempered glass windows, should be used in neighborhoods with close home-to-home spacing.

Wildfire-to-Home: Uninterrupted Vegetative or Ember with Subsequent Home-to-Home Fire Spread

In wildfires where large numbers of homes are destroyed, it is common for a significant number of home ignitions to result from home-to-home fire spread, with the wildfire becoming an urban fire. Close home-to-home spacing is an important component for this kind of fire. Topography and weather (wind) will also contribute to fire spread during these events. An example of this wildfire-to-urban fire scenario is the October 1991 Oakland-Berkeley Hills Tunnel Fire. The Tunnel Fire destroyed more than 3,600 homes while burning more than 1,500 acres. Similarly, during the Waldo Canyon Fire, a large number of homes were destroyed as a result of home-to-home fire spread after a smaller number of wildland fire-to-home ignitions occurred.



Figure 7: This damaged Talleson Court home was approximately 30 feet from a destroyed home. Two windows were damaged (one is circled in red; another window of the same size is located to the left of the one shown). The tall pine tree had lower branches removed and noncombustible gravel was used within approximately 10 feet from the house. Note the scorch on the destroyed home side of the pine tree and small tree in the foreground. Source: IBHS.

FIRE ADAPTED COMMUNITIES MITIGATION ASSESSMENT TEAM FINDINGS: LESSONS LEARNED FROM WALDO CANYON

Observed Wildfire Risks and Mitigation Strategies

Area Focus: Majestic Drive

Aerial photographs of the Majestic Drive area before and after the fire are shown in Figures 8 and 9. As shown in Figure 8, the fire burned down to Flying W Ranch Road, burning the vegetation on the west side of the road (left-hand side in Figure 8). Flying W Ranch Road is a major thoroughfare through the community and is approximately the width of a four-lane road: it consists of two lanes with a center common turning lane and wide, paved shoulders. Because of the width of Flying W Ranch Road, the homes in this area ignited either from direct or indirect ember exposure or home-to-home spread. Although it was not determined which of the homes in the Majestic Drive area were ignited by embers and which were specifically ignited through home-to-home fire spread, because of the relatively close between-home spacing, it is probable that many of the 135 homes destroyed in this area were the result of home-to-home fire spread.



Figure 8: Majestic Drive area of the Mountain Shadows neighborhood prior to the Waldo Canyon Fire. Source: Google Maps.



Figure 9: Majestic Drive area of the Mountain Shadows neighborhood after the Waldo Canyon Fire. Source: Colorado Springs Division of the Fire Marshal.

RISK: HOME-TO-HOME SPACING

The homes included in the assessment from this area were on Hot Springs Court. Between-home spacing for these homes was between 12 and 20 feet, representative of the other homes in the Majestic Drive area. Four homes were inspected in this area: two that were destroyed and two that were damaged (Figure 10). The homes had a Class A (asphalt composition shingle) roof covering and wood composite (hardboard) siding. The homes that were damaged had soffited (and vented) eaves. Decks on these homes used both solid wood (non-fire retardant treated) and wood-plastic composite deck boards. Both of these products are combustible. Neither qualifies as being an ignition-resistant material, which requires passing a longer-duration (30 minutes versus 10 minutes) version of the test used to evaluate the flame spread rating of a material. This test and designation applies to materials used as siding, decking and trim. Only a few commercially available materials qualify as an ignition-resistant material—the most common being wood products treated with an exterior-rated pressure impregnated fire retardant chemical formulation.

MITIGATION STRATEGIES

Maranghides and Johnsson⁵ reported that by using a one-hour, fire-rated wall construction, the spread of fire from one building to another located 6 feet away could be slowed down compared to a building clad with combustible materials that did not include the underlying materials (such as a fire-rated gypsum wallboard product) to provide the fire-rating. Since fire-resistance is a measure of fire penetration through the wall assembly, and does not evaluate flame spread up the wall, or ignition resistance, a one-hour fire-rated wall would not be the complete answer to hardening a building, but it could help in situations where there is close home-to-home spacing.

⁵Maranghides, Alexander and Erik L. Johnsson (2008). *Residential Structure Separation Fire Experiments*, National Institute of Standards and Technology, Gaithersburg, MD.

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Observed Wildfire Risks and Mitigation Strategies

Mitigation strategies for this threat would also include installing multi-pane windows that incorporate tempered glass. Studies have shown that the glass is the most vulnerable component of window in terms of complete failure. When glass breaks, it creates openings large enough for fire or embers to enter the home. Shutters or other coverings that would be deployed when wildfire threatens could also be used. Shutters and coverings are typically active devices, meaning that a resident must be present to deploy or install. There are advantages to passive devices since they are always enabled.



Figure 10: Majestic Drive area of the Mountain Shadows neighborhood showing destroyed (blue), damaged (yellow) and undamaged (green) homes, as shown in the preliminary damage assessment survey map. An undamaged home in the middle identified by an arrow was not included in this field assessment. Source: Colorado Springs Division of the Fire Marshal.

Ignition of the destroyed home at 2551 Hot Springs Court, shown as the upper most home in the red circled area in Figure 10, was either from the adjacent destroyed home located 16 foot away or through direct ember ignition. Defensible space was very good; rock mulch surrounded the home and the balance of the property consisted of irrigated lawn. The wood “half wine-barrel” planters were either largely undamaged, or burned on the house-facing side, indicating exposure from the burning house.



Figure 11: The distance between the destroyed home on the left and the damaged home on the right was approximately 16 feet. Source: IBHS.



Figure 12: Embers ignited a firewood pile located next to the garage of this home. The direct flame contact exposure from the burning firewood ignited the composite wood (hardboard) siding product. Source: IBHS.

RISK: NEAR-HOME COMBUSTIBLES

The distance from the destroyed home to the adjacent damaged home included in this survey was also approximately 16 feet (Figure 11). Damage to this home occurred on two sides: the side facing the adjacent destroyed home at 2551 Hot Springs Court and the opposite side, facing the non-damaged home (green dot within red circle in Figure 10). Damage to the side facing the destroyed home was relatively minor – one window in the window-well was damaged. Damage to the opposite (garage) side was more extensive, and was caused by the ember ignition of a fire wood pile immediately adjacent to the wood siding. The wood siding was ignited by the flames from the burning fire wood pile and the fire ultimately entered the garage (Figure 12). Firefighter intervention was reported at this home, and there is clear evidence that intervention occurred with wood from fire wood pile being kicked away from the building.

Observed Wildfire Risks and Mitigation Strategies

MITIGATION STRATEGIES

Ignition of the firewood pile by wind-blown embers points to the importance of creating and maintaining a noncombustible zone, or at minimum a low combustible zone, within five feet of a home or building. Firewood piles, lumber and other combustible materials, bark and rubber ground mulch products, and woody vegetation should not be stored, planted or used in this area. The goal is to create a “near-home” zone that minimizes the opportunity for a direct flame contact exposure to the side of the house or to the underside of the deck.

The relatively minor damage to the side of the home shown in Figure 11 is unusual given the close between home spacing. The lack of charring or scorch on the siding and shrubs (not shown in Figure 11) indicated that the destroyed house largely burned within the interior and then collapsed before involving most of the exterior. This would imply minimal window area on the sides facing the damaged home. A portion of the unconsumed wood-framed wall was standing on the side of the destroyed home facing the damaged home. The terrain at this location was relatively flat which could also help minimize exposure to the adjacent home⁶.

Damage to the remaining non-destroyed home on this court consisted of bubbling paint on window and other trim boards and a deformed vinyl window frame (Figure 13). The distance to the destroyed home was approximately 20 feet.



Figure 13: Radiant heat from the burning home, which was destroyed and was located 20 feet from this damaged home, was sufficient to cause paint on the wood trim to bubble (circled blue) and thinner components on the vinyl window frame to deform (circled red). Source: IBHS.

Area Focus: Courtney Drive

RISK: HOME-TO-HOME FIRE SPREAD

The perimeter homes located on the west side of the road (left side in the figure) shown in Figure 14 were included in the assessment. Evidence observed at the site indicated the likely wildland fire-to-home ignition occurred at 2340 Courtney Drive (Figure 14). This was likely due to the initial ignition of a detached storage shed and fire that subsequently spread to the home. Six additional homes were destroyed through home-to-home fire spread. The between-home spacing was consistently between 12 and 17 feet, which is consistent with the findings from prior post-fire field investigations, indicating the vulnerability of closely spaced homes to this type of home-to-home fire spread. All the homes were located on a moderate upslope between 10% and 20%, with the home at 2340 Courtney Drive being located at the bottom of the slope (Figure 15).

The defensible space around the destroyed homes was adequate. Observations during the site visit showed that burned and scorched vegetation and other combustibles were from radiant heat and / or fire spread out from the burning homes rather than the wildfire (Figures 16 and 17).



Figure 14: Homes on Courtney Drive that were destroyed by home-to-home spread after an initial wildfire-to-home ignition (indicated with red arrow). One home at the top of slope (red circled) suffered minor damage. The home to the east (right) of the wildfire-to-home, shown as a non-damaged green dot in this figure (blue circled), also had minor damage. Source: IBHS.

⁶Interpretation of this event includes input resulting from personal communication with Dr. Jack Cohen, USDA Forest Service, Missoula, MT.

Observed Wildfire Risks and Mitigation Strategies



Figure 15: A composite figure showing destroyed Courtney Drive homes, as viewed from upslope and down slope different perspectives. Source: IBHS.



Figure 16: Composite figure of backyards of two destroyed homes on Courtney Drive; photos taken from the home site location. Damage to vegetation and other combustible components was from burning home, not wildfire. Source: IBHS.



Figure 17: Damage to the play structure slide resulting from radiant heat exposure from the burning Courtney Drive home. Deformation of plastic components (slide and roof) was observed. Scorch or charring of wood structural support members was not observed. Source: IBHS.



Figure 18: A composite figure of two damaged homes on the west side of Courtney Dr. The up-slope home is above and the down-slope home below. The charred combustible siding in the up-slope home is not visible in this figure. The damaged components in the down-slope home are circled. Source: IBHS.

Observed Wildfire Risks and Mitigation Strategies

MITIGATION STRATEGIES

The mitigation strategies here are the same as those recommended by Maranghides and Johnsson referenced in the Majestic Drive section of this report.

The Courtney Drive homes included in this survey suffered from radiant heat damage to the siding, windows and/or the edge of the roof (Figure 18). The combustible siding on the upslope home was charred (the damaged home shown in the upper photograph in Figure 18). This home was approximately 25 feet away from the adjacent destroyed home, and was off-set from the other homes on this side of the street. Damage to the down-slope home (bottom in Figure 18) was limited to deformation of the vinyl frame in one window, similar deformation of part of a satellite dish and evidence of the flow of heated asphaltic compound in the asphalt composition roof covering; the combustible component of this Class A fire-rated roof covering. As was the case with the damaged home on Talleson Court, because the damage resulted from a radiant heat exposure, firefighter intervention did not likely occur.

WILDFIRE-TO-HOME: EMBER IGNITION

Embers, either via direct or indirect means, have been identified as the major cause of building ignitions during wildfires. It is difficult to quantify wildfire ember exposure of a component in terms of the mass or number of embers that land during a wildfire. Several examples of ember accumulation on or adjacent to materials will be discussed in this section. In most cases the accumulation of embers resulted in ignition.

RISK: EMBER ACCUMULATION AT THE BASE OF EXTERIOR WALLS

Low ground-to-siding clearance is commonly observed in construction. This condition was observed on many homes that were included in the assessment. When wood or wood-based siding is used, the building code requires a six-inch earth-to-wood clearance. This means the concrete foundation must extend 6 inches above the ground before the first course of wood siding is applied. This requirement is included in the code to minimize degradation to the siding (e.g., fungal decay or subterranean termite damage). Construction assemblies where clearance is low

may be vulnerable to the accumulation of embers at the base of the wall. Ember accumulation at the base of a wall in Mountain Shadows home resulted in ignition of the wall assembly. Construction details that could be vulnerable to ember accumulation were observed on a Cedar Heights home. These conditions will be discussed in the following section.

Area Focus: Lanagan Street

The exterior siding on the garage of a Lanagan Street home (the location of this street is shown in Figure 3) consisted of an exterior insulation finishing system (EIFS) assembly (Figure 19). In this case, the EIFS assembly consisted of a thin noncombustible stucco-like outer layer, an underlying foam insulation board, oriented strand board sheathing, and wood framing. There was a (metal) weep screed at the base of the wall to allow for drainage of water that gets behind the outer-most siding layer. As seen in Figure 19, combustible components in the middle and right-hand columns ignited. The apparent cause was from an accumulation of embers at the base of the EIFS wall. The bottom of the weep screed is perforated to allow for water to exit the wall assembly. These perforations also allowed for easier access of the accumulating embers at the base of the wall to the combustible components in the wall assembly (Figure 20). The combustible materials included the foam insulation, wood-based sheathing, building paper or house wrap and wood framing.

Observed Wildfire Risks and Mitigation Strategies

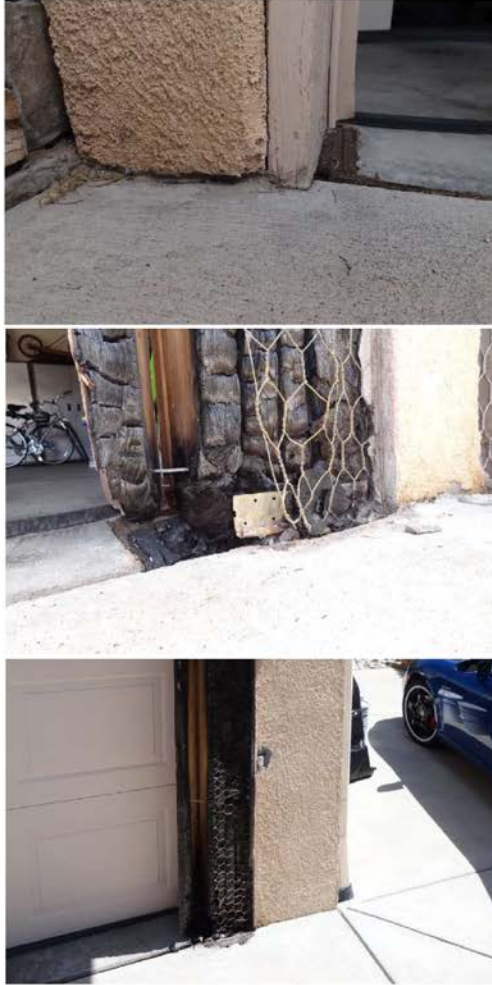


Figure 19: Photographs of the left, middle and right side columns of the two-car garage at a home on Lanagan Street. Note the low clearance between the concrete driveway and the EIFS system, as shown in the left-hand side column. The metal weep screed is visible at the base of the middle column. Source: IBHS.



Figure 20: The components of this EIFS system include a noncombustible stucco outer coating, and inner layers of combustible foam insulation, wood-based sheathing, and wood framing. Source: IBHS.

CEDAR HEIGHTS

While the Waldo Canyon Fire threatened the Cedar Heights community no homes were lost. This is a community of single-family detached homes that are more widely spaced than those in Mountain Shadows. The Mitigation Assessment Team found significant fuel treatment actions in Solitude Park, which is located above the neighborhood and covers approximately 300 acres, significantly assisted firefighters in their quest to save homes in this community. However, there was evidence of potentially vulnerable conditions around homes in Cedar Heights, which may not have performed as well if weather conditions had changed.

Area Focus: Outer Vista Point Road

One home on Outer Vista Point Road in the Cedar Heights neighborhood was included in the assessment survey. This home exhibited two different low clearance conditions that would make this home vulnerable to the accumulation of embers at or near the base of the wall. The front of this home is shown in Figure 21; the wall assembly at this location included a noncombustible fiber-cement shingle product and a wood-based sheathing product that was exposed at the bottom of the wall. Bark mulch was used at this location. The vulnerability of this location is exacerbated as a result of the bark mulch which can be ignited by

Observed Wildfire Risks and Mitigation Strategies

embers during a wildfire. If the mulch ignited, the resulting fire could spread to the exterior wall. This assembly shows one way that the protection offered by a noncombustible cladding product can be by-passed, since the underside of the wall assembly (and the wood-based sheathing) would be exposed to a direct flame contact exposure. If the sheathing ignites, the fire could spread into the wall cavity and then into the living space of the home. Flame height would depend on the type and depth of the mulch product, but given this condition, earth-to-siding clearing would have to be greater than that needed to avoid damage if accumulation were occurring on a noncombustible surface, such as the driveway at the Lanagan Street home.



Figure 21: The siding on this home was a noncombustible fiber-cement shingle product (upper photo). The assembly at the base of the wall, showing combustible wood-based sheathing, is shown in the lower photo. Source: IBHS.

A noncombustible rock mulch product was used on the back side of this home (Figure 22), along with a fiber-cement shingle product. As was the case of the Lanagan Street home, the ground-to-siding clearance for this home was minimal and accumulation of embers at the base of the wall could result in the ignition of the underlying wood-based sheathing. In this case, the foam insulation was not included in the assembly.

MITIGATION STRATEGIES

In each of the construction conditions discussed in this section, increasing the ground-to-siding clearance would result in a less vulnerable assembly. Mitigation strategies for the Lanagan Street home would include increasing the height of the concrete foundation to increase the distance between the driveway and the beginning of the EIFS cladding system. Use of a six-inch driveway-to-EIFS clearance would correspond to the already code-required earth-to-wood clearance for wood-based siding products. A six-inch clearance may or may not be the optimal separation to avoid ember accumulation-related damage via smoldering and / or flaming combustion, but based on these observations, it would be the preferred option to the observed much lower earth-(or ground)-to-siding clearances.

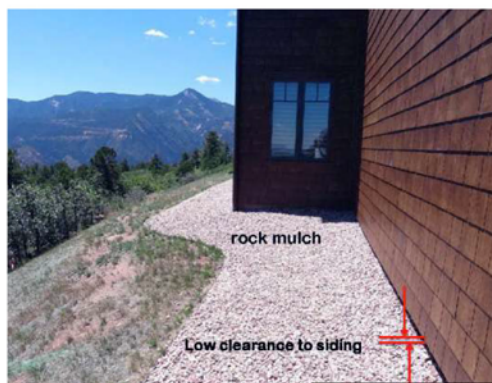


Figure 22: The back side of the home on Outer Vista Point Road. Noncombustible rock mulch and fiber-cement shingle siding products were used. The low clearance may allow for the underlying wood-based sheathing product to be vulnerable to ember accumulation at the base of the wall. Source: IBHS.

For the condition at the front of the Outback Vista Point Road home, where combustible mulch was used near the home, the best option would be to use noncombustible siding and noncombustible mulch products to reduce the vulnerability of the home to a wind-blown ember exposure.

Detailing using noncombustible materials, such as a concrete foundation wall, should generally be used at the intersection between horizontal and vertical surfaces where one or both of the materials are combustible or where the assembly incorporates an exposed combustible component, would reduce the vulnerability of these

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Observed Wildfire Risks and Mitigation Strategies

assemblies. In some situations, such as a deck to wall intersection, metal flashing could be used. The metal flashing detail could be more easily incorporated into a mitigation strategy for an existing home.

These findings are in agreement with those of Barrow. In his report about the 1944 Beaumaris Fire (Australia), Barrow stated his observations "... showed that the resistance to fire is determined more by the details of construction than by the materials used in the walls."⁷ Hardening the building using appropriate details can be as important as hardening with materials alone (e.g., using noncombustible materials) since poor detailing can result in a given wildfire exposure by-passing the protection offered by the exterior material.

RISK: ROOF VULNERABILITY TO EMBERS

A similar vulnerability can also occur on complex roofs, as shown in Figure 23. This detail was observed on a home in the Majestic Drive area, but is common on complex roof systems. The code required clearance between the roof and wood and wood-based siding is two-inches (less than that required for earth-to-wood siding). Ember ignition of vegetation debris in gutters and on the roof at roof-to-wall intersections has been demonstrated⁸ as has the ignition of wood decking, without an accumulation of vegetative debris⁹.



Figure 23: The roof-to-siding return on this complex roof consists of a composite wood (hardboard) siding product and a Class A fire-rated asphalt composition shingle roof covering. Even without vegetative debris at the roof-to-wall intersection, an accumulation of embers could result in ignition of the wood-based siding. Source: IBHS.

MITIGATION STRATEGIES

As mentioned with the EIFS cladding system, detailing using noncombustible materials, such as metal flashing, at the intersection between horizontal and vertical surfaces, where one or both of the materials are combustible or where the assembly incorporates an exposed combustible component, would reduce the vulnerability of these assemblies. The metal flashing detail could be more easily incorporated into a mitigation strategy for an existing home. If using a flashing detail, to avoid moisture-related degradation, the upper portion of the flashing should be tucked in behind (or into) the siding in such a way that rain water cannot get into the space between the flashing and the siding.

Area Focus: Rossmore Street and Champagne Drive

The vulnerability of (non fire-retardant treated) wood shake roofs has been documented. Removal of wood shake roofs and replacement with Class A fire-rated roof coverings has been a strong recommendation by the fire service and others involved in homeowner educational programs for a number of years. The roof represents a large relatively horizontal surface that can and will collect embers. Highly combustible roof coverings, such as wood-shake coverings, can be easily ignited. In many locations, including Colorado Springs, use of wood shake roofs in wildfire-prone areas is not allowed when a roof covering is replaced. Although many homeowners in the Colorado Springs have replaced their wood shake roofs in recent years, many homes still have this type of roof covering.



Figure 24: Location of the Rossmore Street and Champagne Drive homes (circled red) within the Mountain Shadows community. Source: IBHS.

⁷Barrow, G.J. 1945. A Survey of Houses Affected in the Beaumaris Fire, January 14, 1944. *Journal of the Council for Scientific and Industrial Research*, 18.

⁸Quarles, Stephen L. (2012). *Vulnerabilities of Buildings to Wildfire Exposure*. <http://www.extension.org/pages/63495/vulnerabilities-of-buildings-to-wildfire-exposure>.

⁹Manzella, Samuel L. and Sayaka Suzuki. 2012. *Exposing Wood Decking Assemblies to Continuous Wind-Driven Firebrand Showers*.

NIST Technical Note 1778. National Institute of Standards and Technology, Gaithersburg, MD. 20 pp.

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RISK: WOOD SHAKE ROOF

Two homes in the Mountain Shadows neighborhood, both located well-away from the perimeter of the community (Figure 24), had wood shake roofs that were ignited by wind-blown embers (Figure 25). The actions of firefighters saved each home, supporting findings from many other post-fire surveys and investigations of the benefit of intervention / suppression efforts in saving homes that have ignited. Fires in homes that are destroyed start out as relatively small fires and can be extinguished if discovered early. The Rossmere Street photo in Figure 25 shows three neighboring homes, with the middle one having the wood shake roof. The two adjacent homes have a Class A fire rated roof covering. These homes were not damaged. Given the proximity of the homes to each other, the ember exposure to each was likely similar, demonstrating the importance of replacing a wood shake roof covering.



Figure 25: Homes on Rossmere Street (upper) and Champagne Drive (lower), each had wood shake roof coverings that were ignited by wind-blown embers. Source: IBHS.

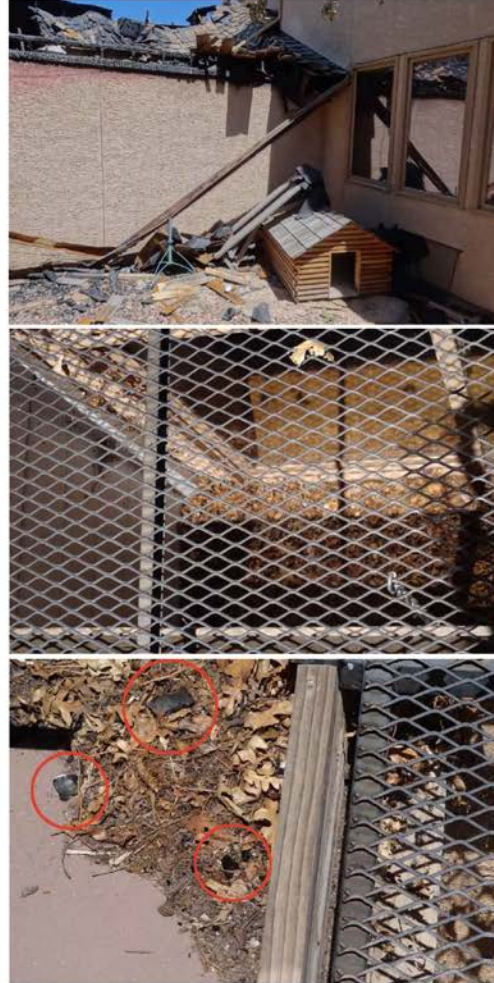


Figure 26: Combustible materials were present in the near-home zone of the Rossmere Street home. Embers are evident in the right-hand middle photo (embers circled in red). Source: IBHS.

Each of the two homes with wood shake roof coverings also had relatively poor defensible space in the near-home, 0-5 foot zone (Figures 26 and 27), and an ember exposure to near-home combustible materials was evident. The front of the Rossmere Street home had a design feature that,

Observed Wildfire Risks and Mitigation Strategies

coupled with the wood mulch on the ground, resulted in a vulnerability to the home (Figure 28). This condition is very similar to the previously discussed earth-to-wood condition observed at other homes in Mountain Shadows and Cedar Heights. Although an ember exposure occurred in this area at the front of the home, ignition of mulch was not evident. Although any of these could have resulted in ignition of the home indirectly, given a large enough ember exposure, the wood shake roof was the most vulnerable feature on these homes.



Figure 27: Combustible materials were present in the near-home zone of the Champagne Drive home. Source: IBHS.



Figure 28: The "bump out" design feature at the front of the Rossmore Street home would be vulnerable, if the wood mulch had been ignited by the observed ember exposure. Given the low earth-to-wood clearance, flame spread to the bump out would have provided a flame contact exposure to the combustible underside feature. Source: IBHS.

MITIGATION STRATEGIES

Wood shake roofs should be replaced with Class A fire-rated roof coverings. Adequate defensible space in the three zones: 0-5 feet (the noncombustible zone), 5 feet- 30 feet and 30 feet-100 feet or to the property line, should be created and maintained along, with regular roof maintenance to keep gutters clear and the roof free of debris, particularly at intersections where debris can easily accumulate.

SUMMARY AND CONCLUSIONS

The Waldo Canyon Fire represented the first opportunity for the partners in the Fire Adapted Communities Coalition to study a community post-wildfire. The FAC Mitigation Assessment Team found that Colorado Springs' post-fire mitigation work closely mirrors recommendations of the Fire Adapted Community strategy in most aspects (see chart below).

The mitigation work conducted in the high risk areas of the community was credited with helping the fire department achieve an 82 percent save rate. According to estimates provided by the Colorado Springs Mitigation Section and FEMA, the cost benefit ratio for the mitigation efforts for the Cedar Heights neighborhood was 1/257; \$300,000 was spent on mitigation work and \$77,248,301 in losses were avoided. Combined cost benefit ratio was 1/ 517 for the three neighborhoods with the highest impacts. However, it should be noted that changes in fire weather behavior such as wind shifts could have resulted in significantly higher fire losses.

This field survey has confirmed findings of other post-fire surveys in terms of the basic mechanisms whereby buildings can ignite, particularly by exposure to wind-blown embers. Construction details were identified that can make buildings vulnerable to wildfire and solutions to mitigate these vulnerable features were offered. This survey confirmed that effective pre-fire mitigation efforts must be conducted at both the individual and community levels in order to create fire-adapted and fire-safe neighborhoods in wildfire-prone areas. Wildfires will continue to occur and homes and communities in wildfire prone areas must be prepared to resist the associated wildfire exposures.

By addressing the vulnerabilities identified in this report, coupled with mitigation strategies outlined, residents with existing properties can significantly reduce their risk of wildfire-related property losses. However, regular maintenance of properties located in wildland areas is also a

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critical component of this process. By incorporating mitigation strategies when rebuilding or repairing properties post-fire, communities will take an important step toward becoming more fire-adapted.

Major Findings of FAC Mitigation Assessment Team

BUILDING DESIGN AND MATERIALS IMPROVEMENTS AND MAINTENANCE COULD HAVE REDUCED LOSSES

- Ember ignition via ignition of combustible materials on, in or near the home was confirmed by the surveys. This reaffirms the serious risk posed by ember ignitions to properties during wildfires. This reinforces the importance of maintaining an effective defensible space and regularly removing debris from areas on and near the home.
- Home-to-home fire spread was again a major issue, as with prior post-fire field investigations. When it occurred, it was dependent on at least one wildland fire-to-home ignition and then home spacing and slope / terrain. Home-to-home fire spread was

attributed to a relatively large number of home losses in this survey.

- Wildland fire-to-home ignition was influenced by location of home on slope and fuels treatment(s) or lack of on the slope leading to the home.
- A building can be hardened with noncombustible materials, for example, but it is also necessary to incorporate appropriate construction details, which will help ensure that the protections offered by those materials is not by-passed.
- Individual homeowners must take responsibility for fortifying their property against wildfire damage by taking appropriate measures to incorporate noncombustible building materials and construction details.

A COMMUNITY-WIDE APPROACH IS BEST

- Community leaders must recognize the value of community-wide collaboration, an essential component to home survival and creation of fire adapted communities.
- While creating ember resistance, defensible space, and ignition-resistant construction are key wildfire mitigation features,

FAC Elements Compared to Colorado Springs Mitigation	Yes	No	N/A
Engaged, active community	X		
Firewise defensible space, hardened structures	X		
Codes and Ordinances	X		
Wildfire Prevention, Fire Danger Monitoring	X		
Fuels Treatments	X		
Evacuation Routes	X		
CWPP	X		
Co-op Agreements			X
Local Capacity			X

Observed Wildfire Risks and Mitigation Strategies

equally important are mitigation efforts conducted neighborhood-by-neighborhood and community-by-community.

- A small dedicated/motivated organization or group can have a big impact.
- Homes located closer than 15 feet apart can be vulnerable if a neighboring home has not been well prepared and ignites.
- The community tax base is significantly impacted by the widespread damage and destruction of homes and businesses during wildfires. This has economic consequences for all residents.

FUELS REDUCTION IS IMPORTANT

- Hazardous fuels reduction should continue both around neighborhoods and in more remote areas containing flammable vegetation. Treatments should have explicit, specific objectives.
- While the Waldo Canyon Fire caused widespread damage, it also left behind a healthier landscape by reducing the amount of fuel for future fires. The FAC site visit underscored the importance of prescribed fire as a fuels reduction tool.

PARTNERS IN PREPAREDNESS CAN EQUAL SUCCESS

- The preparedness message is most effective when carried by a variety of partners. Public policymakers, officials and local community and business leaders should echo best practices provided by the Fire Adapted Communities Coalition to reinforce the need for wildfire mitigation efforts at every level.
- Partnerships are critical in building support and extending the area of influence for wildfire preparedness efforts.
- The Colorado Springs Mitigation Section integrated a variety of methods that mirrored, to a large extent, the Fire Adapted Communities effort and were able to accomplish significant mitigation, even with a relatively small staff and budget. This was the result of collaborative efforts with important partners.
- There is a need to create WUI messages that work for different neighborhoods, different audiences, and different contexts. This is particularly true for rural and urban communities. People may not identify with their risk if they don't see their neighborhood as being in the traditional WUI.
- Contractors and design professional, along with code/ordinance development bodies, have an important role to play in wildfire preparedness. By incorporating best practices to reduce wildfire vulnerabilities into building design and construction techniques and ordinances the risks to properties can be reduced.

APPENDIX A: THE HISTORY OF THE COLORADO SPRINGS WILDFIRE MITIGATION SECTION

- 1993:** City ordinance passed regarding vegetation management, roadway width and sprinkler installation that applied to development after April 1993.
- 1994:** Chief Manuel Navarro was hired and immediately acknowledged the need for a wildfire mitigation program, based on prior experience in California.
- 1999:** A Tri-Data Study identified need to address wildfire risk in the community.
- 2000:** Office of the Fire Marshal created a wildland risk manager position and began meetings with stakeholders toward formation of a Core Advisory Group. Risk model analysis began. Risk assessments conducted on 44,000 properties.
- 2001:** Wildfire Mitigation Plan completed, including partnering with Colorado Springs Utilities.
- First grants received through USDA Forest Service and U. S. Fire Administration Assistance to Firefighters.
 - Senior GIS analyst hired.
 - Voters approved Public Safety Sales Tax to fund Wildland Risk Management Program.
 - First wildfire risk materials created.
 - Colorado Springs Firewise Program Coordinator hired to serve as liaison between homeowners and fire department.
 - "Sharing the Responsibility" tagline created and public awareness education and outreach launched.
 - Mandatory evacuation ordinance presented to the city council.
- 2002:** Launch of interactive Colorado Springs Firewise website. Free onsite mitigation consultations for homeowners by mitigation specialists begin. Research begins on development of a cedar shake roofing ordinance. Class "A" Roofing Ordinance passed.
- 2003:** Class "A" Roofing Ordinance takes effect on Jan. 1.
- Vegetation Management Coordinator hired. Neighborhood Stewardship Agreements begin.
 - Collaboration with City Parks and Open Spaces begins.
 - Mayor proclaims an annual Firewise Week.
 - Outreach to Peak-to-Prairie Landscaping Symposium, Home Builders Association Home and Garden Show, Insurance Company Outreach with State Farm and California Casualty.
 - Mitigation media campaign launched. First homeowners' association mitigation project completed with help of Eagle Scouts.
- 2004:** Curbside Chipper Program begins. Neighborhood demonstration sites created. Third in a series of Colorado Springs Firewise videos produced for city's cable access channel.
- 2005:** FEMA Pre-disaster Mitigation Grant received. First Colorado Springs Firewise Newsletter mailed to homeowners. 20 Firewise Champions from 14 neighborhoods recognized during Wildfire Awareness Week.
- 2006:** FEMA Pre-disaster Mitigation Grant received by 28 new Firewise Champions. First Annual Patrick Niedringhaus Memorial Award presented to a homeowner; recipient embodies Niedringhaus' spirit, energy, and enthusiasm for preserving community and its natural beauty. Niedringhaus, who was killed in an avalanche in 2005, was the first Eagle Scout to complete a mitigation project with the Wildfire Mitigation Office.
- 2007:** FEMA Pre-disaster Mitigation Grant received.
- 2008:** 65 more Firewise Champions recognized. Eight Colorado Springs neighborhoods become NFPA Firewise Recognized Communities.
- 2009:** FEMA Pre-disaster Mitigation grant received. Fuels crew established.
- 2010:** Colorado re-brands Firewise for local application.
- 2011:** Two new NFPA Firewise Communities recognized.
- 2012:** Waldo Canyon Fire strikes destroying more than 300 homes and killing two people; 82 percent of impacted homes are saved due to response and previous mitigation work.

APPENDIX B: DAMAGE ASSESSMENT FORM

Colorado Springs - Waldo Canyon Fire - Damage Assessment Form

Day - (circle one) Wednesday 7/18/2012 Thursday 7/19/2012 Friday 7/20/2012 Time: _____

Photograph Number(s): _____

Site Information -

Street Number _____ Street Name _____ Unit No. (if applicable) _____

Parcel and Residence Information -

Type of Parcel: Single Family ☐ Townhouse ☐ Apartment ☐

Slope: Low (Flat-10%) ☐ Moderate (11-30%) ☐ Steep (>30%) ☐

Extent of Damage: None ☐ Minor ☐ Destroyed ☐

Type of Ignition: Ember/0-5 ☐ Vegetation Ember/5-30 ☐ Ember/Building ☐ Wildfire ☐

Radiant Heat / Flames from Neighbor ☐

Topography / Location: Flat ☐ Bottom - Lower 1/3 ☐ 1/3 - top of slope ☐

Adequate Defensible Space: 0-5 ft. (including fencing) ☐ 5-30 ft. ☐ 30-100 ft. ☐

Proximity to Neighbor / Secondary Building(s): Front _____ Left _____ Back _____ Right _____
(Relative to Front)

D-space Comments: _____

Roof-type: Flat ☐ Sloped ☐ [Steep (>5:12) yes ☐ no ☐] Simple ☐ Complex ☐ Not Known ☐

Skylights: No ☐ [Yes ☐ Glass ☐ Plastic ☐]

Roof Material: Asphalt Comp ☐ Metal ☐ Tile-Flat ☐ Tile-Barrel ☐ Wood Shake ☐ Other / Unknown ☐

Bird Stop evident: yes ☐ no ☐ n/a ☐

Vents: Eave ☐ Gable End ☐ Through-roof ☐ [Ridge ☐ High Wind? yes ☐ no ☐ Not Known ☐

Gutter: Vinyl ☐ Metal ☐

[Evidence of cover: yes ☐ no ☐] [Evidence of drip edge: yes ☐ no ☐]

Eave Type: Open ☐ Soffited ☐ Not Known ☐ Material: _____

Deck: Solid Surface ☐ Combustible (Wood / W-P Composite) ☐

Enclosed: Horizontal ☐ Vertical ☐ n/a - Not Known ☐

Window Frame: Vinyl ☐ Other ☐ Glass: Single Pane ☐ Multi-pane ☐ Tempered ☐

Window Screen: Yes ☐ No ☐

Foundation: Slab on Grade ☐ [Raised Floor ☐ Vented? yes ☐ no ☐] Basement ☐

Earth-to-Siding: <6 inches ☐ > 6 inches ☐

Siding: Solid Wood ☐ Heavy Timber / Log ☐ Shingles ☐ Composite (HB/OSB) ☐ Vinyl ☐ Noncombustible ☐

GPS Location:

Reason for inadequate D-space:

APPENDIX B

B1

APPENDIX C: OBSERVATIONS ON THE ROLE OF FUELS MANAGEMENT AND LANDSCAPE VEGETATION AND FEATURES

WALDO CANYON: FUEL TREATMENT EFFECTIVENESS AND FIREWISE LANDSCAPING

Cedar Heights

Past fuel treatments, by mastication, in heavy, continuous, mature Gambel oak retained multi-season effectiveness for reducing wildfire spread. Two and three year old oak treatments did not carry fire. Oak leaves were scorched, but did not typically burn (Figure C1). Arboricultural explanation: Re-sprouted oak is connected to a well-developed root system necessary to support mature oak. Even during drought conditions, a large root system was supporting a much smaller, above-ground biomass. In effect, it retained characteristics of a Firewise plant.



Figure C1: Crown Fire (left), treated Gambel oak (right). Source: NFPA.

Mountain Shadows

Hardened landscape barriers such as noncombustible retaining walls, paths, and gravel borders were effective in stopping fire in lighter fuel types. Landscape ignitions, when isolated by gravel borders and other hardscaping features, did not spread to adjacent areas (Figure C2). These hardened areas were observed to be effective in preventing fire spread caused by ember ignitions of native fuels in adjacent open spaces.



Figure C2: Ember ignition in landscaping contained by rock border. Source: NFPA.

Pruning and thinning of ladder fuels in Gambel oak clumps as a Firewise practice by homeowners appeared to be effective in keeping fire on the ground, and reducing crown fire potential (Figure C3). Fire burned underneath the treated clumps and scorched the leaves, but generally did not crown (Figure C4). There are two explanations for this: 1) ladder fuels contribute significantly to the fuel loading, and crown fire potential of Gambel oak as a native fuel; and 2) cleaned out and thinned native oak clumps more closely meet the criteria for Firewise landscape plants: lean, clean and green.



Figure C3: Ember ignition and under-burn below treated Gambel oak. Source: NFPA.

FIRE ADAPTED COMMUNITIES MITIGATION ASSESSMENT TEAM FINDINGS: LESSONS LEARNED FROM WALDO CANYON

APPENDIX C: OBSERVATIONS ON THE ROLE OF FUELS MANAGEMENT AND LANDSCAPE VEGETATION AND FEATURES



Figure C4: Ember ignition with treated ladder fuels in oak and pines. Source: NFPA.



Figure C6: Torched Austrian pine in front of scorched deciduous shrubs below window. Source: NFPA.

Firewise landscape plants, primarily deciduous trees and shrubs, were scorched, but did not burn when exposed to heat from adjacent crowning fuels (Figure C5). Two examples were: crabapple trees planted in a row below a deck and retaining wall that were scorched, but did not carry fire to the deck and shrub plantings adjacent to structures that were scorched, but did not ignite even from crowning fuels that were located within 15-18 feet (Figure C6).

Landscaping fencing contributed to fire spread from adjacent native areas to structures (Figure C7). Split rail and cedar privacy fencing both led fire to structures. In many instances, home loss was prevented by intervention of the fire services when resources were available to the remove the fence connection to the structure. This observation re-enforces the message that, "If it's connected to the house, it's part of the house."



Figure C5: Scorched deciduous trees in foundation planting below deck. Source: NFPA.

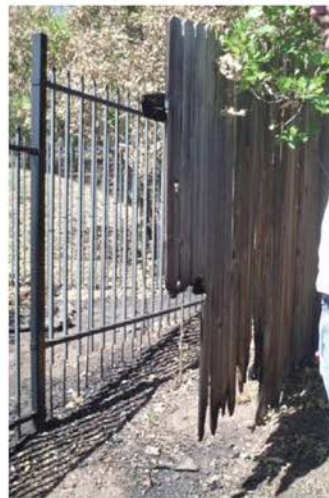


Figure C7: A partially burned cedar privacy fence. Source: NFPA.

APPENDIX C: OBSERVATIONS ON THE ROLE OF FUELS MANAGEMENT AND LANDSCAPE VEGETATION AND FEATURES

Summary of Firewise Landscape Observations

- Past fuel treatments by mastication in heavy, continuous, mature Gambel oak retained multi-season effectiveness for reducing wildfire spread. Two- and three-year-old oak treatments did not carry fire. Oak leaves were scorched, but did not typically burn.
- Hardened landscape barriers such as noncombustible retaining walls, paths and gravel borders were effective in stopping fire in lighter fuel types.
- Pruning and thinning of ladder fuels in Gambel oak clumps, as a Firewise practice by homeowners, appeared to be effective in keeping fire on the ground and reducing crown fire potential.
- Firewise landscape plants, primarily deciduous trees and shrubs, were scorched but did not burn when exposed to heat from adjacent crowning fuels.
- Landscaping fencing contributed to fire spread from adjacent native areas to structures. Split rail and cedar privacy fencing both led fire to structures.

APPENDIX D: CASE STUDIES

Case Studies

Information about the inspection of two undamaged homes in the Cedar Heights neighborhood and one undamaged home in Mountain Shadows neighborhood is provided here. The fire came close to the Cedar Heights neighborhood (Figure D1), but did not reach it. The Outer Vista Point Road home in this neighborhood would be considered a perimeter home and the Manor Rock Lane home was an interior home. The Darien Way home in the Mountain Shadows neighborhood was an interior home.



Figure D1: The fire came within about 500 feet of the neighborhood at the Outer Vista Point Road perimeter. Source: IBHS.

Outer Vista Point Road

The Outer Vista Point Road perimeter was directly across the street from the home that was inspected (Figure D2). The defensible space around the home is shown in Figures D3 – D6, with one figure showing the general condition on each side of the house. Defensible space was generally good, particularly on the two sides (left and rear) that used rock in the near-home zone. Bark mulch was used in the near-home zone in the front and right sides of the house. Bark mulch has been shown to be ignited by embers and therefore on these exposures any ember-ignited mulch would result in a flaming exposure to the side of the house. The fiber cement shingle siding is a noncombustible product, but the construction detailing of the wall-assembly exposes the wood-sheathing product (Figure D4 and 19). Given a direct flame contact exposure to the wall system, the sheathing would become the vulnerable component. This provides an example of a situation where the non-combustible “near-home” zone is critical even in situations where a noncombustible exterior siding product is used. This detail could also be vulnerable to an ember ignition of a sufficient quantity of dried debris on rock mulch (Figure D5).



Figure D2: The Outer Vista Point Road, located at the top of the Cedar Heights community. Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D3: These photographs depict the vegetation management (defensible space) in the area at the front of the house. The upper photograph is representative of the 5-to-30 foot zone and the lower photograph is representative of the 0-to-5 foot (near home) zone. Source: IBHS.



Figure D4: The upper left photograph depicts the vegetation management (defensible space) in the 0-to-5 foot zone on the left side of the house. The lower right photograph is a bottom-view of the wall construction consisting of oriented strand board sheathing under the fiber cement shingle siding product. Source: IBHS.



Figure D5: The upper left photograph depicts the vegetation management (defensible space) at the rear of the house. The lower right photograph shows an accumulation of dried vegetative debris in the corner, on top of the rock mulch. Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D6: The upper photograph depicts the vegetation management (defensible space) in the 0-to-5 foot zone on the right side of the house. The lower photograph shows low earth-to-siding clearance. Source: IBHS.

Another vulnerability observed at this home was un-screened vents into a room at the rear of the home that contained gas appliances (Figure D7). Although 1/8-inch mesh screen will not prevent embers from passing through the vent and into the home, 1/8- inch mesh screen and finer,

as allowed by the building code) will reduce the size and number and is a better choice compared to non-screened vents and ¼-inch mesh screening. Finer mesh screen will be more likely to become occluded with air-borne debris and so will require more maintenance to keep the screen clear so it can perform its moisture management function and also to supply make-up air for combustible appliances.

Although it is more commonly understood about the need to plug ("bird-stop") the ends of certain styles of roof coverings (e.g., clay-barrel tile and certain metal roof coverings), openings along the ridge and hip must also be plugged with a noncombustible material. As shown in Figure D8, this home had a flat tile roof. An opening at the end of the roof is not as likely with this style, but openings still occur at the hip and ridge.



Figure D7: These photographs show venting for the make-up air to a room containing gas appliances. Metal screening was missing from these vents, as seen in the lower photograph. Source: IBHS.

APPENDIX D: CASE STUDIES

Monitor Rock Lane

The other home that was inspected in the Cedar Heights neighborhood was located on Monitor Rock Lane (Figure D9). The defensible space for this home is shown in Figures D10–D15. As seen in these figures, the defensible space, particularly in the 0–5 foot “near-home” zone is inconsistent. The right and left sides of the home have good defensible space, with rock mulch in the near-home zone (Figures D12 and D15). Defensible space at the front (Figures D10 and D11) and some of the rear of the home (Figure D13 and D14) is poor.



Figure D8: Un-stopped/unblocked openings at the hips of the flat-tile roof. Source: IBHS.

Ignition of near-home vegetation increases the chance for flame contact exposure to the exterior wall (siding, windows and other components) and the under-eave area, including any under-eave vents. A noncombustible stucco-type cladding was used on this home, but in this case, the windows and under-eave areas would still be vulnerable. The same detail whereby the wood-based sheathing is exposed at the bottom of the wall was used on this home, making a nominally noncombustible wall vulnerable because of a combustible component in the wall assembly (Figure D14). This detail was also observed on the Outer Vista Point home (Figure D4). Note the open window in Figure D10. Although a wildfire was not threatening this home on the day of the site-visit, residents should remember that windows should be closed when a wildfire is threatening. In order for the defensible space of a home to be effective, it must be consistently implemented and maintained.



Figure D9: The Monitor Rock Lane home located in the Cedar Heights neighborhood. Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D10: Near-home vegetation was prevalent at the front of this home. Note the open window in the lower photograph. Source: IBHS.



Figure D11: Near-home vegetation located at the front of the home. Note the fine fuels on the ground and in the vegetation. This fine fuel would facilitate ignition by wind-blown embers. Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D12: The left side of the house had good defensible space, particularly in the 0-to-5 foot near-home zone. Source: IBHS.



Figure D13: The defensible space at the rear of the home was very good on one side on one side (top photograph). The near home zone was poor on the other corner (bottom photograph). Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D14: Bark mulch was used in areas at the rear of the home, under one of the decks. Note that the wood-based sheathing product is exposed (lower photograph). Source: IBHS



Figure D15: The defensible space in the near-home zone on the right side of the home was good. Source: IBHS.

The eave design incorporated a vented soffited eave (Figure D16). Soffited eaves have been shown to be a good detail, both in resisting ember entry into vents and being better able to resist flame contact exposures. At least some vents in the soffited eave did not have screens (Figure D16), making the vent more susceptible to ember entry. Regardless of the presence or absence of mesh, given the near-home vegetation at the front of the house, these under-eave vents could be vulnerable to flame contact exposure if the vegetation ignited.

APPENDIX D: CASE STUDIES



Figure D16: A soffited eave was used on this home. Some of the under-eave vents did not have mesh screening. Source: IBHS.

This house had a clay-barrel style roof covering. The ends of the roof covering at this house were not plugged, i.e. “bird-stopped.” Debris was observed at one roof-edge location (Figure D17). Wind-blown embers could ignite this roof-edge debris, and potentially other debris that have blown under the roof. When a roof such as this one is not “bird-stopped,” wind-blown embers can easily by-pass the protection offered by this Class A fire-rated (and in this case,

also noncombustible) roof covering. Bird-stop materials are available from the manufacturer. The homeowner can also plug the openings with a mortar mix. The tiles at the hip are also open; these openings should also be plugged.



Figure D17: The ends of the barrel-tile roof covering on this home were not “bird-stopped.” Note the debris in the under-roof area at the end of the roof (lower photograph). Source: IBHS.

Most decks are built using combustible materials for both the structural support system and the walking surfaces. Combustible materials used for the structural support system are typically wood joists (2 x lumber) and larger dimension posts and beams (i.e. 4 x material and larger). Combustible materials used for walking surfaces include wood, plastic and wood-plastic composite decking materials. One deck on this home incorporated a noncombustible (flagstone) walking surface and the typical wood-based structural support system (Figures D18 and D19). The solid surface, noncombustible walking surface option is considered a better choice for homes in wildfire-prone areas,

APPENDIX D: CASE STUDIES

although this option is more expensive. Given the typical combustible structural support system with these decks, unless the underside is enclosed with a noncombustible material, the advantage applies most directly to an ember exposure to the top of the deck, and would assume a noncombustible material at the deck-to-wall intersection, where embers might accumulate.

As seen in Figure D19, a between flagstone joint failed, allowing water to enter behind the surfacing material. Water entry occurred long enough for fungal decay to occur in the underlying wood and wood-based structural support system (Figure D19, lower photograph). If dry, this material would be more easily ignited. Vegetation was observed growing under the deck (Figure D18, lower photograph) – ignition of this vegetation by embers or other adjacent burning vegetation would result in a flame contact exposure to the underside of this deck. A flaming exposure to any part of the home should be avoided. In this case, the damaged deck should be repaired, and the under-deck and adjacent vegetation removed.



Figure D18: These photographs show the solid surface deck (upper) and the near-home vegetation under and near the deck (lower). The lower photograph was taken while under the deck. Source: IBHS.

APPENDIX D: CASE STUDIES



Figure D19: The flagstone covering on this solid surface (noncombustible) deck had failed (upper) allowing water to get below the covering, eventually resulting in fungal decay in the horizontal wood-based sheathing (lower). Source: IBHS.

Darien Way

The undamaged Mountain Shadows home included this case study was located on Darien Way, shown in Figure D20.

The defensible space for this home is shown in Figures D21 and D22. As seen in these figures, with the exception of the area in the front of the home, the defensible space, particularly in the 0-5 foot “near-home” zone is good. Rock mulch or a concrete walk was used next to the home and under the decks on the other sides of the home. Rock mulch was used at the front of the house, but if ignited, the low-to-ground vegetation, located under the drip line of the adjacent tree, could serve as ladder fuel. Removal of the ladder fuel vegetation and pruning the tree would improve the defensible space in this area.

The window well shown in Figure D22 contained accumulated debris. Burned-out embers were observed on the ground, but the number that accumulated was insufficient for ignition. Use of a rock retaining wall, as shown in this photograph, would be a better option.



Figure D20: The Darien Way home, located in the Mountain Shadows neighborhood. Source: IBHS.

D10

APPENDIX D: CASE STUDIES



Figure D21: Defensible space on the front and left side of the home. Source: IBHS.



Figure D22: Defensible space in the right side and rear of the home. Source: IBHS.

APPENDIX D: CASE STUDIES

The decks on this house used wood joists and beams for the structural support system and a wood-plastic composite (walking surface) product for the deck boards. The space under the deck consisted of noncombustible rock mulch. No storage of combustible materials was observed. Deck furniture was only observed on one of the decks (Figure D23). Wood and wood-plastic composite decking are both combustible materials. Ignition of these decks can be caused by a flame contact to the underside of the deck, or potentially by ignition of combustible materials on top of the deck. Ignition of wood decks by an ember exposure was recently demonstrated. This study did not evaluate the performance of wood-plastic composite and other decking products with a plastic component. The California Office of the State Fire Marshal (OSFM) standard test method (SFM 12-7A-4 and 12-7A-4A) uses two different exposures to evaluate the performance of combustible decking products. The first is an under-deck flame contact exposure and the second uses a 6 inch x 6 inch standard Class B burning brand placed on top of the deck. This brand is specified in the American Society for Testing and Materials (ASTM) Standard E108 (a standard test method used to classify the fire rating of roof coverings). Since both of these decking products are combustible, and based on performance from the OSFM standard test they can perform similarly, the same mitigation options should apply to each (e.g., no storage of combustible materials under the deck, etc.)

Home ignitions from ember entry into dryer vents were reported during the recent Washoe Drive Fire (January 2012) in the Reno, Nevada area¹⁰. The closure plate used on the exhaust vents on this house would reduce the chance of ember entry into these exhaust vents (Figure D24) since the plate would be in the closed position unless the dryer was operating.



Figure D23: The decks at this home used wood for the structural support system and a combustible wood-plastic composite decking (walking surface) product. Source: IBHS.

¹⁰Personal Communication (2012), Mark Regan, North Lake Tahoe Fire Protection District and Ed Smith, University of Nevada Cooperative Extension.*

APPENDIX D: CASE STUDIES



Figure D24: Dryer and other exhaust vents used vents coverings that were normally closed (upper left); when operating positive pressure in the duct would force open the closure flap to at the outlet. Source: IBHS.



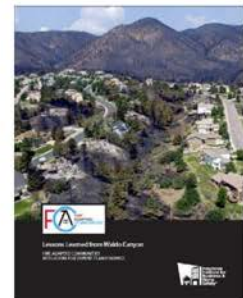
Figure D25: A flat concrete tile was used for the roof covering on this house. Note the openings at the hip and edge of the roof. Source: IBHS.

This house had a flat-tile covering (Figure D25). As was the case with the Outer Vista Point Road home the hip openings were not plugged with a noncombustible materials (e.g., with a mortar mix). As a result of the installation details of this covering, openings also occurred at the end of the roof (i.e., the area above the gutter) along the ridge and hip that must also be plugged with a noncombustible material. These openings should be plugged to minimize the opportunity for embers to get under the noncombustible roof covering, potentially igniting fine fuels that have accumulated.

D13

APPENDIX D

Lessons Learned from Waldo Canyon
FIRE ADAPTED COMMUNITIES
MITIGATION ASSESSMENT TEAM FINDINGS



APPENDIX C

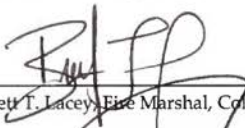
“CITY OF COLORADO SPRINGS COMMUNITY WILDFIRE PROTECTION PLAN” (2011)

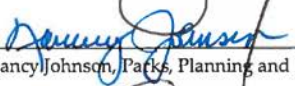
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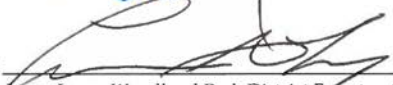
City of Colorado Springs Community Wildfire Protection Plan



"Sharing the Responsibility"

Recommended by:  Date: 8/16/11
Brett T. Lacey, Fire Marshal, Colorado Springs Fire Department

Approved by:  Date: 8/16/11
Nancy Johnson, Parks, Planning, and Public Works Director, City of Colorado Springs

Approved by:  Date: 8/16/11
Larry Long, Woodland Park District Forester, Colorado State Forest Service

Approved by:  Date: 8-16-11
Richard Brown, Interim Fire Chief, Colorado Springs Fire Department



Reviewed By:

Neighborhood Champions

Jamie Adams, Warren Management
Margaret Brettschneider, Skyway HOA
James Doukas, Village at Comstock HOA
Dick Hansen, Mountain Shadows HOA
Francine Hansen, Mountain Shadows HOA
Ron Iaconis, Woodmen Oaks HOA
Richard Ingold, Country Broadmoor HOA
Sandy Lewis, Cedar Heights Community Association
Johnnie Toniolli, Hunters Point HOA

Interagency Cooperators

Brent Botts, District Ranger, USFS Pikes Peak Ranger District
Marti Campbell, CWPP Coordinator, Coalition for the Upper South Platte
Scott Campbell, Deputy Fire Marshal, El Paso County
Scott Campbell, Executive Director, Palmer Land Trust
Bob Chastain, President / CEO, Cheyenne Mountain Zoo
Ron Honn, Department of Public Safety, University of Colorado at Colorado Springs
Eric Howell, Natural Resources Planner, Colorado Springs Utilities
Ken Lewis, Administrator, CSPD Code Enforcement
Mitchell Martin, Park Manager, Cheyenne Mountain State Park
Jim Reid, Fire Marshal, El Paso County
Dave Root, Forester, Colorado State Forest Service, Woodland Park District
Frank Serpe, Facilities Director, Mount Saint Francis
Paul Smith, City Forester, Colorado Springs
Diane Strohm, Forester, US Air Force Academy
Brett Veltman, Manager, Development Review Enterprise

Intra-agency Cooperators

Steven Dubay, Interim Deputy Chief, Colorado Springs Fire Department
Troy Branham, Battalion Chief, Colorado Springs Fire Department
James Schanel, Battalion Chief, Colorado Springs Fire Department
Kent Matthews, Battalion Chief, Colorado Springs Fire Department

Contributors

Brett Lacey, Fire Marshal, Colorado Springs Fire Department
Christina Randall, Wildfire Mitigation Administrator, Colorado Springs Fire Department
Andrew Notbohm, Wildfire Mitigation Program Coordinator, Colorado Springs Fire Department
Roger Mounts, Wildfire Mitigation Program Coordinator, Colorado Springs Fire Department
Dustin Steigauf, Lead Fuels Technician, Colorado Springs Fire Department

Edited by

Amy Sylvester, Senior Office Specialist, Colorado Springs Fire Department



Colorado Springs Community Wildfire Protection Plan

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Introduction

In 1999, a Tri-Data Corporation Study of the Colorado Springs Fire Department (CSFD) identified the need to address the risk of wildfire to the City of Colorado Springs. As a result of the recommendations in that report, the Colorado Springs Wildfire Mitigation Plan was completed in 2001. It included an extensive, interactive risk assessment of the wildland urban interface and the establishment of a strong community education program. The Colorado Springs Community Wildfire Protection Plan is an update to the Wildfire Mitigation Plan with detailed emphasis on future project planning and program features.

Wildland urban interface is defined as that part of the city where people and development meets wildland fuels and topography. The Colorado Springs region has a long history of wildland fires resulting in several fatalities and millions of dollars in suppression costs and property loss. The city continues to experience wildland fires on an annual basis. These fires pose a risk not only to neighborhood residents, but to special populations (i.e. nursing homes, schools and assisted living facilities), fire fighters, city infrastructure, natural resources and the city's economy. Throughout the western United States, wildland fires continue to increase in size, intensity, suppression costs and recovery costs. This is not a forest health issue alone, but an issue that must address the built environment as well. It is the relationship of the natural environment to the built environment that determines the risk of wildfire to life and property. Note an example of the relationship of the built environment to the natural fuels and landscape in Figure 1.

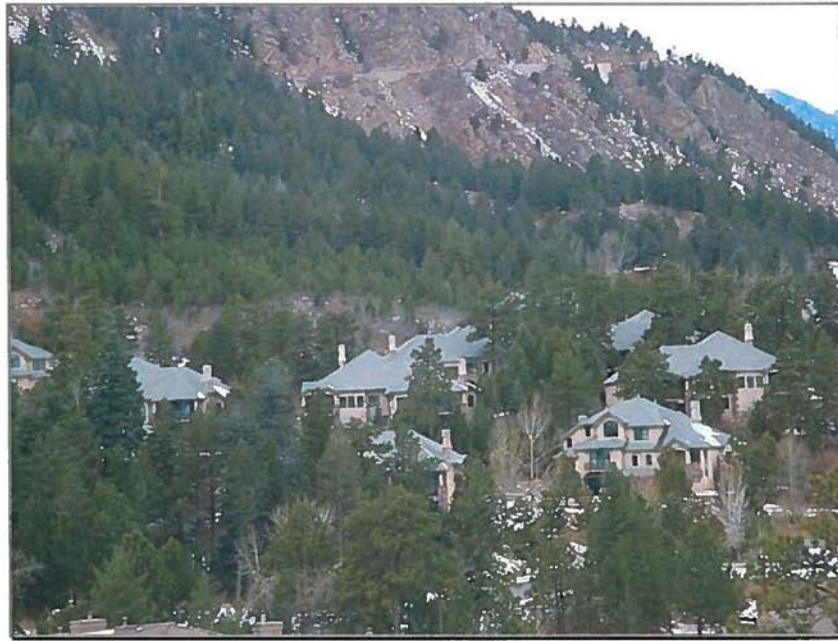


Figure 1. Broadmoor Neighborhood in the Colorado Springs wildland urban interface.



Goals and Objectives

The goals of the Colorado Springs Community Wildfire Protection Plan are:

- To reduce the risk of wildfire to the residents of Colorado Springs
- To reduce the risk of wildfire to fire fighters in a wildfire event
- To reduce the risk of wildfire to property and infrastructure
- To reduce the risk of wildfire to natural resources

The objectives of the Colorado Springs Community Wildfire Protection Plan are:

- To educate residents regarding ways to reduce their wildfire risk
- To reduce the amount of natural, hazardous fuels around and adjacent to homes, businesses, schools, infrastructure and medical facilities by 10-60% depending on fuel loading and stand health
- To improve the structural characteristics of new and existing construction in the wildland urban interface through ordinances, development review and individual consultation
- To manage common areas and open spaces with respect for the natural characteristics and protecting habitat features

Area Description

The City of Colorado Springs is located 60 miles south of Denver with a population of 414,358 residents. Colorado Springs is the county seat for El Paso County and is a home rule city. The Colorado Springs wildland urban interface encompasses 28,800 acres and shares over 16 miles of boundary with federal lands. 24% of the city's population resides in the interface. The wildland urban interface runs south from the Air Force Academy to Cheyenne Mountain Air Force Station and Fort Carson Army Installation. Although most of the defined area is in the foothills west of Interstate 25, there are areas to the east on bluffs and mesas that exhibit wildland characteristics. To the west of the interface is the Pike National Forest and within city boundaries there are state and county parks. City owned undeveloped parks and open spaces comprise 10,492 acres. See Figure 2 for area map and defined wildland urban interface.

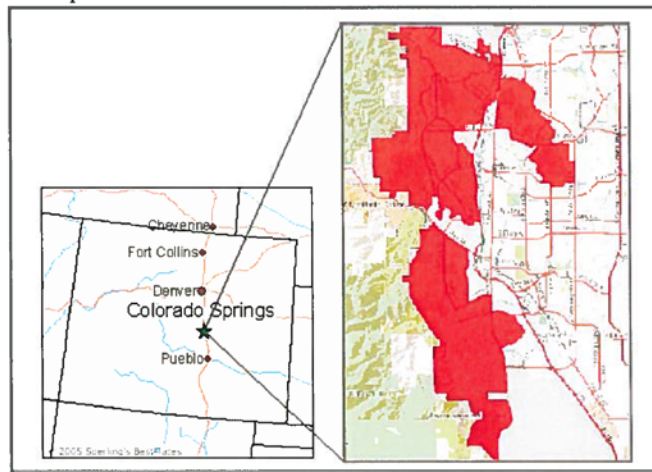


Figure 2. Colorado Springs Wildland Urban Interface



As the City of Colorado Springs sits at the foot of Pikes Peak, most of the wildland urban interface is located in foothills, with long narrow drainages and ridgelines. Throughout the interface, slopes range from flat to 45%. Currently, as defined in the Hillside Ordinance, no structures are built on slopes greater than 25%. Elevations range from 6,035 to 7,200 feet above sea level.

Historical Fire Regime

Colorado Springs has a mixed severity regime of frequent, low intensity fires with infrequent high intensity fires. Although large fires are less frequent, the city has had several wildland fire fatalities and millions of dollars in property loss. In 1950, the Camp Carson burn claimed 9 lives including 8 soldiers and a 14-year old volunteer. In 2008 on the Fort Carson TA 25 Fire, there was a single fire fighter fatality as a result of an aircraft accident. Other fires resulting in property loss or damage include the Mesa Fire in which a home was destroyed, the Westwood fire in which an outbuilding was lost and the Camp Carson Burn during which there was more than \$3 million in property damages.



Figure 3. Newspaper headline and photos of the 1950 Camp Carson Burn. (Source: Gazette Telegraph and Pikes Peak Library Photo Archives.)



Several large fires have occurred in and around Colorado Springs including the Big Burn of 1854, the Cheyenne Mountain Fire of 1890 and the Camp Carson Burn of 1950. Recent fire history includes the Westwood Fire in 2005 (35 acres), the Manitou Incline Fire in 2007 (30 acres) and the Coronado Fire in 2009 (12 acres). Historical fire occurrence includes large fires every 50 -75 years, with smaller, more frequent fires every 2-4 years. Tree ring data collected in and around Colorado Springs shows a more frequent fire regime prior to settlement; on average fires occurring every 17-35 years.

Current Conditions

The Colorado Springs wildland urban interface is predominantly Ponderosa pine with Gambel oak understory. There are several areas with mixed conifer stands including North Cheyenne Canyon, Cheyenne Mountain Zoo and Blodgett Open Space. Other vegetation types include short grass prairie with yucca and prickly pear cactus as well as pinyon-juniper stands. There are isolated pockets of beetle-kill in the city as well as areas with mistletoe in the Ponderosa pines. Stand density in many areas have greater than 300 stems per acre, where traditionally stand densities have ranged between 75-150 stems per acre.

Fire behavior fuel models represented in the wildland urban interface include:

- Short Grass (Fuel Model 1)



- Pine with grass understory (Fuel Model 2)



- Intermediate brush (Fuel Model 5)



- Timber Model, light surface fuel load (Fuel Model 8)



- Timber Model, heavy surface fuel load (Fuel Model 10)



Desired Conditions

Desired conditions around structures include 10 foot clearance with mitigation (limbing, thinning and removal) out at least 30 feet or to the property line, whichever comes first. Homeowners can extend beyond 30 feet as long as it is still on their property; 30 feet is the minimum recommendation. In adjacent open spaces and parks, stand management is intended to reduce the number of stems per acre as well as removing dead and diseased individuals, not clear cutting or putting in fire breaks.

In adjacent areas and open spaces, specifications for desired conditions include:

- Manage for less than 20% mortality in the timber and brush
- Reduce stand density to 50 – 150 stems per acre
- Remove ladder fuels by limbing and thinning
- Create separation between oak clumps by at least 10 feet (or 1 ½ times the height of the fuels)
- Retain a minimum of 2 snags per acre for wildlife, as available (minimum of 6 inch diameter at breast height)
- Thin out understory regeneration in mixed conifer and manage for mature pine overstory

Wildfire Hazard Risk Assessment

The Wildfire Hazard Risk Assessment for Colorado Springs was determined using the Wildfire Hazard Information Extraction model (WHINFOE). WHINFOE processes 25 weighted values with fire behavior modeling to determine the risk rating at the parcel level. The model inputs are derived using Geographic Information Systems (GIS) and collected data. The input factors range from structural characteristics to fuels and topography. Wildfire risk ratings are not a guarantee of the ignitability or survivability of the structures, but instead are a statement of relative risk. It is also important to note that the risk assessment is not an operational model and is not intended to be used as a tactical or decision making tool during a wildfire event.

In Colorado Springs there are 35,360 individual parcels identified as at-risk in the wildland urban interface. There are 5 adjective risk ratings that range from LOW to EXTREME. Homeowners can access their individual wildfire risk ratings at <http://csfd.springsgov.com>. The initial data collection of the wildfire risk ratings was made in 2000, with updates as homeowners made modifications and upgrades. Maintenance of the wildfire hazard risk map with reassessments and updated parcel data is done every 10 years. The Wildfire Mitigation Section will update the 35,360 parcels by collecting ground-truth data and updated GIS files, including parcel data (new construction, development and subdivision.)



Neighborhoods Identified in the Wildland Urban Interface or having wildland characteristics:

1. Bradford Heights
2. Broadmoor
3. Broadmoor Bluffs
4. Broadmoor Resort Community
5. Canyons at Broadmoor
6. Cedar Heights
7. Chatham
8. Cheyenne Canyon
9. Country Broadmoor
10. Country Club
11. Crescent
12. Discovery
13. Eagle Rock
14. Erindale
15. Erindale Heights
16. Friendship
17. Garden Ranch
18. Gold Camp
19. Golden Hills
20. Greencrest
21. Highland Oaks
22. Highland Terrace
23. Hillside
24. Holland Park
25. Hunters Point
26. Kissing Camels
27. La Strada
28. Mesa
29. Mesa Point
30. Mountain Shadows
31. Oakmont
32. Oak Valley
33. Panorama
34. Peregrine
35. Perfect View
36. Pinecliff
37. Pine Terrace at Broadmoor
38. Pinon Valley
39. Pleasant Valley
40. Quail Ridge Point
41. Raven Hills
42. Rustic Hills
43. Sanctuary at Peregrine
44. Skyway
45. Skyway Heights
46. Sondermann



47. Spires
48. Star Ranch
49. Stonebridge
50. Stratton Forest
51. Stratton Pines
52. Stratton Preserve
53. Sunset Mesa
54. Top of Skyway
55. University Park
56. Village at Comstock
57. Village at Erindale
58. Villages at Peregrine
59. Village at Skyline
60. Village Seven
61. Woodmen Oaks
62. Woodmen Oaks Estates
63. Woodmen Valley

The CSFD Wildfire Risk Rating maps show wildfire risk at the lot level and include homeowner associations, community associations, subdivisions and the neighborhood groups listed. Some areas identified outside of the wildland urban interface or the hillside have also been included as needing to address wildfire risk. Those neighborhoods identified as wildland urban interface consist of natural fuels with topographical features. Although there are neighborhoods that do not have all the criteria necessary to meet wildland characteristics, they may have certain fuels (either addressed as immediate or as an adjacency) that increase the risk of a wildland fire (e.g. grassy areas, oak brush or mature conifers in the landscaping.) See Figures 3 through 15 for neighborhood scale risk assessments of those neighborhoods identified in the wildland urban interface.



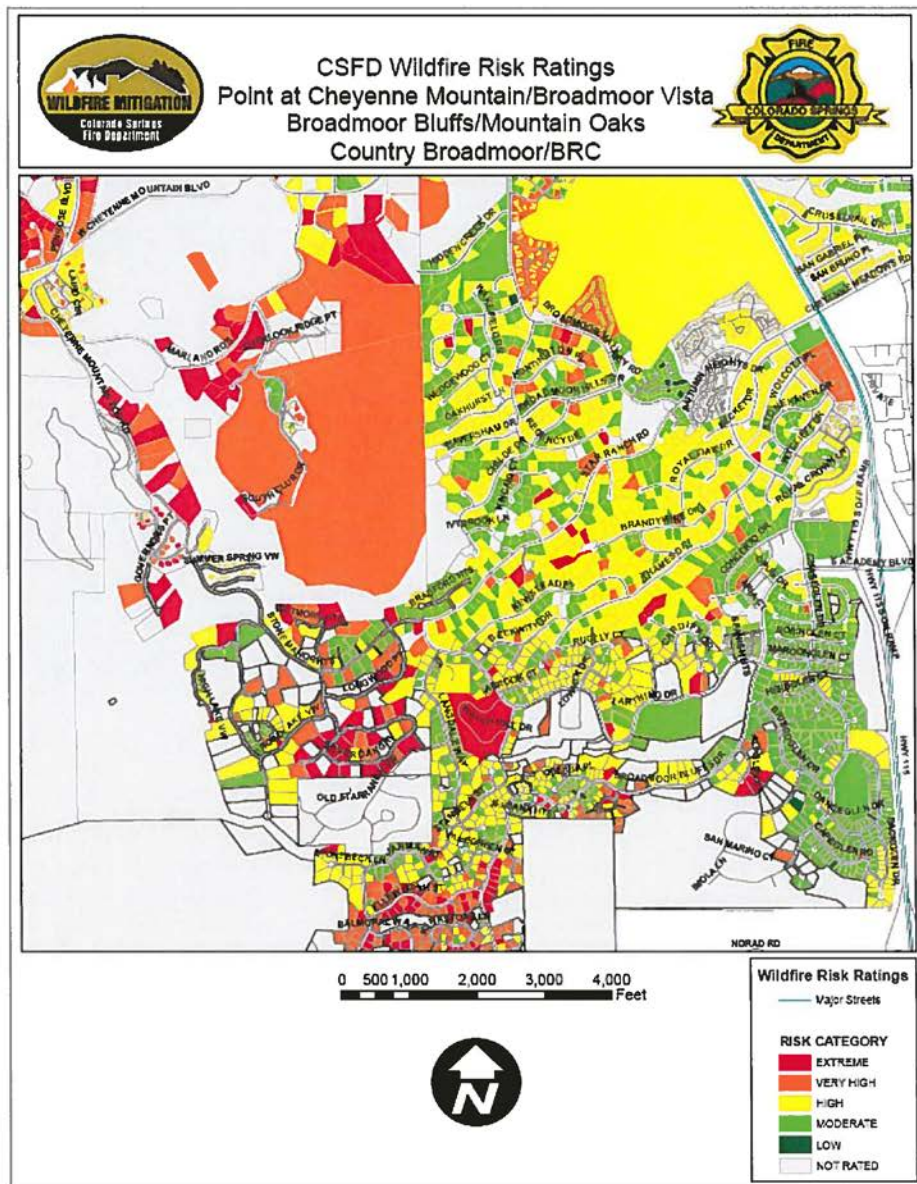
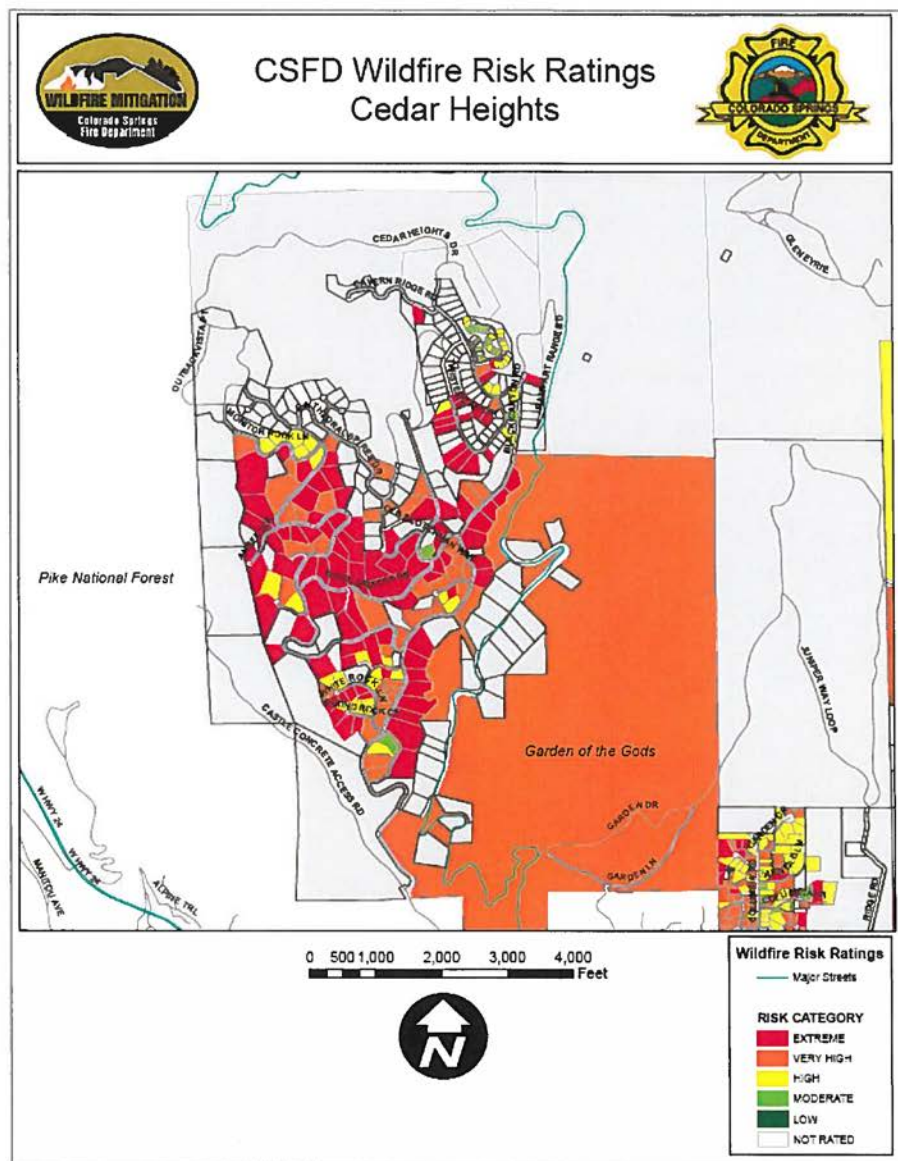
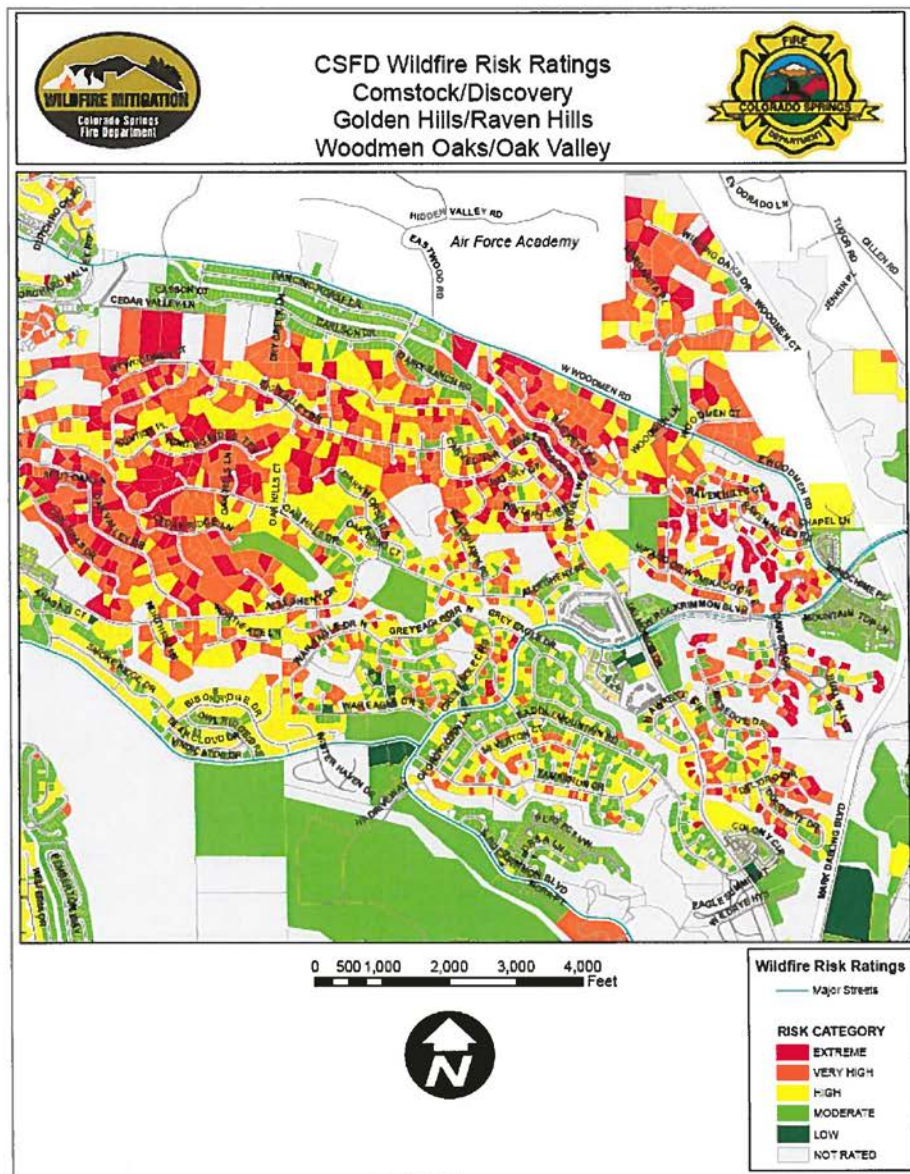


Figure 3. Broadmoor Area Wildfire Risk Assessment Map







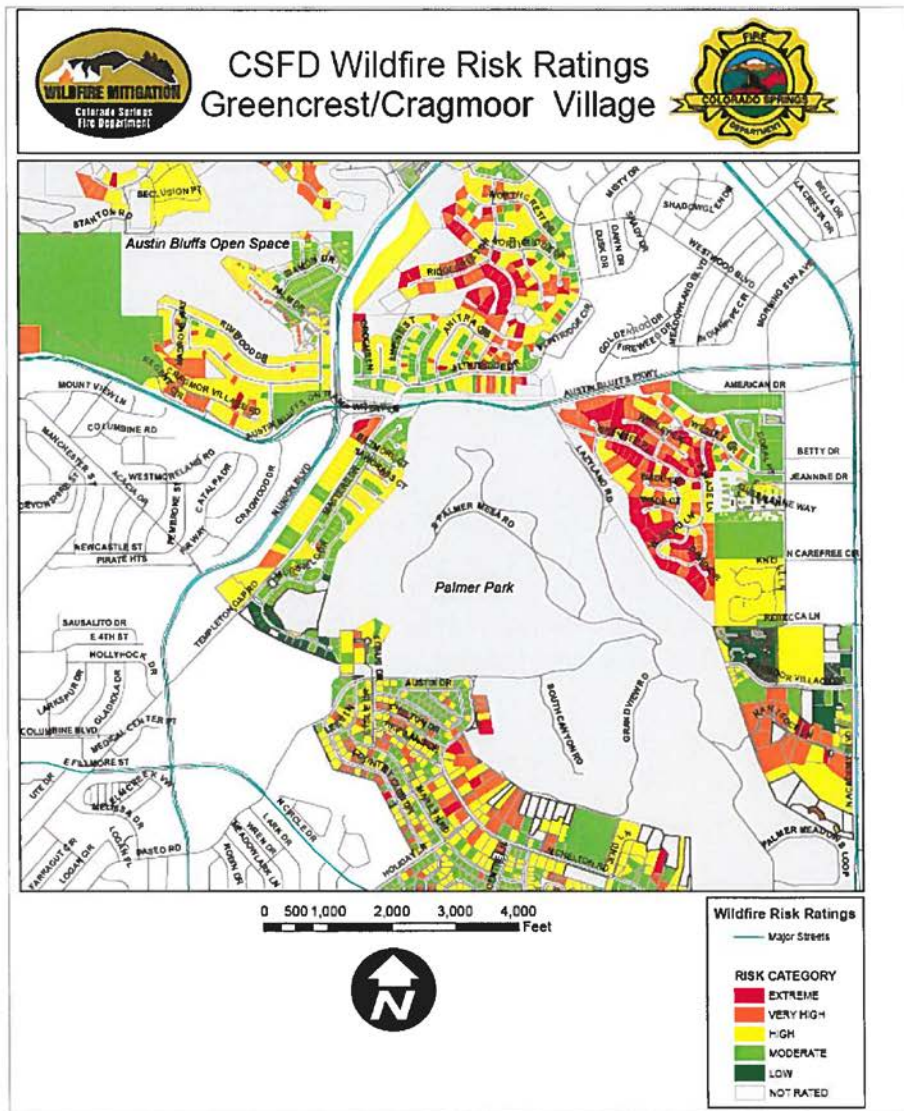


Figure 6. Palmer Park / Austin Bluffs Area Wildfire Risk Assessment Map



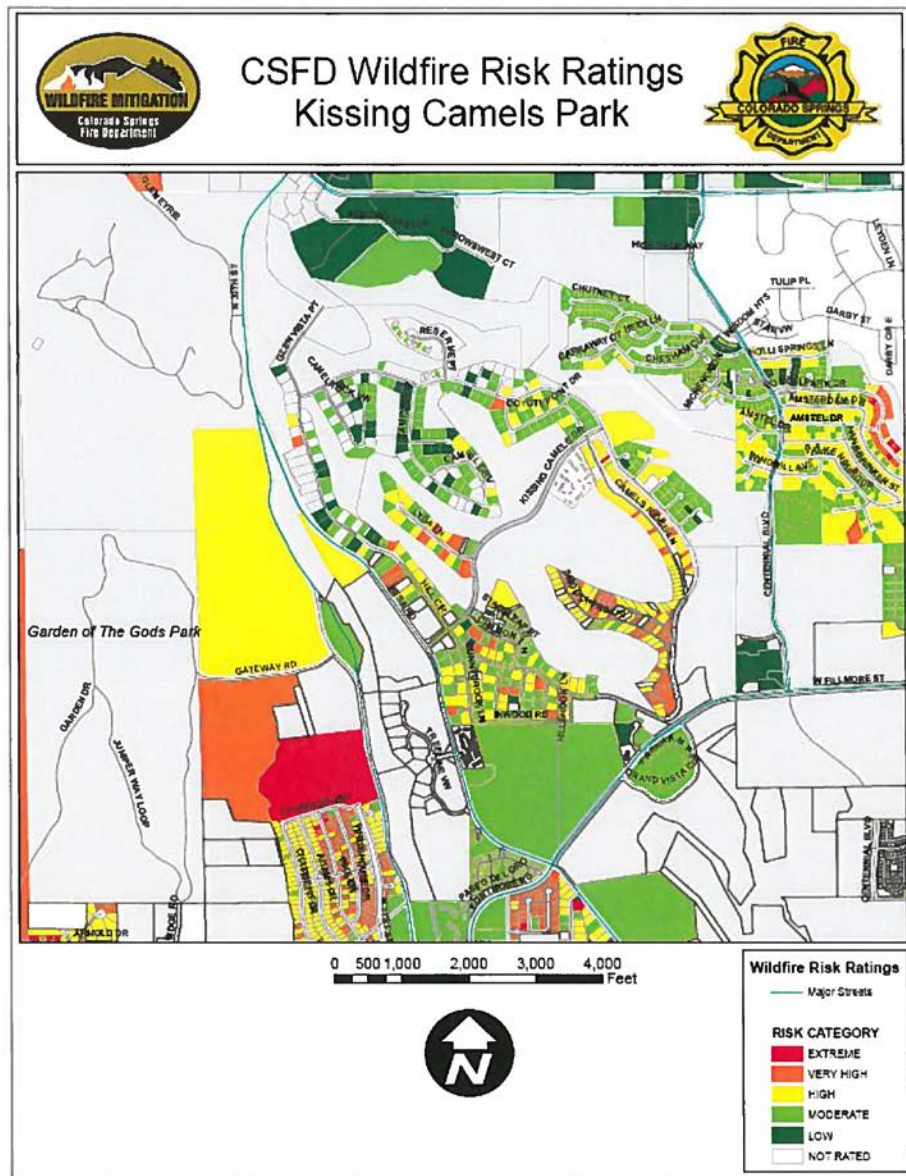
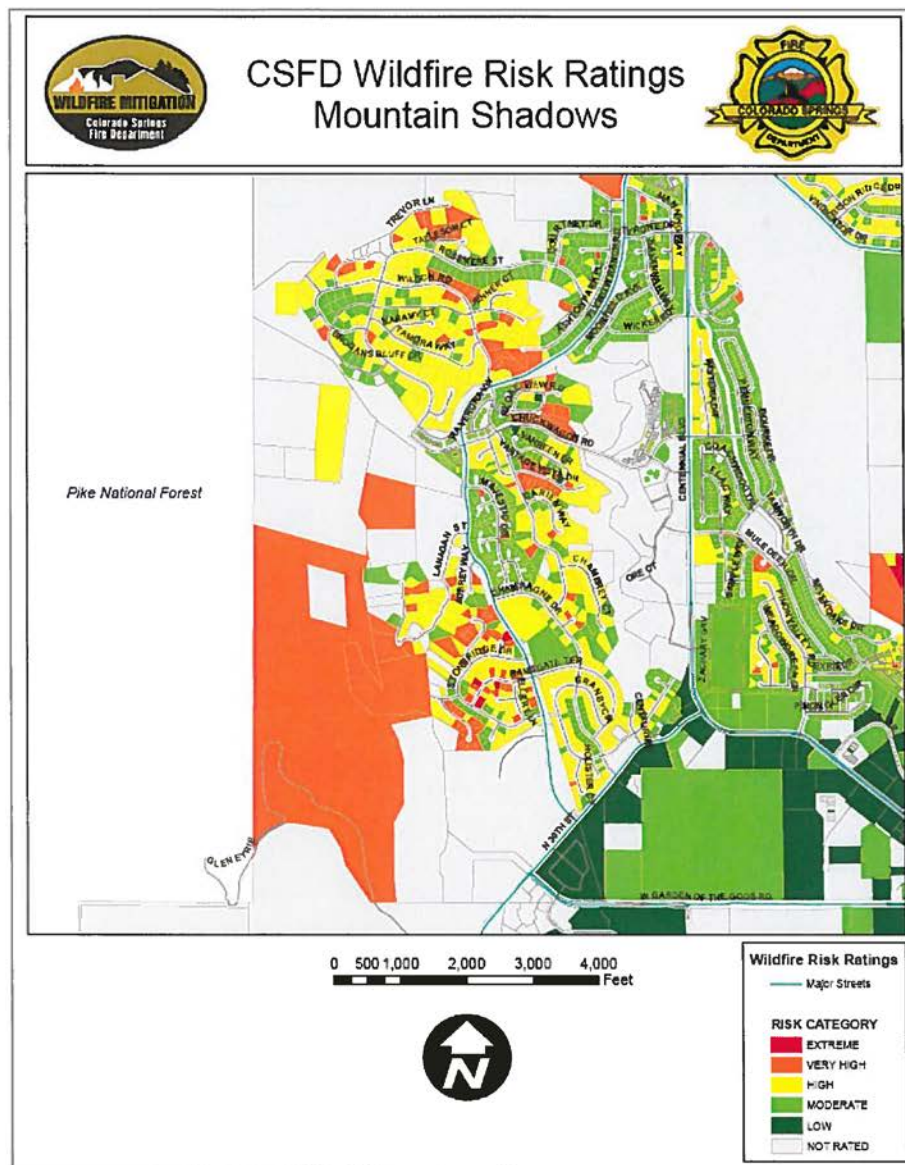


Figure. 7 Kissing Camels Park Wildfire Risk Assessment Map





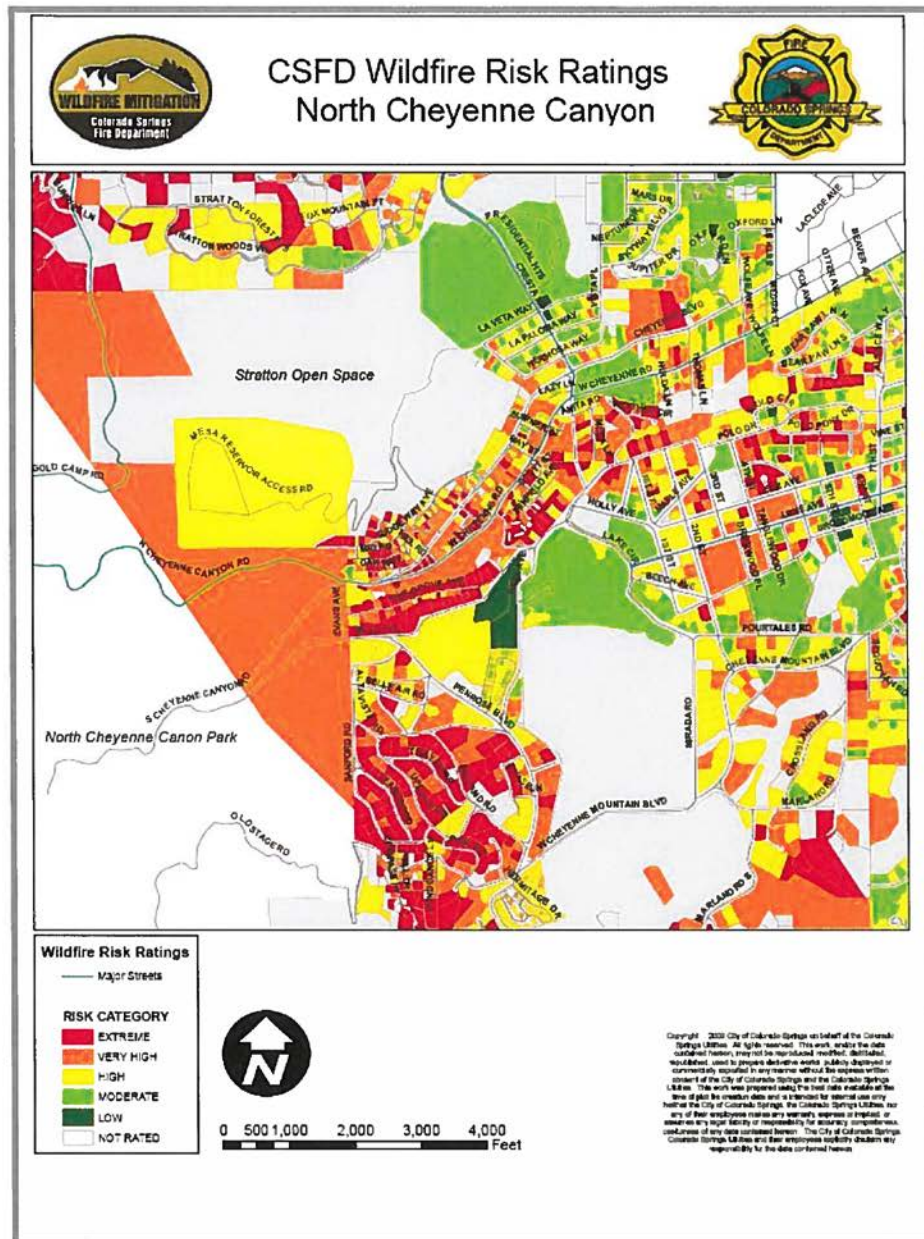


Figure 9. Cheyenne Canyon Wildfire Risk Assessment Map



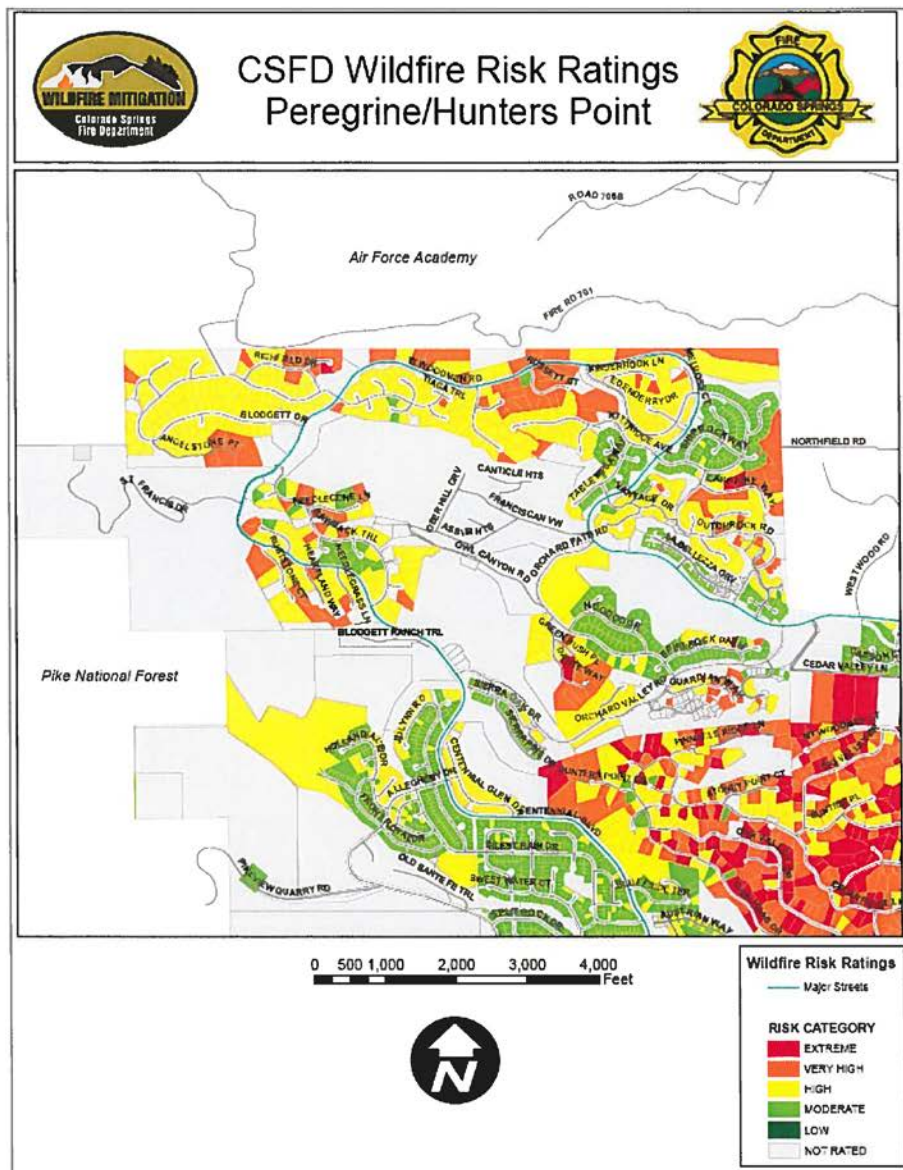


Figure 10. Peregrine / Hunters Point Area Wildfire Risk Assessment Map



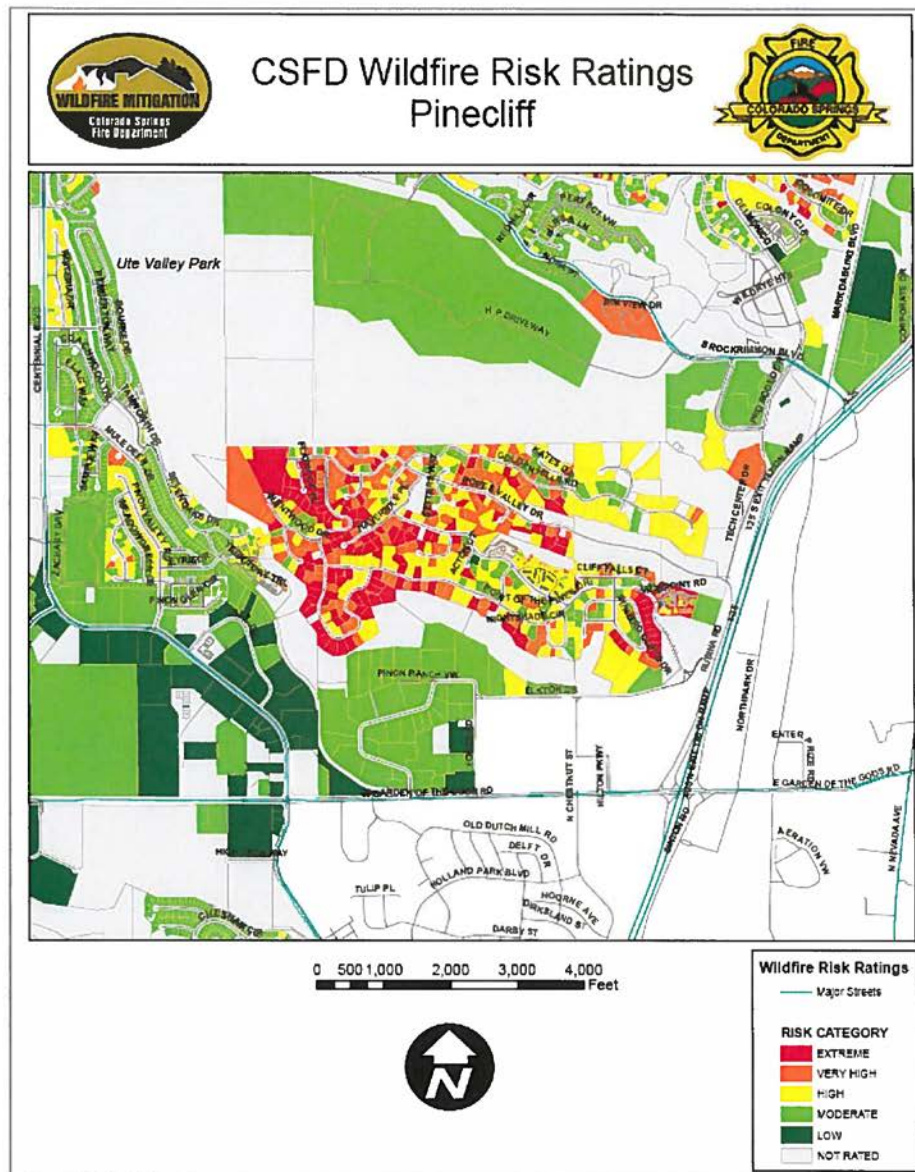


Figure 11. Pinecliff Wildfire Risk Assessment Map



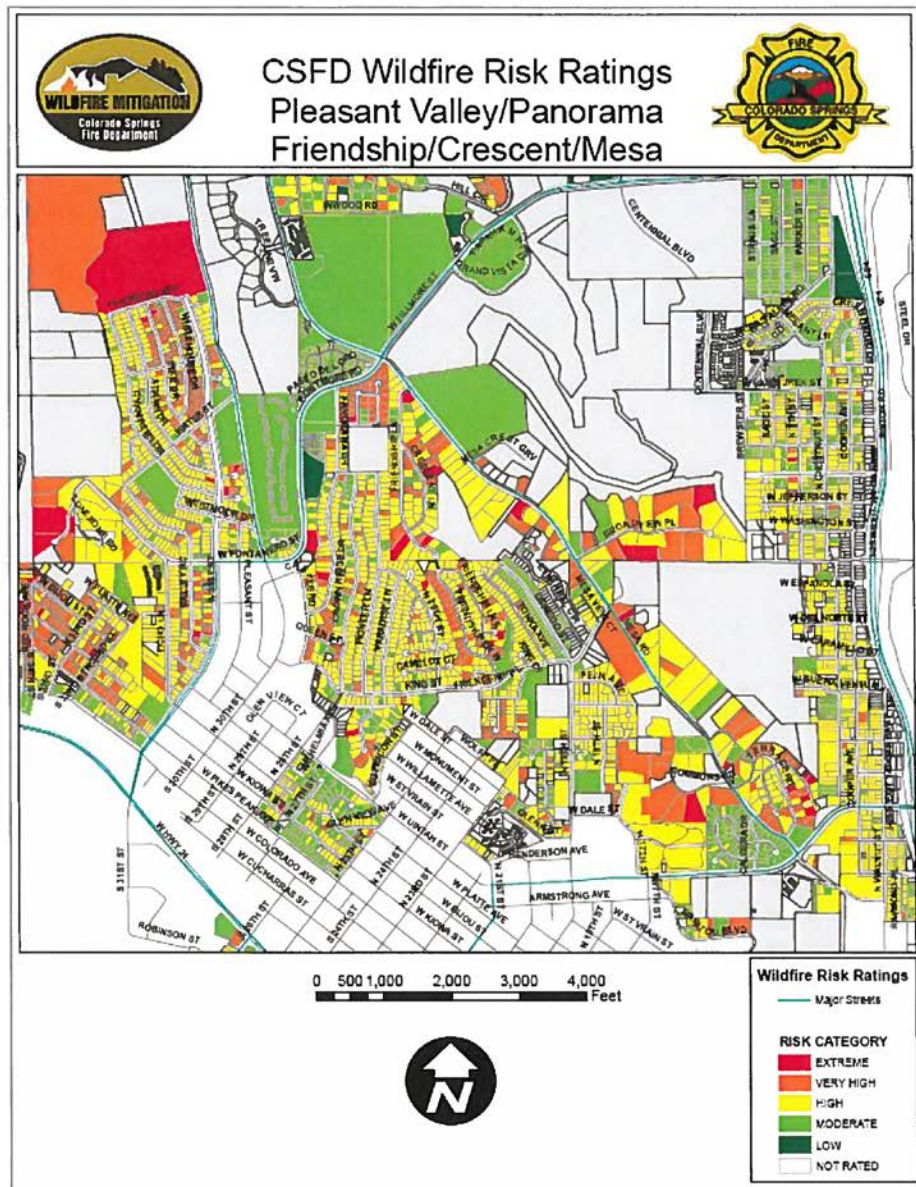


Figure 12. Mesa Area Wildfire Risk Assessment Map



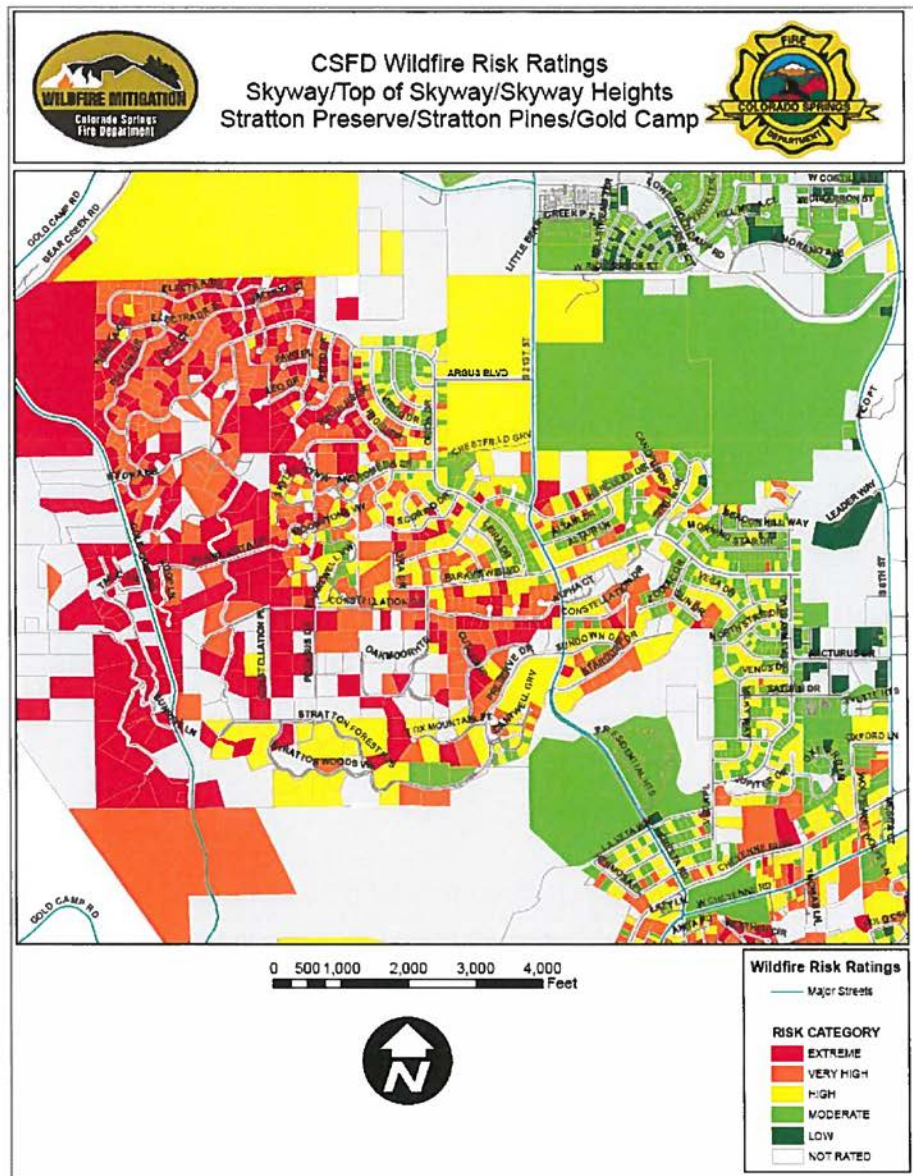


Figure 13. Skyway / Stratton Area Wildfire Risk Assessment Map



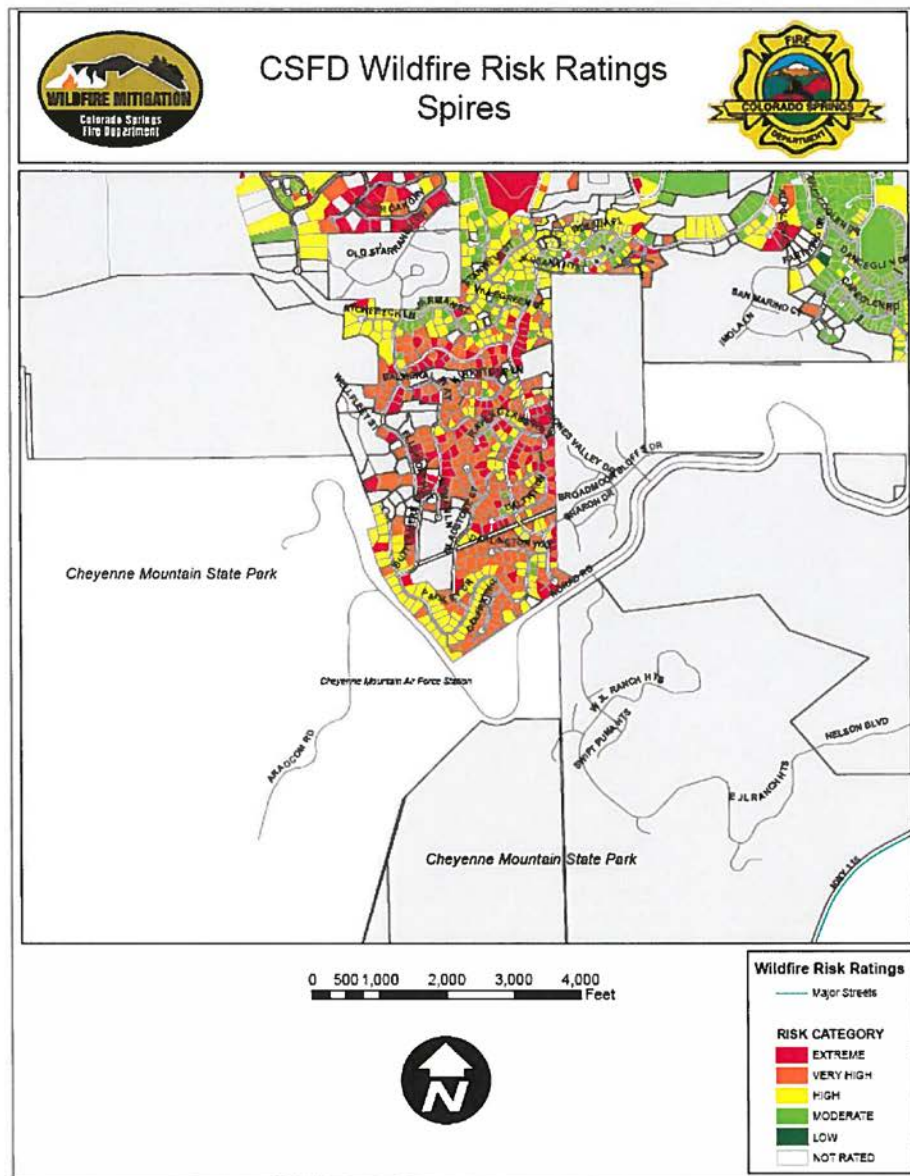


Figure 14. Spires Wildfire Risk Assessment Map



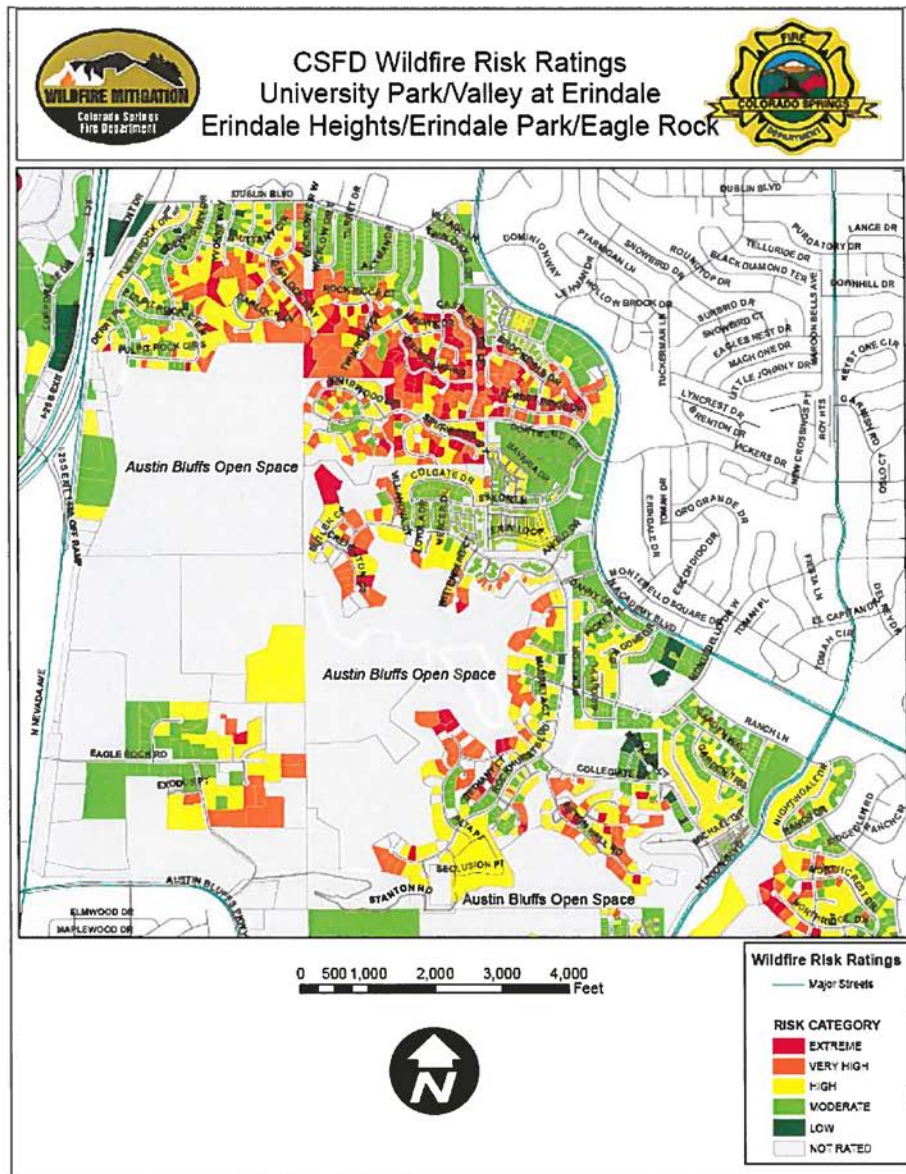


Figure 15. Erindale / University Park Area Wildfire Risk Assessment Map



Wildfire Mitigation Section Services

The Colorado Springs Fire Department Wildfire Mitigation Section, as part of the Division of the Fire Marshal, provides many services to the community to help reduce wildfire risk. These program features align with the Division's mission statement:

"To promote a safer community through hazard mitigation, fire prevention, fire code development and enforcement, fire investigation, public education, hazardous materials regulation, and wildland fire risk management."

Reducing wildfire risk depends on commitment from every level of the community: from federal, state and local government agencies to residents and non-profit agencies. The tagline *"Sharing the Responsibility"* emphasizes the need for collaboration between agencies and the public.

Community Education and Outreach

As part of the tagline *"Sharing the Responsibility,"* the Wildfire Mitigation Section works closely with neighborhood organizations and homeowner's associations. The education program for existing construction works without an enforcement posture; homeowners are given the information and must decide on an acceptable level of risk. The intent of educating and involving residents at the homeowner level is to engage them so they understand their risk and how it impacts their neighborhood. Because a wildland fire is a landscape scale event, their risk also influences their neighbors. The risk assessment model is not only designed to educate homeowners, but to motivate them to take action. The tagline *"Sharing the Responsibility"* emphasizes the need for commitment and collaboration at every level of involvement from the homeowner to the local, state and federal agencies.

There are several methods to deliver the wildfire mitigation message to homeowners. Neighborhood meetings are offered free of charge. During these meetings citizens learn about fire behavior, homeowner guidelines and evacuation tips in the event of a wildfire. As part of the outreach, free onsite consultations are also provided where residents receive specific guidelines as to how they can mitigate wildfire risk through vegetation management and structural retrofits on their property. The interactive website, where homeowners and residents can access their risk rating, also has tips and guidelines for mitigation around their property. Several forms of print media are also used as educational tools including brochures and signs with homeowner information (see Appendix I for the homeowner brochure).

In addition to traditional onsite consultations and neighborhood meetings, the Colorado Springs Fire Department is developing a lecture series in response to request for additional educational opportunities. The Wildfire Mitigation Section plans to offer several lectures annually covering wildfire topics ranging from fire behavior and fire effects to forest health and basic arbor care. In addition to neighborhood events, the Wildfire Mitigation Section will also host an annual, city-wide Wildfire Mitigation season kick-off event each spring. The event will include vendor booths, agency cooperator booths and champion recognition to kick-off awareness of the field season.



Fire danger signs are also a good tool for increasing wildfire awareness and notifying residents about fire danger, burn restrictions and burn bans. Fire danger signs are slated for city fire stations, neighborhoods and park entrances. Priority for sign installation: 1) fire stations in the wildland urban interface, 2) park entrances, 3) remaining fire stations, and 4) neighborhoods.

Considerations for sign locations include:

- Visibility
- Target audience
- Traffic
- Fire history
- Wildfire risk
- Fuel conditions
- Natural resource value
- Historic value
- Firewise Communities USA designation

Sign maintenance will be the responsibility of the Wildfire Mitigation Section working with individual fire stations, neighborhood designees and the Colorado Springs Parks, Recreation and Cultural Services. Along with posting current fire danger, signs will also have riders attached with pertinent messages including burn restrictions, burn bans and fire safety messages.

Fire Danger Sign Installation (as funding allows)

1. Station 12
2. Station 9
3. Station 4
4. Station 3
5. Station 13
6. Station 16
7. Station 18
8. Station 5
9. Garden of the Gods
10. North Cheyenne Cañon
11. Palmer Park
12. Stratton Open Space
13. Ute Valley Park
14. Blodgett Open Space
15. Red Rock Canyon
16. Station 11
17. Station 19
18. Station 17
19. Station 15
20. Station 8
21. Station 6
22. Station 14
23. Station 7
24. Station 10
25. Station 20
26. Station 1



- 27. Station 2
- 28. Colorado Springs Fire Wise Communities/USA
 - a. Cedar Heights
 - b. Country Broadmoor
 - c. Greencrest
 - d. Raven Hills
 - e. Hunters Point
 - f. Top of Skyway
 - g. Village at Comstock
 - h. Woodmen Oaks
 - i. Golden Hills
 - j. Skyway

Stewardship Program

The Colorado Springs Fire Department is not a land management agency and therefore has no authority or responsibility for property management. However, we are responsible for improving public safety and mitigating risk to life and property. Work is completed through stewardship with property owners on private and public property, common areas and open spaces. Signed stewardship agreements must be in place before any work can begin including project planning, obtaining funding, structural upgrades, neighborhood chipping or vegetation removal. Stewardship agreements outline the responsibility of the Colorado Springs Fire Department and funding availability, as well as property owner liability and participation requirements (see Appendix II, stewardship agreement). The stewardship agreement is intended as a handshake between the fire department and the property owner. The Wildfire Mitigation Section will not incur costs on behalf of the owner without notification or prior consent. Likewise, project implementation is based on funding availability only.

Fuels Management

The Wildfire Mitigation Section has the responsibility and authority to assist with mitigation efforts. This coincides with the Colorado Springs Fire Department's responsibility to respond operationally. If property is within city boundaries or threatens any city asset other than federal land, CSFD has the responsibility to work with the owner or agency responsible for maintaining that property to mitigate wildfire risk. City assets can include utilities, watershed, communication sites or infrastructure. Implementation is based on several factors including: wildfire risk rating, willingness to participate in the program, environmental assessment, cultural and historical assessment, slope, access, fuel loading, forest health and mortality, values at risk, ownership, funding and resource availability.

Fuels management has a very high benefit to cost ratio. Nationally, these types of projects have a 4:1 benefit cost ratio, meaning that for every \$1 spent on mitigation, there is a savings of \$4 for operational response and recovery. Analysis of Colorado Springs projects for grant funding has shown that every dollar spent on fuels mitigation projects results in a savings of \$12 - 24 in a wildfire event.





Figure 16. Photo point 1: Fuels Mitigation project at Cedar Heights (Untreated / Treated.)



Figure 17. Photo point 7: Fuels Mitigation project at Cedar Heights (Untreated / Treated.)

Colorado Springs treats on average more than 900 acres annually between project acres, maintenance, prescribed burning, volunteer projects and neighborhood chipping. For a map of completed fuels management projects see Figure 18. Fuels mitigation projects adjacent to at-risk neighborhoods reduce potential fire behavior, but also act as an educational tool for the residents. Those areas that are visible from roadways serve as an excellent example to homeowners how mitigation can look without clear cutting their property. Additional benefits include providing for fire fighter safety and improving wildlife habitat.

Cross-boundary projects include shared boundaries and city assets with US Forest Service, Air Force Academy, El Paso County and Colorado Springs Utilities (Pikes Peak Watershed.)



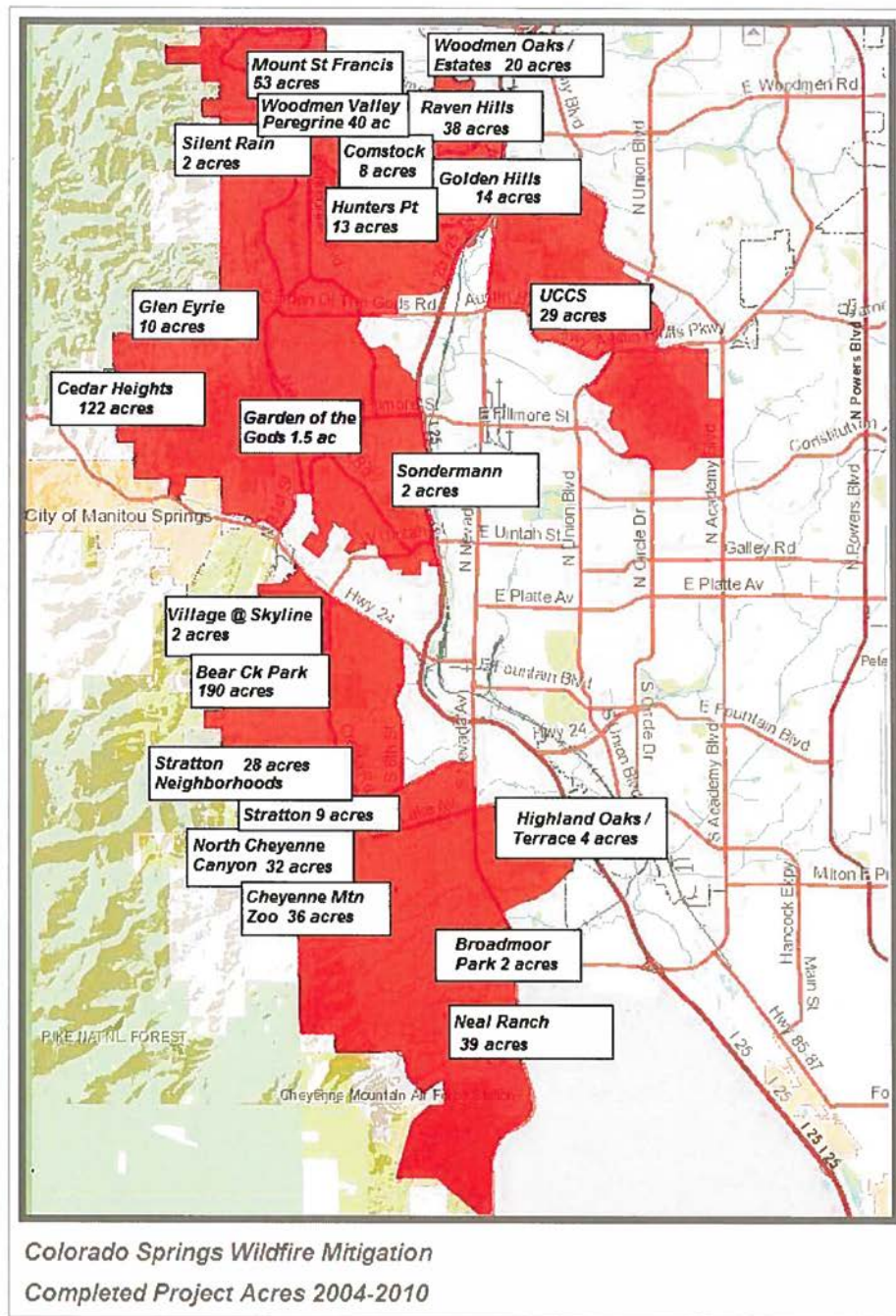


Figure 18. Completed Fuels Mitigation Projects from 2004 – 2010



Neighborhood chipping is part of *"Sharing the Responsibility."* The Colorado Springs wildland urban interface is truly an urban setting; many households do not own a truck for hauling debris to a collection site. The neighborhood chipping service offers homeowners free curbside chipping and hauling when they do mitigation work on their own property. The curbside chipping prevents the need for a dedicated collection site. The Colorado Springs Fire Department works closely with city Code Enforcement to ensure that the slash does not block sidewalks or roadways. Chipping crews follow a safety plan that includes traffic cones and signs for working in high traffic areas.

Neighborhood chipping participation criteria includes a minimum of 12 neighbors participating. This is done to engage neighborhoods and educate them on wildfire mitigation concepts. The intent of neighborhood chipping is not debris removal, landscaping or cleanup. Rather, the intent is to reduce the risk of wildfire, modify fuels adjacent to structures and reduce fire behavior in the event of a wildfire. With a 2-person chipping crew working in stewardship with 63 homeowner associations, we are unable to respond to individual requests for chipping; this participation requirement also helps with scheduling and geographic coordination. Homeowners must also attend a wildfire mitigation meeting or schedule a free on-site consultation to participate. There is no fee for the service which is funded 100% from voter approved Public Safety Sales Tax. See Appendix III for a neighborhood chipping flier.

In addition to the CSFD Wildfire Mitigation fuels crew and neighborhood chipping crew, mitigation work is also contracted out to private tree service companies. Contracting standards include using licensed and insured contractors only. Adding contracting of crew projects allows execution of simultaneous projects without additional salary or capital investment of fleet and equipment.

Development Review

As part of the effort to address wildfire risk on the front end of new construction, the Division of the Fire Marshal offers free Hazard Risk Assessments for development plans in the wildland urban interface. When development plans are routed through the Fire Protection Engineer for design review and the site is identified as located in the wildland urban interface, a risk assessment with recommendations are attached to the plans and put into comments. As an added value from the Fire Marshal's office, this service saves money and turnaround time. Recommendations include vegetation and landscape designs as well as structural components.

Hazardous and Non-Hazardous Materials Permitting

For any activities that increase wildfire potential, the Division of the Fire Marshal in Colorado Springs issues Hazardous and Non-Hazardous Materials activity permits. These permits are required for activities that include public fireworks displays, pyrotechnics, blasting, prescribed burning, bonfires and rockets. The permit fee is based on inspection and processing.

Monitoring and Fire Danger

Wildfire detection is not an issue in a city with more than 400,000 city residents and 20 fire stations. The city does not post lookouts, however during VERY HIGH and EXTREME days CSFD may send out hire-back patrols. These patrols serve not only for detection, but allow for pre-positioning in order to improve response time. These patrols also serve to make public contact and provide visibility to remind residents of the heightened wildfire danger.



The Wildfire Mitigation section monitors fire weather and fuel moistures year round. Using the National Fire Danger Rating System and FireFamily Plus, thresholds are in place based on predicted fire behavior. The fire danger adjective rating for Colorado Springs is posted daily on the fire department website at www.springsgov.com (follow the links to the fire department web page).

Fuels are monitored throughout the growing season on a bi-weekly basis. During burn restrictions or burn bans, wildland fuels are monitored every week. Fuel moisture sampling includes representative species indicative of Colorado Springs. Wildland fuels monitored for fire danger include Ponderosa pine, Gambel oak, herbaceous plants, grasses, dead and downed woody debris, litter and duff. Fire weather is also monitored year round. Outside of the growing season, relative humidity is used as an indicator for fine fuel moistures and driving fire danger.

Operational Support

The Wildfire Mitigation Section works as part of the CSFD Plans Section in a wildfire event. Responsibilities include collecting spot weather data, field observations, fire behavior analysis, Global Position System (GPS) mapping and documentation. The Wildfire Mitigation Section also serves to provide logistical support.

Burn Ban and Restrictions

The Wildfire Mitigation Section monitors fire weather and fuels in support of the Fire Marshal and the Fire Chief as the authorities having jurisdiction in the City of Colorado Springs for enacting burn restrictions or burn bans. Pre-established thresholds and criteria are in place for determining when to enact burn restrictions or burn bans. These include:

- Fire weather conditions (i.e. winds, relative humidity and temperature)
- Fuel moisture conditions (i.e. live and dead fuels)
- Regional fire activity
- Aircraft availability
- Resource availability
- Cooperator status
- National Preparedness Level
- Holidays

Grant Administration

The Wildfire Mitigation Section relies heavily on federal and state grants for project funding. Grant sources include FEMA Pre-Disaster Mitigation grants, Western States Wildland Urban Interface grants, Healthy Forest Restoration Act stimulus grants and Assistance to Firefighter grants. Grant administration involves project planning, application process, scoping, monitoring, reporting, project oversight, evaluation and closeout. Matching commitment is funded through the Public Safety Sales Tax, soft matching using volunteer labor and homeowner matching. Examples of homeowner matching include neighborhood volunteer projects, structural retrofits, contracted labor and hard cash donations.

Volunteer Program Coordination

Volunteer labor is not free labor; it requires an investment of time and resources. However, volunteers are important for community buy-in, involvement and educational outreach. Volunteer projects bring neighborhoods together and help create a strong sense of community.



Volunteer labor can be a beneficial source of soft match for grants; volunteers and grant projects can be coordinated to meet required matching.

The Wildfire Mitigation Section has had extremely good success with several organizations that provide a great service to their community. These include:

- Colorado Springs Fire Department Explorers Post #1894
- Mile High Youth Corps
- Boy Scouts of America
- Twocor Youth Vocational Education

Volunteer projects include fuels management projects in parks, open spaces, common owned areas and on private property. Projects on private property will be coordinated with the volunteers for those owners who cannot do the work themselves; including those with physical limitations or impairments.

Homeowner Assistance

The Wildfire Mitigation Section works with property owners to provide assistance on private property as funding is available. Emphasis and priority will be given to seniors or homeowners with special needs. An individual stewardship agreement is required before work can be done on private property. Mitigation work may involve the wildfire mitigation fuels crew, contracting or coordinating volunteer projects.

Social Media

Program updates are posted on the Colorado Springs Fire Department webpage at www.springsgov.com, on Facebook at www.facebook.com/csfdpio and Twitter at [http://twitter.com/#!/csfdpio](https://twitter.com/#!/csfdpio). These include project information, wildland fire updates and program features. Program features added to the website include a chipping and neighborhood meeting calendar, photo gallery of projects and maps of project areas.

Grass Fire Educational Program

Colorado Springs has identified more than 28,000 acres of wildland urban interface, but the threat of wildfire in grasslands exists throughout the city. Colorado Springs experiences more than 30 grass fires annually. The risk of grass fires occurs year round and impacts all parts of the city. The Colorado Springs Wildfire Mitigation Section works with neighborhood groups and homeowner associations identified outside of the wildland urban-interface to teach grass fire safety. The educational message includes ways to mitigate the risk of grass fires and provide evacuation guidelines. As in the wildland urban-interface, on-site consultations and neighborhood meetings are provided free of charge.

Prescribed Burning

Prescribed burning is another tool in fuels reduction and wildfire mitigation. Although it is not practical in many parts of the city due to large population density, there may be remote areas where it is feasible. Considerations that limit the use of fire include:



- Smoke impact on residents, hospitals, schools and nursing homes
- Risk of escape
- Existing fuel loading
- Critical habitat
- Risk of invasive plants or noxious weeds
- Erosion or slope movement
- Impact on water quality
- Impact on roadways and visibility

Prescribed burning may be beneficial in areas that are remote and where the prescription calls for reintroducing fire. These areas may include steep areas that are not accessible to mechanized equipment. Other prescribed fire opportunities would include areas with specific resource objectives and training fires.

The Wildfire Mitigation Section works with Operations to administer prescribed burns. Support includes public process and outreach, prepping units (layout, line, mapping, GPS and flagging units) and line assignments (lighters, holders and field observers).

Fuel Treatment Options

Efforts to lessen the impacts of the various treatments include education, outreach, rehabilitation, specified operating periods (time of year) and specialized equipment. Treatment options may also include a combination of treatment prescriptions (e.g. hand thinning and pile burning). See Table 1.

Table 1. Fuel Treatments and Resulting Issues

Treatment	Issues							
	Slash	Smoke	Wildlife	Visual	Water	Soils	Cost	Risk
Neighborhood Chipping	x							
Hand Thinning	x						x	
Mechanical	x		x			x		x
Pile Burning		x		x				x
Chemical Treatment	x		x		x		x	x
Understory Burning		x	x	x	x			x



There can be associated benefits as well as detriments for each of the treatment options. Cost benefit analysis goes beyond project expenditures to include social and political capital. Hand thinning can be species selective with little to no ground disturbance. It also tends to be visually appealing as slash is chipped and hauled away or scattered onsite. Hand thinning tends to be a costly method of removal, but where there are adjacency issues to neighborhoods and the site is used as a demonstration area, then hand thinning is cost effective in terms of visual quality. Mechanical treatment can drive down the treated cost per acre, but can also result in some soil disturbance. Contracting specifications have limited disturbance on past projects. Mechanical treatment is the recommended option for oak brush in areas with high mortality. Chemical treatment can be used in conjunction with a cutting treatment to prevent re-sprouting of the oak brush. The herbicide application adds to the cost of the treatment and should only be used for complete eradication of the oak brush.

Colorado Springs is located in a naturally occurring wildfire environment. Prescribed fire has not been considered a treatment option in the past because of smoke issues and risk of escape in a densely populated area. These issues can be addressed by identifying project areas that are not directly adjacent to neighborhoods as well as an approved burn plan with a smoke management plan. Pile burning is a very cost effective method (no chipping or hauling costs) and easier to contain. Understory burning can have a greater smoke impact and risk of escape, but can be ecologically sound for areas away from neighborhoods. Understory burning would also require a detailed burn plan with a smoke management plan.

Removal and Utilization

Slash disposal requires consideration for travel time and distance, additional cost, smoke impact, insects, root systems and visual quality. Removal methods include chipping and scattering onsite, hauling to landfill, recycling and burning. Chipping and scattering on site is very cost effective; it cuts down on travel time and added expense of hauling away. Scattering slash mulch requires that it be scattered around the site at a depth no greater than 4 inches. Scattering onsite may also be beneficial as the nutrient base is not removed from the site and can also be beneficial by preventing noxious weeds from sprouting after cutting. Hauling to a landfill is not cost effective given the additional time required to haul, fuel costs and the cost of disposal.

In Colorado Springs there is a market for slash mulch. Rocky Top Resources, Inc. recycles slash mulch into decorative mulch for retail. Any slash related to CSFD Wildfire Mitigation projects and neighborhood chipping is taken free of charge. This is a viable alternative to chipping and scattering if slope or visual quality is an issue. Rather than going into a landfill, the material is treated and recycled for landscaping.

Burning has not been utilized for slash removal because of population density and risk of escape. Reintroducing fire in the form of pile burning can have ecological as well as social benefits. There are areas in the wildland urban interface where access is an issue and burning is viable because of distance to surrounding neighborhoods. Pile or understory burning would require an approved burn plan and qualified burn boss, lighting and holding crews. It can also provide benefits to the community as an educational tool; smoke in the air can serve as a reminder of their wildfire risk.



Scoping

Scoping is defined as the ongoing assessment of a situation through monitoring, consultation and discussion. The Colorado Springs Wildfire Mitigation Section works with numerous agencies and non-profit organizations throughout the project planning and implementation process. These include:

Interagency and Non-Profit Collaboration:

- Air Force Academy
- Cheyenne Mountain Air Force Station
- Cheyenne Mountain Zoo
- Coalition for the Upper South Platte
- Colorado Division of Emergency Management
- Colorado Division of Wildlife
- Colorado Historical Society
- Colorado Springs Council of Neighbors and Organizations
- Colorado Springs Police Department Code Enforcement Unit
- Colorado Springs Development Review Enterprise
- Colorado Springs Parks, Recreation and Cultural Resources
- Colorado Springs Public Safety Sales Tax Oversight Committee
- Colorado Springs Utilities
- Colorado State Forest Service, Woodland Park District
- Colorado State Parks, Cheyenne Mountain State Park
- El Paso County
- Federal Emergency Management Agency
- Fort Carson Army Installation
- Friends of Cheyenne Cañon
- Sisters of Mount Saint Francis
- Palmer Land Trust
- Pikes Peak Wildfire Prevention Partners
- School Districts 2, 11, 12, 20
- University of Colorado at Colorado Springs
- US Forest Service, Pikes Peak Ranger District

In 2010, the Wildfire Mitigation Steering Committee met to identify project planning including priority criteria and identifying project areas. Committee members were asked to serve because of their involvement and accomplishments in their own neighborhood.

Wildfire Mitigation Steering Committee:

- Sandy Lewis
- Jamie Adams
- Rich Ingold
- Margaret Brettschneider

Public scoping and notification process includes the following mediums:



- Neighborhood signs
- Colorado Springs Fire Department website and social media sites
- Neighborhood meetings
- Mailings

Potentially Affected Interests

Wildfire mitigation projects have a direct effect on the residents in terms of reducing wildfire risk, but the activities can also cause issues for other cooperators and non-profits. The intent is to balance mitigation measures with social and resource values while minimizing any negative effects. See Table 2 for potentially affected interests and the correlating issues with mitigation measures.



Table 2. Potentially Affected Interests and Associated Issues

PAIs	ISSUES	SMOKE MANAGEMENT / AIR QUALITY	SLOPE MOVEMENT / EROSION	VISUAL CORRIDORS / SCREENING	EGRESS / ESCAPE ROUTES	PREScribed BURNING	WILDLIFE HABITAT	FOREST HEALTH	OUTDOOR RECREATION	WATER QUALITY	MECHANICAL FUELS TREATMENT
1. Residents and HOAs		X	X	X	X	X	X	X	X	X	X
2. Colorado Springs Fire Department		X		X	X	X		X			X
3. Colorado Springs Parks, Recreation & Cultural Resources		X	X	X		X	X	X	X	X	X
4. US Forest Service		X	X	X		X	X	X	X	X	X
5. Palmer Land Trust		X	X	X		X	X	X	X	X	X
6. Colorado Springs School Districts		X			X	X					X
7. Cheyenne Mountain Zoo		X	X	X	X	X	X	X		X	X
8. Colorado Division of Wildlife		X	X	X		X	X	X		X	X
9. Colorado State Parks		X	X	X		X	X	X	X	X	X
10. Colorado State Forest Service		X	X	X		X	X	X	X	X	X
11. Medical / Nursing Facilities		X	X		X	X		X			X
12. UCCS		X	X		X	X		X			X
13. Mount Saint Francis		X	X		X	X		X			X

Potential collaboration on wildfire mitigation projects include cross boundary projects with the Air Force Academy, El Paso County, US Forest Service and Cheyenne Mountain State Park.



Project Planning

Selection criteria were determined by more than fuel conditions as these are not forest health projects. Potential project areas were identified based on local knowledge by the steering committee members. Selection criteria for the project areas were listed and discussed for each project. The following selection criteria were used to identify project areas:

- Neighborhoods with HIGH – EXTREME wildfire risk ratings
- Location and adjacency to population density
- Cooperation and “buy-in” from the surrounding neighborhood
- Involvement in “Sharing the Responsibility;” a demonstrated commitment to reducing wildfire risk on private property.
- Vegetation density, fuel type and fuel loading
- Stand health and amount of mortality in the timber and brush
- Age of homes (existing shake shingle roofs, wood siding, mature vegetation)
- Topography
- Adjacency to critical infrastructure (hospitals, schools, fire stations, transportation routes)
- Critical habitat (threatened and endangered species)
- Cultural and historical resources
- Fire history and frequency
- Project size (larger projects receive the highest priority as they can drive down the cost per acre)

Project Areas

Project areas are identified as city assets at risk. Project scheduling and completion will depend on funding availability, staffing resources and weather conditions. General project specifications include:

- Removal of dead and diseased trees and brush
- Thinning of small diameter understory trees and brush
- Limbing overstory trees
- Removal of ladder fuels within the dripline of trees
- Removal of dead and down woody fuels

For grant funded projects and additional wildfire mitigation project see Tables 3, 4 and 5.

Table 3. Pre-Disaster Mitigation Grant Funded Projects

<i>2011-2013 Project Area (FEMA PDM Grant)</i>	<i>Year</i>	<i>Acres</i>
Broadmoor Resort Community	2011-13	173
Quail Lake Park	2011-12	57
Village at Skyline	2011	5
Palmer Park (North)	2012-13	300
Skyway Heights	2012	20
Garden Ranch / Union Meadows	2013	32
Cedar Heights	2013	75
TOTAL		662



Table 4. Wildfire Mitigation Projects, 2014-2021

<i>2014 – 2021 Project Areas</i>	<i>Acres</i>
University Park	325
Blodgett Peak Open Space	70
Garden of the Gods	530
Palmer Park (South)	300
Sunset Mesa Open Space	78
Southface Rockrimmon	17
Comstock / Linear Park	47
North Cheyenne Cañon Park	225
Bear Creek Cañon Park	80
Mount Saint Francis	15
Ute Valley Park	338
Mountain Shadows	25
TOTAL	2050

Table 5. Other Potential Project Areas as funding allows

<i>Additional Project Areas</i>	<i>Acres</i>
North Slope Recreation Area	2267
Austin Bluffs (Pulpit Rock) Open Space	585
Cheyenne Mountain State Park Backdrop Open Space	832
Manitou Section 16	634
Mesa Valley Open Space	42
Red Rock Canyon Open Space	785
Rockrimmon Open Space	78
Sondermann Park Open Space	100
Stratton Open Space	318
University of Colorado at Colorado Springs	200
TOTAL	5841

The number of targeted accomplished acres (neighborhood chipping, hand thinning, mastication, volunteer projects and prescribed burning) is 1000 acres annually. Volunteer projects and neighborhood contributions will be utilized in grant funded projects toward the matching grant requirement. For a location map of planned projects through 2021, see Figure 19.



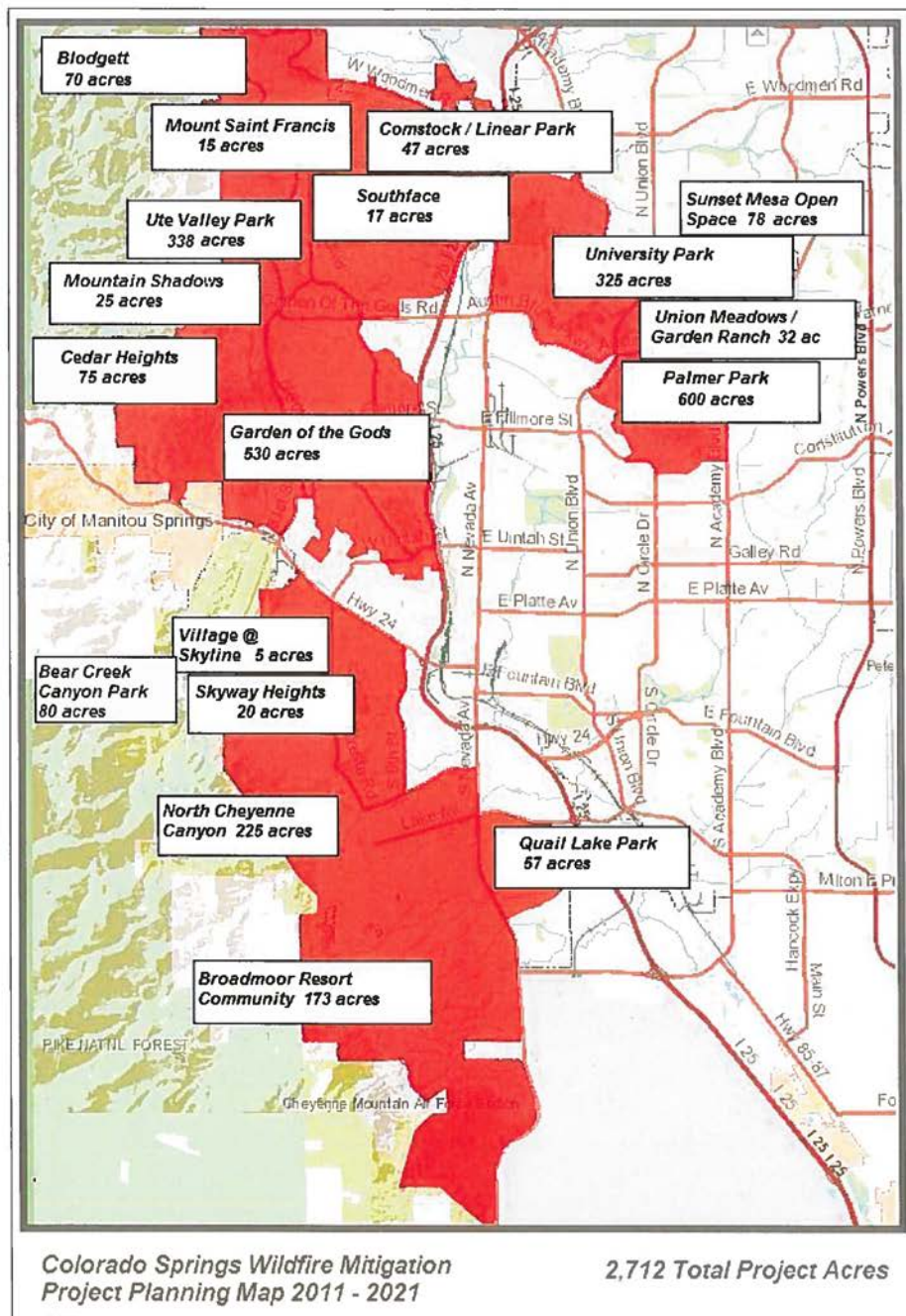


Figure 19. Planned Fuels Mitigation Projects from 2011 - 2021



Monitoring

Projects are to be monitored during implementation and up to 3 years after completion.

Monitoring effects as a result of mitigation efforts include:

- Erosion
- Noxious weeds and invasive plants
- Oak brush regeneration
- Pests
- Wildlife activity
- Social trails and unauthorized vehicle access

Rehabilitation

Rehabilitation planning includes wildfire mitigation projects and wildland fires. In the event of any adverse effects of the mitigation work, prescribed burn or wildland fire, the Wildfire Mitigation Section will mitigate the damages using erosion control methods, spraying of noxious weeds, or other called-for rehabilitation. All attempts to minimize impact to the site will be made with respect to time of year, weather conditions, soil conditions, existing vegetation and amount of disturbance.

Maintenance

Initial costs of fuel treatment can range between \$900 - \$2500 / acre depending on fuel loading, access and slope. It is important that these projects are maintained as there is so much invested on the initial treatment. Maintenance costs range from \$200 – \$500 / acre. Project maintenance is funded from the Public Safety Sales Tax and is part of the grant cycle. Responsibility for project maintenance is shared between the Wildfire Mitigation Section and the property owner. Maintenance includes cutting oak regeneration using brush cutters, mower attachment and ATV. Scheduled maintenance is every 5-8 years post project depending on timing of treatment, seasonal precipitation, regeneration rates and stand composition.



Glossary of Terms

Arbor care: the care of individual trees including planting, pruning and removal

Burn ban: a temporary prohibition on open burning as a result of very high or extreme fire danger

Burn restrictions: a temporary limitation on open burning as a result of high fire danger

Clear cut: to cut down every tree in a designated area

Conifer: a cone bearing tree with evergreen needles

Fire break: an area where all the vegetation has been removed in order to stop a wildfire

Fire danger adjective: standard rating of the fire danger that includes Low, Moderate, High, Very High and Extreme

Fire regime: the pattern and frequency of wildfire occurrence in an area

Forest health: condition of a forest stand based on resiliency, productivity and sustainability

Fuel model: a standard description of available natural vegetation, including dead and down woody material that is available to burn, distinguished by amount and arrangement.

Fuel moisture: the amount of moisture in the plant relative to the oven dry weight of the plant material

Geographic Information System (GIS): a system of hardware and software for storing and displaying geographical information

Hazard: a source of harm

Invasive plants: non-native species that can have an adverse effect on the ecology of the area

Ladder fuels: intermediate sized vegetation that provides continuity allowing fire to spread from the surface into the crowns of trees

Mastication: the process of crushing or breaking down woody vegetation into slash mulch

Mitigation: the act of reducing or alleviating the severity of the hazard

Mulch: shredded or chipped woody material

Noxious weeds: plants that are considered harmful

Prescribed burning: an intentionally set controlled fire intended to reduce wildfire hazard



Pyrotechnics: the use of fireworks, explosives or smoke for special effect

Regeneration: new plant growth after the act of cutting or destroying plant material

Risk: the probability of harm if exposed to a hazard

Slash: the woody debris resulting from cutting or removing trees or bushes

Snag: a dead, standing tree

Social trails: trails established from constant use, not established through trail construction

Stem: the main stalk of a tree or bush

Structural retrofit: adding to or updating building features or material in order to reduce the wildfire risk

Understory: the smaller trees and bushes growing under the canopy of trees

Wildfire Mitigation: to reduce the wildfire risk to life and property through education, outreach, fuels management and structural characteristics

Wildland Urban Interface: An area where communities and homes are adjacent to or intermix with natural vegetation. The combination of fuels, topography, property and people constitutes a risk of wildfire.



Organization

Colorado Springs Wildfire Mitigation staff positions include 2 full-time funded positions out of Public Safety Sales Tax (PSST) and 1 full-time grant funded position. Hourly employees include the Fuels Crew, Chipping Crew and a Fuels Technician. Public Safety Sales Tax funded positions are applied to the grant match. For the Wildfire Mitigation Section organization chart see Figure 20.

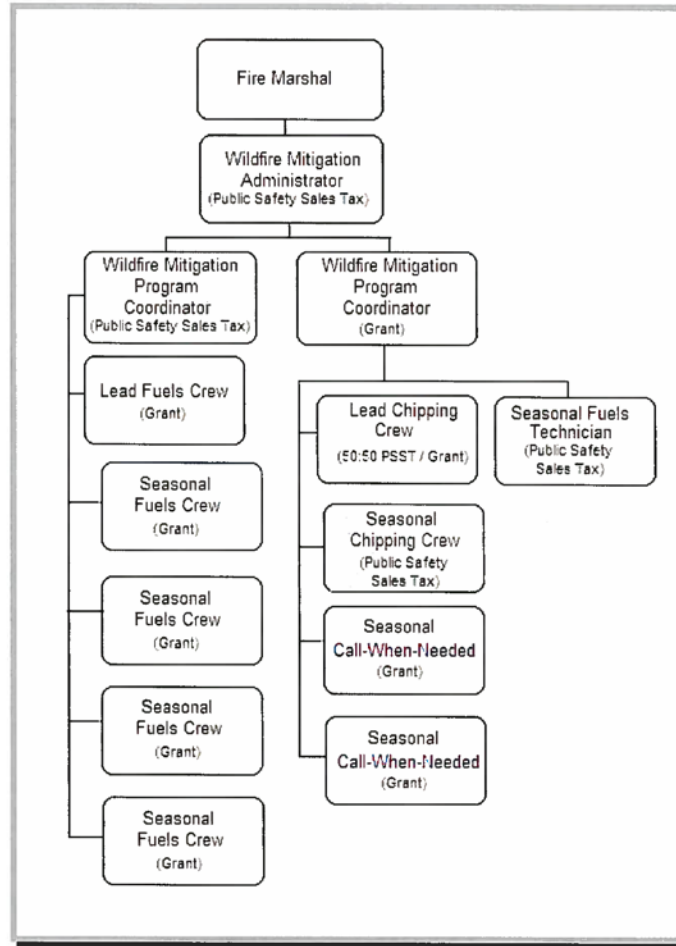


Figure 20. Wildfire Mitigation Section Organization Chart

To access the online Colorado Springs Wildfire Hazard Risk Assessment map go to:

<http://csfd.springsgov.com>

"Sharing the Responsibility"



Appendix I. Homeowner Brochure

What Can You Do To Reduce Wildfire Risk?

1. Create defensible space
2. Keep rain gutters clear of leaves and pine needles
3. Do not use the area on or under decks for storage
4. Rake up pine needles & leaves
5. Plant fire resistant species
6. Keep grasses mowed to a maximum height of 4 inches
7. Incorporate landscape designs to break up fuels
8. Keep address clearly marked
9. Prune lower branches
10. Install class A roofing and fire resistant siding

A Message from the Fire Marshal

Defending against wildfire is **everybody's** responsibility. The work you do on your property goes beyond reducing your own risk, it also impacts your neighbors. Your efforts to mitigate your property ahead of time will improve fire fighter safety in the event of a wildfire. We recognize that mitigation work does not guarantee the survivability of a structure. However, if homeowners follow these guidelines, we can significantly reduce wildfire risk. Thank you for working together and "Sharing the Responsibility."

Brett Lacey, Fire Marshal
Colorado Springs Fire Department

What is the Wildland Urban Interface?

The Wildland Urban Interface (WUI) is that area where structures meet or intermix with natural fuels and topographical features. There are 35,380 addresses identified in the Colorado Springs WUI. All neighborhoods identified in this area are vulnerable to wildfire. Colorado Springs is considered a high hazard wildland fire environment.

Reduce Your Wildfire Risk

1. Create defensible space around your home. Colorado Springs Fire Department recommends thinning out 30 feet or to your property line, whichever comes first.
2. Keep rain gutters clear of leaves and pine needles.
3. Do not store combustibles on or under decks, including fire wood.
4. Rake up pine needles and leaves within 30 feet of any structure.
5. Select plant species with fire resistant characteristics.
6. Keep grasses mowed to a maximum height of 4 inches.
7. Incorporate landscape designs to break up fuel continuity (i.e. paths, rock walls, gravel mulch).
8. Keep address clearly marked and visible from both directions of traffic. (Fire fighters can't help you if they can't find you.)
9. Prune lower branches. Removing ladder fuels will help keep the fire from getting into the crowns of trees. Remove dead or diseased trees and brush.
10. When making home improvements or repairs, consider wildfire safety. Install Class A roofing and fire resistant siding.

Sharing the Responsibility

For more information or to assess your wildfire risk, visit our website at:
[http://csfd.springsoov.com](http://csfd.springsooov.com)
or contact us at: (719) 385-7342

A Homeowner's Guide to Reducing Wildfire Risk

Sharing the Responsibility



Appendix II. Stewardship Agreement

Wildfire Mitigation Stewardship Agreement

This Agreement is entered into this _____ day of _____, _____ between the City of Colorado Springs, a Colorado municipal corporation and home rule city by and through its Colorado Springs Fire Department Wildfire Mitigation Section (hereinafter, the "City") and _____ (hereinafter, the "Owner(s)").

The Parties agree as follows:

The Owner(s) wish to reduce natural fuel accumulation (including brush, grass, duff and litter) in the neighborhood in order to reduce the fire danger posed to the area and the owner's property. The City has code and requirements that regulate the accomplishment of this clearing and removal.

City's Responsibilities

1. To assess current conditions and provide guidelines for property owners.
2. To identify and assist in pursuing grant opportunities for vegetation management on behalf of the Owner(s), whenever possible. The City is not responsible for any funding for the project.
3. To conduct a reassessment upon completion of the work to evaluate and update the wildfire hazard rating.
4. To inspect the project area in order to monitor progress and check for compliance with Colorado Springs Wildfire Mitigation guidelines.

Owner's Responsibilities

1. To implement a comprehensive vegetation management prescription for mechanical thinning and removal of fuels.
2. To approve treatment methods which can include, but are not limited to, the following: cutting, limbing, pruning, felling, bucking, grinding, chipping and hauling of slash or other debris.
3. The work under this Agreement should be limited to the hours of 8 a.m. to 6 p.m. daily.
4. Owner(s) further agree to provide measures recommended by the City on any newly exposed hillsides for protection from erosion. These measures can include, but are not limited to, the following: terracing, retaining walls, plantings, waterbars, slope blankets or mesh.
5. Owner(s) agree to use those standards of good practice as directed by the Colorado Springs Wildfire Mitigation concepts.
6. Upon the completion of the work, Owner(s) will contact the Wildfire Mitigation Program Coordinator for a final site visit. This site visit is for the purpose of reassessing the wildfire risk values for the treated parcel.
7. Owner(s) agree and understand that this agreement may be withdrawn without the consent or acquiescence of the City.
8. Owner(s) agree and understand that in case the agreement is withdrawn, there shall be no liability or responsibility on the part of the City for termination of the agreement. Owner(s) shall hold the City harmless for any such withdrawal or termination.
9. Owner(s) understand that in case the agreement is withdrawn, there shall be no liability or responsibility on the part of the Owner(s) for termination of the agreement. City shall hold the Owner(s) harmless for any such withdrawal or termination.
10. Owner(s) agree that they are responsible for the actions of any work performed by volunteers, contractors, or other persons working on their property.
11. If the Owner(s) employs contractor(s) or personnel, then the Owner(s) will provide a general description of personnel, qualifications, professional certifications and licenses.
12. Owner(s) agree and understand that there is no representation or warranty by any person that this vegetation management project or creation of defensible space will or could prevent the ignition or spread of any fire.

The City and the Owners have executed this agreement on the date above written.

City of Colorado Springs Fire Department

Owner(s)

By _____ By _____

Printed _____

Disclaimer: Wildfire mitigation is intended to reduce wildfire risk; not eliminate the risk of wildfire. It is important to note that wildfires are a dynamic event influenced by several factors including weather (winds, relative humidity, temperature, atmospheric pressure, lightning, etc.) topography, fuels, human activity, response times and seasonal trends (i.e. drought.) There will always be some risk of wildfire regardless of mitigation efforts and structural characteristics.



Appendix III. Neighborhood Chipping Flier

“Sharing the Responsibility”

You Cut and Stack; We’ll Chip and Haul

Getting Started:

- Your neighborhood must be within the City of Colorado Springs and identified as being at risk for wildfire. Find your address at <http://csfd.springsgov.com> or call 385-7342 for assistance.
- Select a neighborhood representative to sign a stewardship agreement.
- Participants **MUST** attend a neighborhood meeting or onsite consultation before the chipping date.
- There must be at least 12 homes participating; no maximum.
- Select a chipper date and submit a list of participating addresses at least 1 week prior to the selected date.

**What’s Acceptable:**

- Woody limbs and branches only, up to 9” diameter.
- No construction or building materials. Must be clear of nails or wire.
- Piles only; no bags.
- No trash, weeds or yuccas.
- No root wads, dirt or rocks.
- No grass clippings or bags of leaves.

Pile Guidelines

- Piles must be within 5’ of the roadway, stacked neatly with ends facing the road.
- Please limit pile size to 5’x5’x5’. No limit as to the number of piles along the curb.
- Piles must be out by the first day; crew will NOT double back to get additional piles during the week (for scheduling reasons.)
- Please do not combine piles with neighbors or haul in from other neighborhoods.

“Good” Pile Example**“Bad” Pile Example**

For more information or scheduling, please contact the CSFD Wildfire Mitigation Program Coordinator at 385-7342 or anotbohm@springsgov.com

Wildfire Mitigation Section, Division of the Fire Marshal - Funded through Public Safety Sales Tax
* This service is provided free of charge to residents as funding is available. Donations accepted.



APPENDIX D

“WALDO CANYON FIRE FINAL AFTER ACTION REPORT” (APRIL 2013)

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WALDO CANYON FIRE

23 JUNE 2012 TO 10 JULY 2012

FINAL AFTER ACTION REPORT

Release Date: 3 April 2013

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ABBREVIATIONS

Abbreviation	Meaning
AAR	After Action Report
AFN	Access and Functional Needs
AMR	American Medical Response
ARC	American Red Cross
AREP	Agency Representative
CAPS	Community Advancing Public Safety
CART	Community Animal Response Team
CDOC	Colorado Department of Corrections
CERT	Community Emergency Response Training
CMHS	Cheyenne Mountain High School
COEM	Colorado Office of Emergency Management
COML	Communications Unit Leader
CSFD	Colorado Springs Fire Department
CSOEM	Colorado Springs Office of Emergency Management
CSP	Colorado State Patrol
CSPD	Colorado Springs Police Department
CSU	Colorado Springs Utilities
COW	Cellular on Wheels
DFM	Division of the Fire Marshal
DHS	Department of Homeland Security
DTRS	Digital Trunked Radio System
ENS	Emergency Notification System
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPC	El Paso County
EPCPH	El Paso County Public Health
EPSO	El Paso Sheriff's Office
FD	Fire Department
FDOC	Fire Department Operations Center

MITIGATION STRATEGIES

Final After Action Report (AAR)

Waldo Canyon Fire

Abbreviation	Meaning
FEMA	Federal Emergency Management Agency
FMAG	Fire Management Assistance Grant
GIS	Geographic Information Systems
HSPPR	Humane Society of the Pikes Peak Region
IAP	Incident Action Plan
IC	Incident Command
ICP	Incident Command Post
ICS	Incident Command System
IDLH	Immediately Dangerous to Life and Health
IMT	Incident Management Team
JIC	Joint Information Center
JIS	Joint Information System
MAC	Multi-agency Coordination
MAPs	Management Access Points
MCP	Mobile Command Post
MHz	Megahertz
MPH	Miles Per Hour
MRCEPC	Medical Reserve Corps of El Paso County
NIMS	National Incident Management System
OEM	Office of Emergency Management
PD	Police Department
PIO	Public Information Officer
PPE	Personal Protective Equipment
PPRCN	Pikes Peak Regional Communications Network
SME	Subject Matter Expert
TCP	Traffic Control Point
TOC	Traffic Operations Center
UCCS	University of Colorado at Colorado Springs
USAFA	United States Air Force Academy
VPN	Virtual Private Network
WUI	Wildland Urban Interface

Abbreviations

4

Colorado Springs, Colorado

EXECUTIVE SUMMARY

INTRODUCTION

At approximately noon on Saturday, 23 June 2012, it was reported that a fire had begun in the Pike National Forest, approximately three miles west of the City of Colorado Springs (City), and to the north of Highway 24 in El Paso County. The fire burned 18,247 acres¹ over 18 days and was reported as fully contained on 10 July 2012. The Waldo Canyon Fire was the most destructive wildfire in Colorado history, destroying 347² homes and damaging many others. Tragically, two individuals lost their lives as a result of the Fire.

The Waldo Canyon Fire was a complex, Type 1 Incident that spanned two counties and multiple municipalities. This After Action Report (AAR) focuses on the actions directly related to the response to the Wildland Urban Interface (WUI) within, and by, the City of Colorado Springs.

The After Action Review process was first used by the United States Army after the Vietnam War to capture lessons learned from simulated battles³. These Reviews are now routinely conducted at all levels within organizations. After Action Reviews are a structured approach for reviewing the work of a group (in this case, the City of Colorado Springs) and identifying strengths, weaknesses and areas for improvement. After Action Reviews focus internally on answering questions to describe: 1) What happened; 2) What went well and why; and 3) What can be improved and how. At the conclusion of the review, the After Action Report is completed to share the results of the review with the entire work group to assist in learning. Sharing an AAR outside of the immediate work group can assist similar organizations in learning and preparing for future events.

This AAR focuses on the responses of all City departments and divisions that supported the City's response to this extremely complex incident. These findings were gleaned from several after-action meetings held with City departments, state and local government, private and non-profit agencies during August, 2012. Additionally, detailed reviews of related incident documentation and first responder radio transmissions were conducted. Although this report focuses solely on the response of the City, it does not discount the invaluable contributions of many local partner agencies and the efforts of first responders working in contiguous municipalities and counties. The City is focusing on internal policies and procedures in a dedicated attempt to determine actionable items that can be identified and corrected in advance of a subsequent event.

¹ <http://inciweb.org/incident/2929/>

² Determining the accurate count of the number of homes that were lost in the Waldo Canyon Fire is an on-going process that has many intricacies involved. On Thursday, 28 June 2012, City authorities announced that 346 homes were destroyed. When announced, this number was reported as preliminary and it was noted that the figure may rise. Since then, the Pikes Peak Regional Building Department (PPRBD) has embarked on an in-depth analysis of the homes in the area. This analysis is complete and the final number of destroyed homes is 347.

³ wildfirelessons.net/documents/AAR_PPT_Final.pptx

This document encompasses all City-specific information that was included in the City's Initial AAR that provided a high-level summary, by capability area, of strengths and recommendations. This document takes the Initial AAR information a step further by reviewing and providing commentary on the City response in greater detail. The major strengths and recommendations remain unchanged from those reported in the Initial AAR.

MAJOR STRENGTHS

The major strengths identified during the City's response to the Waldo Canyon Fire are as follows:

- **Public Safety Collaboration:** Post 9/11, public safety agencies in Colorado Springs began a concerted effort to build collaboration among and between the City's public safety agencies. Colorado Springs Fire Department (CSFD) and Colorado Springs Police Department (CSPD) have since developed a strong working relationship through planning, training, and exercises as demonstrated on real-world events. This strength in collaboration was instrumental in the response to the complex Waldo Canyon Fire.
- **Personnel:** Personnel from the City of Colorado Springs, governmental partners, and local non-profit agencies demonstrated unprecedented dedication to the incident response, as well as to the residents of Colorado Springs.
- **Training and Exercise:** CSFD, CSPD, and the Colorado Springs Office of Emergency Management (CSOEM) have a demonstrated history of coordinating and conducting multi-agency, complex emergency response training and exercises. Additionally, CSFD and CSPD have completed comprehensive tactical training and exercises that directly relate to this type of a response. The City has also participated in the South Central All-Hazards Region⁴ training and exercise program for the past nine years. This extensive training and exercise experience played an important role in the successful response by the City's first responders and support personnel. Exercises, such as the "Up in Smoke" WUI exercise series, included emergency evacuation drills with residents and first responders, as well as components of a larger, full-scale exercise with emergency response agencies.
- **Relationships:** Pre-existing relationships among local government and non-profit agencies were instrumental in ensuring a well-coordinated response. Leadership personnel from local agencies have met face to face, engaged in training, and worked to solidify partnerships over the past several years. These relationships provided the structure for an effective response to all aspects of the Waldo Canyon Fire.
- **Public Safety Response:** CSFD and CSPD safely evacuated approximately 26,000 residents on 26 June 2012, while effectively fighting a fast-moving conflagration fire in the WUI, protecting

⁴ The South Central All-Hazards Region is a multi-county emergency management and homeland security region that consists of the City, El Paso, Teller, Lake, Chaffee, and Park counties.

and saving 82% of the homes in the direct impact area.

- **Planning:** CSFD, CSPD, and CSOEM have worked collaboratively with all City Departments for several years to develop policies, plans and procedures for a WUI fire. These plans have been used in training and tested during emergency response exercises.
- **Wildfire Mitigation Plan:** In 2001, the CSFD developed a comprehensive Wildfire Mitigation Plan (WMP). This plan included an extensive, interactive risk assessment of the WUI and establishment of a strong community education program. In 2011, the Colorado Springs Community Wildfire Protection Plan (CWPP) was finalized as an update to the WMP with detailed emphasis on future planning and program features.
- **WUI Fire Evacuation Appendix to the Colorado Springs Emergency Operations Plan:** A WUI Fire Evacuation Appendix was initially created in 2008, and updated in early 2012. It provides detailed information for the City on the wildfire risk in the WUI as well as resources and plans for first responders to use during a WUI evacuation (including traffic models). This appendix was further tested during the “Up in Smoke” WUI exercise series.

PRIMARY RECOMMENDATIONS

The primary recommendations are as follows:

- **Internal/Partner Agency Communications:** Decisions were made rapidly at key points in time throughout the incident. A system/process needs to be designed and implemented to provide notification to first responders and key agency representatives as command decisions are made throughout the event. Existing technologies should be reviewed and modified to accomplish this.
- **Real-Time Documentation:** Documenting dates, times, and decisions during each day of the incident was an overwhelming task. Moving forward, a process should be developed to train existing staff and/or public safety volunteers to work as “scribes” throughout the various geographically-dispersed locations affected by the incident. Scribes will track real-time information for record-keeping and can serve as a communications link between locations when primary staff is busy with their duties.
- **Logistics:** The nature of the Waldo Canyon Fire incident (i.e., duration, number of personnel assigned, multiple geographic incident locations) created an unprecedented need for logistics support. Training should occur for staff and volunteers who can immediately be placed in the Emergency Operations Center (EOC) to form a more robust Logistics Section to assist with providing support to all aspects of the incident. The goal is to have three individuals trained to perform each role in the EOC.
- **Incident Management:** The Incident Command System (ICS) is a standardized, on-scene, all-hazard incident management system that allows its users to adopt an integrated

organizational structure that matches the complexities of the incident. While ICS training has been delivered over the past several years to first responders, a need has been identified to practice (i.e., exercise) advanced ICS skills. Additional training and exercise on ICS job aides, organization charts, and checklists that have previously been developed should be provided.

CONCLUSIONS

The Waldo Canyon Fire was an historic incident that demanded the best from the City of Colorado Springs. Personnel from within the City, along with the hundreds of individuals from assisting agencies, reacted in an incredibly professional and heroic manner throughout the duration of this incident.

Numerous strengths and lessons learned were demonstrated during this incident. It is imperative that these strengths and lessons are captured so that City personnel build upon them for future similar responses. This document is the first step in a lengthy process to ensure that the City embraces the strengths identified in the response and builds upon them. Additionally, the City of Colorado Springs is committed to work toward implementing, to the swiftest and fullest extent possible, the recommendations contained in this AAR.

Although this report does not address recovery efforts related to the Waldo Canyon Fire, several initiatives are in place. Colorado Springs Together, a 501(c)3, was immediately established and has been successful in working with residents on recovery needs. In addition, much work is underway to address the aftermath related to potential flood risks following the Fire.

While not covered in this report, the City of Colorado Springs would like to acknowledge the significant outpouring of support received during this incident. Individuals and agencies throughout the Pikes Peak Region – and beyond - provided personnel and goods to support fire and law enforcement response efforts. Agencies from the local area did not hesitate to make their personnel available at all times. Additionally, an outpouring of support came from local business that provided food, supplies, and equipment to all aspects of the City's response.

The Waldo Canyon Fire was an incident of epic proportions for not only the City of Colorado Springs, but also for numerous neighboring municipalities and counties that were directly impacted. This AAR covers the response of only one of many agencies involved in fighting this historic fire. The City of Colorado Springs stands by these AAR findings and the response by the public safety agencies.

Post fire studies have been conducted by the United States Department of Agriculture (USDA), Forest Service on many Type 1 wildland fires, such as the Boulder Fourmile Canyon Fire. A contract was recently granted to a team to conduct a comprehensive, holistic study of the Lower North Fork Fire. These studies differ from this AAR in that all agencies and aspects of the fire can be examined, such as fire pre-mitigation efforts, in a scientific manner to determine the social, economic, organizational and ecological impacts.

In October, 2012, Senators Udall and Bennet sent a letter to USDA Secretary Vilsak requesting a comprehensive and scientific review of the Waldo Canyon and High Park Fires (see Appendix J). This type of study will provide insight into the interdependencies that existed among the various local, state and federal response agencies throughout the duration of the fire and how the environment influenced the fire behavior. The City of Colorado Springs fully supports this request and is prepared to actively participate in a further holistic review of the Waldo Canyon Fire, understanding that the USDA study would complement this AAR.

SECTION 1: COLORADO SPRINGS DAILY RESPONSE

This section of the AAR provides a day-to-day review of the overall incident, to include fire behavior, fire progression, weather conditions, and general information regarding significant activities that occurred in areas adjacent to Colorado Springs.

A narrative overview of the City of Colorado Springs' response is provided for each day. This narrative captures the highlights of the City's response to various, key aspects of the Waldo Canyon Fire. It is impossible to fully document all the events occurring during the City's response and, therefore, this overview provides a snapshot of what the various City departments and divisions were responsible for. This document does not address interactions with partner agencies and neighboring governments in any detail. It is not the intention of the City to diminish the importance of these interactions; instead this document reviews the strengths and recommendations that the City has the direct ability to impact and authority to change.

Strengths and recommendations are tied to the capabilities that were first cited in the City's Initial AAR. The compilation of capabilities is found in Section 2.

FIRE OUTLOOK AND BACKGROUND

On 14 June 2012, the Pike and San Isabel National Forests issued Stage 1 fire and smoking restrictions on all national forest system lands. This ban prohibited the building, maintaining, attending of or using a fire, campfire, or stove fire, as well as smoking, except in designated locations.

On the same day, Colorado Governor John Hickenlooper issued Executive Order D2012-015, a ban on open burning in the State. At that time, Colorado had already experienced 344 wildfires⁵ in 2012. The Executive Order defined "open burning" as "any outdoor fire, including but not limited to, campfires, warming fires, charcoal grill fires, fused explosives, fireworks, and any other activity that poses a significant risk of starting a fire."

Eight days later, on 22 June 2012, initial calls were made to the Manitou Springs Fire Department reporting smoke in the area of Pyramid Mountain and Waldo Canyon. The United States Forest Service (USFS) and local departments received calls and/or dispatched units to the area. First responders looked for the source of the smoke until dark, but were unable to locate any fire. The USFS took command of the incident in the evening and called it "Pyramid Command".

⁵Colorado Governor's Executive Order D2012-015

23 JUNE 2012 (SATURDAY)

OVERVIEW

A Red Flag Warning was in effect. Firefighters from the USFS and the Cascade Volunteer Fire Department began looking for the source of smoke again, on foot, at approximately 0700 on 23 June 2012. At approximately 1230, numerous residents throughout the Pikes Peak Region reported seeing smoke in the area of Waldo Canyon. This was about the same time that on-scene fire crews verified a quick-burning fire in the Pike National Forest. First responders from Colorado Springs mobilized mid-day in the Cedar Heights neighborhood.

As response efforts were underway, the Colorado Springs EOC was activated and a mandatory evacuation order was issued for the Cedar Heights neighborhood. Further voluntary evacuations were ordered for neighborhoods along the westernmost edge of Colorado Springs and by EPSO for the towns along Highway 24. CSFD and CSPD, along with CSOEM, developed evacuation zones and Management Action Points (MAPs), based on the current and predicted fire behavior.

The first American Red Cross (ARC) shelter opened at Cheyenne Mountain High School, in coordination with the Medical Reserve Corps of El Paso County (MRCEPC). This collaboration resulted in a fully functioning all-population shelter accommodating individuals with Access and Functional Needs (AFN). Penrose Equestrian Center was established as the large animal shelter and was managed by the El Paso County Animal Response Team (EPC CART). Both companion and large animals were accepted for sheltering at the Humane Society of the Pikes Peak Region (HSPPR).

The weather conditions were hot and dry with erratic winds causing the fire to spread rapidly to the northwest and south. The initial ICS structure made the decision to delegate the authority of this fire to a Federal Type 1 IMT. During mid-afternoon, a mandatory evacuation order was issued for southern Mountain Shadows.

The high temperature in Colorado Springs was 100 degrees.

COLORADO SPRINGS RESPONSE**NOON TO 1400**

The Colorado Springs Public Safety Dispatch Center (Dispatch) became aware of the quickly growing fire west of Colorado Springs at approximately noon. A resident near Bear Creek Park called 9-1-1 at 1210 to report seeing smoke west of the quarry above the Cedar Heights neighborhood. At the same time, CSFD Battalion Chief (BC) Royal was in the vicinity of Highway 24 and 26th Street when he heard a CSFD officer contact Dispatch inquiring about the smoke on the mountainside. BC Royal saw the growing plume of smoke and called for an Engine/Brush Truck response to Cedar Heights. BC Royal then requested that the CSFD Mobile Command Post (MCP) be deployed to the Safeway parking lot at 31st Street and Colorado Avenue (see Appendix I for a listing and map of key locations). This location was identified as the initial Staging Area. With the plume of smoke rapidly growing, BC Royal

contacted CSOEM Director, Bret Waters and requested the evacuation of Cedar Heights. Director Waters contacted Dispatch, while enroute to the EOC, and requested that the Emergency Notification System (ENS) mandatory evacuation message be developed for Cedar Heights and that an EOC activation notification be sent to on-call EOC personnel.

The CSFD Public Information Officer (PIO) reported the fire on Twitter at 1218, stating that there was a possible wildland fire in Waldo Canyon, and that City units were responding to assist the El Paso County. At this time, BC Royal was also informed that the EPSO and Cascade Volunteer Fire Department were working the fire in Cascade. The City requested air support from EPSO at approximately the same time that EPSO requested a mutual-aid wildland response from the City to the "Pyramid Command." A quick-moving crown fire could be seen moving south and west of Cedar Heights. CSFD established lookouts on the southwest ridge of the eastern slope of Williams Canyon and on Rampart Range Road above the west side of Williams Canyon and Waldo Canyon.

At approximately 1222, numerous 9-1-1 calls reporting smoke inundated Colorado Springs Dispatch. As a result, Dispatch notified the Colorado Springs Traffic Operations Center and the Colorado State Patrol (CSP) to use variable message boards throughout the City and on Highway 24, requesting community members to refrain from contacting 9-1-1 to report the fire. Additionally, at approximately 1243, Twitter became very active with the same message, acknowledging that responders were working the fire.

The EOC and the Fire Department Operations Center (FDOC) were activated at approximately 1230. FDOC and EOC personnel were responsible for developing evacuation zones (see Appendix B for evacuation zone maps). Information on current and possible fire behaviors, as indicated by fire-behavior models, was used to establish the first evacuation Zones 1-3 (Zone 1: Cedar Heights, Zone 2: southern Mountain Shadows, Zone 3: northern Mountain Shadows, Peregrine, north Rockrimmon). Based on predicted fire activity, MAPs were determined for each zone. The Zone 1 (cedar heights) MAP was established as any encroachment on the ridge above Cedar Heights. The Zone 2 (southern Mountain Shadows) MAP was established as any boundary breach of Zone 1 (Cedar Heights), or fire crossing Rampart Range Road. The Zone 3 (northern Mountain Shadows) MAP was any breaching of Zone 2 (southern Mountain Shadows), or any fire activity observed on the eastern ridge of Queens Canyon above the quarry. These points were closely monitored by CSFD personnel working in the FDOC, as well as by personnel out in the field, to include lookouts.

At 1255, CSFD requested CSPD to stop all traffic to Rampart Range Road from Garden of the Gods Park. This information was also immediately released via Twitter. By 1300, evacuation plans for Cedar Heights were initiated.

The USFS took Command of the fire shortly before 1300 and named it the "Waldo Canyon Fire."

At 1303, CSPD was requested by CSFD to respond to Staging at 31st Street and Colorado Avenue to assist with the evacuation of Cedar Heights. Manitou Springs was notified of the impending evacuation efforts. Significant staffing support from CSFD was requested to assist in Cedar Heights

with evacuation, critical infrastructure protection (communications and water towers), and preparing homes for fire. Colorado Springs Utilities (CSU) worked alongside CSFD cutting dozer lines. CSFD District Chiefs conferred and decided to use modified dispatch procedures, diverting several medical calls to American Medical Response (AMR) until 0300 the following day.

At 1305, the CSFD PIO tweeted that evacuation of Cedar Heights had begun and requested that residents leave the area. The official ENS for the Cedar Heights neighborhood evacuation was sent at 1339, while CSFD and CSPD evacuation efforts were already underway.

The CSFD MCP arrived at the Staging Area at 1315. The first media briefing was held at this location at approximately 1345. By this time, numerous City and County leaders were at the Staging Area and provided comments or interviews at the press conference. At this time, the fire was referred to as the "Pyramid Mountain Fire" by local response agencies, and referred to as the "Waldo Canyon Fire" by the USFS.

1401-1700

Twitter notifications began at 1410 noting that Garden of the Gods Park was closed and people in the park were told to leave. This was later confirmed by the EOC in conjunction with the Colorado Springs Parks Manager. The Pikes Peak Highway, and all trails in the area, was also closed at 1440. Numerous hikers and individuals in cars were evacuated from each of these areas with the assistance of City staff.

Staff in the EOC called Colorado Springs Fleet Services at approximately 1400 to ensure that fuel trucks were ready to provide support. Staff responded and ensured the readiness of fuel vehicles. By 1500, two mobile fuel trucks carrying unleaded and diesel fuel were deployed to the Staging Area and to the Mountain Shadows area. Fleet Services employees were also contacted and placed on indefinite 24-hour emergency call-in notice.

CSPD deployed approximately 15 officers to assist with the Cedar Heights evacuation and initiated door-to-door notifications at 1422. In addition to the media coverage and the ENS messages sent out, CSPD officers drove through the neighborhood using vehicle-mounted Public Announcement (PA) systems. Call screen history shows that CSPD responded to numerous calls for service requesting assistance with evacuation. CSPD officers noted the status of each residence to which they responded. Minimal refusals were noted, and the majority of attempted notifications resulted in no contact. CSPD personnel completed the individual notification process of 213 homes and approximately 406 residents.

Based on the fast-moving fire activity, the USFS requested a Type 1 incident declaration. At approximately 1430, Rich Harvey, Incident Commander of the Great Basin Type 1 IMT #2 was notified to begin mobilization to the Waldo Canyon Fire. Holmes Middle School was identified as the Type 1 ICP location. The Type 1 IMT was scheduled to arrive beginning Sunday afternoon. During this same time frame, CSFD completed the necessary paperwork to provide a Delegation of Authority to El Paso

County. CSFD Deputy Chief (DC) Dubay drove the Delegation of Authority to the Type 3 IMT Command Post in Green Mountain Falls, but was unable to execute the document.

At 1458, an ENS and Twitter message were sent simultaneously announcing a voluntary evacuation of southern Mountain Shadows, north of 30th Street from Gateway Road and north to Chuckwagon Road. At 1506, CSPD closed southbound 30th Street at Garden of the Gods Road.

CSFD Station 9 contacted the EOC at 1511 to notify personnel that a large retreat was underway at the Glen Eyrie Conference Center. CSPD suggested voluntary evacuation of the Center. At 1524, two CSPD officers were requested to provide traffic control at the entrance of the Conference Center to facilitate the evacuation of Glen Eyrie. A few minutes later, the Conference Center was included in the mandatory evacuation zone. A CSFD Structure Protection Group was assigned to Glen Eyrie at this time. In total, approximately 200 people were evacuated from the Glen Eyrie Conference Center.

Shortly after 1500, Cheyenne Mountain High School (CMHS) was identified as an ARC shelter. At approximately the same time, the Penrose Equestrian Center was identified as a large animal shelter. The EPC CART managed this large animal shelter. The Colorado Springs Community Animal Response Team (CS CART) was in the process of being activated and would later establish a companion animal shelter at CMHS.

Driven by hot/dry conditions and ever-shifting winds, the fire grew and crossed over Rampart Range Road. Breach of this Zone 2 MAP resulted in the mandatory evacuation order for southern Mountain Shadows. The CSFD PIO first announced the mandatory evacuation of southern Mountain Shadows at 1517 on Twitter. Internal EOC communications noted the evacuation of Zone 2 (southern Mountain Shadows) and Glen Eyrie at 1521, and the ENS message notifying the mandatory evacuation of southern Mountain Shadows was sent at 1531.

CSPD started evacuations of southern Mountain Shadows and established an evacuation Command Post at 2525 Garden of the Gods Road, the Verizon building. CSPD also assisted with the evacuation of personnel from this building. Once again, CSPD deployed approximately 15 officers to conduct notifications using PA systems, as well as going door-to-door. This evacuation took approximately eight hours to complete and included 840 homes and 1,875 residents. The total number of evacuated residents grew to 2,281. CSPD Command remained at the Verizon parking lot throughout the night, managing the evacuations and security detail in the southern Mountain Shadows area.

A media briefing was held at 1615 at the Staging Area. At this time, it was publicly announced that there was a single fire that had been named by two different entities: the "Pyramid Mountain Fire" and the "Waldo Canyon Fire." The name of this single fire was clarified during this press briefing as the "Waldo Canyon Fire."

CSU and the Pikes Peak Regional Communications Network (PPRCN) identified critical infrastructure west of Cedar Heights. Water and communications towers were in the direct path of the fire and, if affected by the fire, could create a disruption in services. CSFD monitored these towers carefully

throughout the incident.

1701-2400

The HSPPR provided shelter for small animals at its facility on Abbott Lane. Local veterinary care facilities also accepted small animals and published this information through official and non-official means during the incident.

Additional media briefings were held at 1730 and 1800. Media briefings continued to include representation from the City, El Paso County, the USFS, and the Type 3 IMT. These agencies began to develop a Joint Information System (JIS) during the evening that would be formalized the next day. CSFD provided additional resources to the Cedar Heights and southern Mountain Shadows neighborhoods, while ensuring that the necessary resources were available to handle the everyday needs of the residents of Colorado Springs. CSFD initiated mutual-aid with Cimarron Hills Fire Department, Stratmoor Hills Fire Department, Cheyenne Mountain Air Force Station Fire Department, and Peterson Air Force Base Fire Department to provide coverage within the City limits. Additionally, CSFD reserve apparatus were used to backfill the stations.

During the early evening hours, CSPD EOC staff began to contact residential group living locations within Zone 3 (northern Mountain Shadows, Peregrine, north Rockrimmon). CSPD focused on these locations to ensure that the staff was prepared to evacuate, should the order be given. The two locations that were contacted provided resident numbers and were able to articulate their plans to evacuate their respective locations.

The EOC worked throughout the day ensuring that the appropriate resources and infrastructure were in place at the EOC, and in other locations, to support this incident. A time reporting code category was established for City personnel to make certain that all employees working the incident were coding their time.

CSPD, CSFD, and mutual-aid personnel worked during the night to provide structure protection and security in the evacuated neighborhoods. The fire remained active and CSU built and maintained dozer lines during the night. Fire behavior was continuously monitored and situational awareness reports were provided to the FDOC. CSFD established a staffing and accountability plan for the next day that included using a bus to transport crews to the fire from the Staging Area.

24 JUNE 2012 (SUNDAY)

OVERVIEW

For the second consecutive day, a Red Flag Warning remained in effect. High temperatures and erratic winds continued throughout the day. The fire spread mostly to the north, west, and south. No further evacuations were ordered in the City. The high temperature in Colorado Springs was 100 degrees.

Due to the fire behavior on the southern and western end of the fire, EPSO ordered Highway 24 closed and it remained so until 1 July 2012. Mandatory evacuations were also enacted for the towns along Highway 24 from Colorado Springs to Woodland Park.

City evacuees remained at 2,281 and the total acres involved grew from 2,500 acres to 3,600 acres of USFS and El Paso County land combined.

COLORADO SPRINGS RESPONSE

Shortly after midnight, CSFD and CSPD personnel reported that fire behavior was unpredictable, noting fire flare-ups and spotting west of Cedar Heights. The fire also grew very close to radio towers located in this area. CSFD and CSU worked through the night to complete and maintain existing dozer lines, ensuring that any fire that threatened the radio towers was immediately extinguished.

CSFD used the early morning hours to conduct a full accountability check of personnel. Personnel accountability was managed out of the CSFD MCP, located at the Staging Area. Full personnel accountability was achieved and, a plan was finalized to rotate CSFD staffing in the Cedar Heights neighborhood. This rotation plan would keep the apparatus in the neighborhood and would allow assigned personnel the ability to work the fire without disruption, until rotated.

Shortly after 0230, a CSFD lookout reported that fire had crossed into Cedar Heights. Two engines were assigned and were able to contain the fire. Reports continued throughout the morning of active fire moving close to, and into, the Cedar Heights neighborhood. Dozers continued to work throughout the morning to create and maintain the fire lines.

CSFD leadership reviewed the proposed Delegation of Authority with the City Attorney's Office and signed the document as part of the transition to the Type 1 IMT. At this time, it was decided that DC Dubai would be assigned to the Type 1 IMT and he would be responsible for CSFD resources. DC Dubai responded to Holmes Middle School to assist with coordinating resources for the incoming Type 1 IMT.

A morning press conference was held with individuals representing the many agencies involved with the fire. The morning update noted that the fire had spread at least 500 acres overnight and was a quarter-mile away from structures in Cedar Heights.

The JIS was activated in the morning at the Joint Information Center (JIC), located at the EPSO Law Enforcement Bureau on West Costilla Street. A bank of phone numbers was identified and published for the public to call for information. The JIC location did not have a pre-established bank of telephones and equipment that could be used during this incident. As a result, cellular phones provided by a cell service provider were used for the phone bank. These cellular phones were from Denver and had a long-distance (720) area code. The City established a schedule of eight-hour shifts and began to request volunteers and former staff members to assist with answering phones. The JIC was staffed with personnel from a variety of agencies, to include the City, EPSO, and USFS. The City positioned a PIO at the EOC to ensure that information was relayed to and from the JIC.

Personnel in the EOC and the FDOC continued to define and map the evacuation zones. The evacuation areas for Zone 3 (northern Mountain Shadows, Peregrine, north Rockrimmon) were redefined. The pre-established evacuation Zone 3 was broken into Zones 3 & 4. Zone 3 was re-defined to include northern Mountain Shadows, Peregrine, and Oak Valley and Zone 4 included north Rockrimmon. Zone 5 (Pleasant Valley) was also added. The City EOC Geospatial Information System (GIS) staff produced maps each time that an evacuation zone was created. GIS staff also provided related information to the evacuations zones, such as the number of buildings and the approximate population. GIS relied on a number of databases to develop this information using City GIS data, digital imagery, and the El Paso County Assessor's Office data. Each time a map was created hard copies were printed and distributed to a number of geographically-dispersed locations. These locations included the FDOC, press conference sites, the CSFD and CSPD MCPs, and staging-area locations.

The morning accountability check and staging for CSFD took place at 31st Street and Colorado Avenue. After all personnel and apparatus had been released, the CSFD MCP moved to Holmes Middle School, the assigned location of the incoming Type 1 IMT. The MCP was the identified location for CSFD Incident Command (Command). CSPD also moved its MCP to Holmes Middle School and established a Unified Command with CSFD. As such, the City's ICP, CSFD and CSPD's MCPs, were operational at Holmes Middle School by noon.

CSFD moved staging operations to Coronado High School. The Staging Area was used for CSFD apparatus to check-in/out and became the staging location for other apparatus, such as fuel trucks. Media staging was also moved to Coronado High School. From this point forward, media personnel often referred to this location as the "Command Post."

During mid-morning, a shift in wind direction was noted, blowing the fire to the southwest. This created a new concern for El Paso and Teller counties pushing the fire closer to the communities in Ute Pass and up toward Woodland Park. This prompted the relocation of the Type 3 IMT's ICP from Green Mountain Falls to Holmes Middle School. At this time, Highway 24 was closed from 31st Street to Woodland Park.

At approximately noon, the shifting winds caused the fire to encroach closer to Cedar Heights and

then retreat back again. Due to the fire behavior, lookouts were repositioned back in Cedar Heights and an additional lookout was placed at the water tower at Rampart Range Rd and the Queens Canyon access road. Air tankers worked on establishing a north/south retardant line east of Cedar Heights in order to inhibit east fire movement. At about this same time, an ENS message was reissued for Cedar Heights reminding residents of the mandatory evacuation and providing information on the fire behavior that was threatening the neighborhood. This message also directed residents to watch local media for updates.

The erratic fire behavior continued to threaten the “Cedar Heights” radio communications tower. CSFD personnel monitored the tower and provided situational awareness updates to the Colorado Springs radio shop on any fire in the immediate vicinity. Mitigation efforts continued on this radio tower as retardant was dropped on it and dozer lines were maintained. Additionally, personnel in the area maintained a visual on the Cedar Heights water towers and provided updates, as the fire grew closer.

CSPD maintained security around the evacuated areas. The Cedar Heights neighborhood (Zone 1) is a “gated community” and the contracted security service provided round-the-clock security at the entrance gate, while CSFD provided structure protection against the fire within the neighborhood. The contracted security resulted in a reduced burden on CSPD. In addition to providing Traffic Control Points (TCPs) and security patrols, CSPD sent an evacuation team into southern Mountain Shadows beginning at 1300. This team consisted of 12 personnel - two supervisors and 10 officers - who went door-to-door in attempt to contact any residents who may not have received or adhered to the mandatory evacuation order from the previous day. Refusals were called in to Dispatch noting the address of the location, name of the refusing party, and how many individuals were in the house.

The Colorado Springs CART (CS CART) set up a companion animal shelter at the CMHS shelter around noon. The CS CART shelter was established for companion animals of those individuals who were sheltering at the CMHS. Non-companion animals were directed to the HSPPR. Shortly after the opening of the CS CART shelter, the HSPPR announced that it was at capacity and could no longer accept animals. Numerous private kennels, stables, and veterinary locations announced that they would take in animals.

Additional parks within Colorado Springs were closed during the early afternoon hours, one of which was Palmer Park. CSPD requested the closure, due to the risk of people gathering in a forested area. Garden of the Gods Park, Red Rock Canyon Open Space, Cheyenne Canyon Park, High Drive, and the Pikes Peak Highway remained closed.

The Mayor signed a disaster declaration at the same time as El Paso County. A press release was issued by the JIS at 1358 announcing the disaster declarations. The disaster declaration activated the local Emergency Operations Plan (EOP) and inter-jurisdictional emergency plans and mutual-aid assistance agreements. The disaster declaration made the City eligible for federal and state disaster assistance.

During the day, the City EOC was the hub for activities to support the response to the fire. The need to provide logistics support to the operational personnel working the fire grew, and more resource requests were sent to the EOC for processing. Prior to this time, many resource requests were being handled directly by the departments through internal mechanisms. As the City moved into the second 24-hour period of the incident and agency personnel became more geographically dispersed, resource requests were consolidated in the EOC. EOC staff planned for multiple operational periods and developed staffing plans to accommodate this.

The EOC ICS structure was activated with staffing for the Finance, Logistics, Operations and Planning Sections. While these functions were established during these early stages of the fire, the personnel staffing was not always in place to support all positions that were needed.

EOC personnel tracked City staff who were affected by the evacuations, as well as the closures in the City (i.e. City parks/open space employees) and developed plans for contacting these individuals and providing Human Resource/staffing direction. An estimated 125 employees were directly impacted and living in the evacuated areas of Zones 1 and 2.

Colorado Springs received notification from FEMA that approval had been received to use federal funds to help with firefighting costs. This funding, the Fire Management Assistance Grant (FMAG) was provided through the President's Disaster Relief Fund and was made available to all jurisdictions fighting the Waldo Canyon Fire.

The Colorado Springs community showed their incredible support by dropping off hundreds of cases of water and non-perishables snacks at the Coronado High School Staging Area. With the extremely hot temperatures and lack of staff to manage the donations, media distributed messages to the public to send all non-perishable food donations to Care and Share. Until processes were fully developed with Care and Share, Coronado High School became the primary location where personnel working on the fire could access hydration and snacks. The Pikes Peak Fire Fighter's Association, Fire Rehab Services was activated and EOC logistics supported their operations. Anyone wishing to volunteer was directed to Pikes Peak United Way.

An afternoon media briefing was held at 1600 at Coronado High School. Members of the Type 3 IMT and local officials provided information related to the fire growth, as it pertained to all of El Paso and Teller Counties. Members of the Type 1 IMT were onsite and worked toward transition of the incident, scheduled to occur later in the evening. Press conferences were now being held at regularly scheduled intervals with a variety of agencies. At the initiation of the press conference, individuals were given an opportunity to express their desire to speak, and a speaking order was subsequently established. After this press conference, and subsequent ones, various officials and agency PIOs remained to conduct individual on-camera interviews with media.

After setting up Command at Holmes Middle School, both CSFD and CSPD experienced numerous problems with cellular and radio service. The lack of cellular connectivity also resulted in a lack of internet/data connections. The two departments were working solely out of their command vehicles

and could not tie into existing landlines and telecommunications infrastructure. The lack of service was unacceptable and resulted in a need to relocate the command vehicles. The CSFD MCP was relocated to the Fire Department Complex (FDC). The CSFD MCP was parked outside and personnel initially set up Command in the Prevention Conference Room, off the front of the FDC lobby. This building was also the physical location of the FDOC, which was coordinating all CSFD efforts within the City that were not assigned to the Waldo Canyon incident (i.e., all regular operations within the City limits).

With the departure of the CSFD MCP and the continued connectivity problems, CSPD moved its MCP to a fixed facility near the southern Mountain Shadows area, CSFD Station 9. Staff at Station 9 indicated that there was adequate space to accommodate the CSPD personnel inside and confirmed that the PD Command could be moved to this location. The MCP was needed elsewhere in the City and was placed back in service when CSPD personnel moved to Station 9. Station 9 became "Command 2" for CSPD and this is the location where security and traffic control officers checked in for assignments. CSPD began to work mandatory 12-hour shifts for incoming personnel the following morning.

Personnel in all locations (EOC, FDOC, CSFD Command, CSPD Command, Staging, and Type 1 IMT) planned for the following day. Fire behavior was closely monitored and security was provided in the evacuated areas.

25 JUNE 2012 (MONDAY)

OVERVIEW:

A Red Flag Warning remained in effect for a third consecutive day and hot temperatures and erratic winds continued. The Type 1 IMT arrived and formally took control of the incident in the morning. The erratic weather continued to cause concern in the Cedar Heights neighborhood and the Highway 24 corridor. The fire made a major run to the north and west toward the area of Woodland Park and Rampart Reservoir. The high temperature for the day in Colorado Springs was 98 degrees.

No additional evacuations were ordered in the City. City evacuees remained at 2,281, and the total acres involved grew from 3,600 acres to 4,500 acres of USFS and El Paso County land combined.

COLORADO SPRINGS RESPONSE

CSFD lookouts reported active fire during the overnight hours, noting that the fire took a large run north toward Eagle Lake Camp and heading toward Rampart Reservoir. Improvements were made overnight to the dozer lines that were previously established around the perimeter of Cedar Heights.

At 0600, the Type 1 IMT assumed formal control of the incident. CSFD resources within the City limits remained under the control of the CSFD, with the exception of the three CSFD task forces that were assigned to the "Zulu Division" of the Type 1 IMT. The Zulu Division, under the direction of the Type 1 IMT, was responsible for structure protection/preparation in the Cedar Heights neighborhood. CSFD BC Schanel was responsible for this Division in Cedar Heights. The Type 1 IMT was very concerned about this area and requested CSFD remain on this assignment due to the availability of CSFD's structure protection apparatus and equipment. By 0800, the Zulu Division in the Cedar Heights neighborhood reported that there was heavy fire on three sides of the neighborhood and firefighters were aggressively attacking the spot fires.

CSFD established a "Structure Protection Branch" that operated under the Operations Section of the Type 1 IMT, but was independent from the Type 1 IMT and remained under CSFD leadership. This Structure Protection Branch remained separate from the Type 1 IMT due to its relative distance from the fire, as it was not a priority for the Type 1 IMT at the time. The Branch Director was Deputy Chief (DC) Dubai and the Deputy Director was Battalion Chief (BC) Collas. These CSFD Chiefs were also identified as Agency Representatives (AREPs) from the City of Colorado Springs to the Type 1 IMT. As AREPs, the Chiefs provided a morning briefing, to the Policy Group, EOC and then to the FDOC, providing the most recent IMT information, to include the Type 1 IMT's daily objectives and fire and weather conditions and forecasts.

The Colorado Springs Policy Group had been meeting in an ad-hoc fashion since Saturday. The Policy Group began holding formal meetings each day prior to the 0800 Press Conference. These meetings involved select City Department Heads and included a briefing by the CSFD Type 1 IMT AREPs. After the meetings concluded and Policy Group members departed for the 0800 Press Conference, the

CSFD Type 1 AREPs provided a briefing to the staff at the EOC and the FDOC.

A press conference was held at 0800 and an update was provided on the fire and overnight actions. The lead for each press conference was the Type 1 IMT Incident Commander, Rich Harvey. Individuals representing government, public safety agencies and elected officials followed IMT updates. Each individual took a few moments to provide his or her input and then reporters and community members were given an opportunity to ask questions.

The City mobilized volunteers from the Community Advancing Public Safety (CAPS) and would use their services throughout the duration of the incident. Approximately 20 volunteers were requested to assist with community-outreach efforts. CSPD contacted neighborhood watch captains to enlist their support as well. CAPS volunteers were also stationed at the City EOC to provide support and to ensure proper sign-in/sign out procedures were followed.

CSPD Command was notified by incoming CSFD personnel at Station 9 that there would not be enough room within the building to adequately support law enforcement activities. Station 9 personnel assisted CSPD with arrangements to move Command to Station 18. As CSPD began the process of moving, CSPD officers, who were not already assigned to existing TCPs, and security patrols were assigned to southern Mountain Shadows to conduct re-checks to look for residents who were not yet evacuated and had not been contacted the day before. Officers spent the majority of the day in the neighborhood going door-to-door. CSPD requested all operational personnel to bring their uniforms to work in the event that specialized units and teams might need to be diverted to response assignments requiring a uniform.

CSFD personnel continued to model the fire behavior based on the existing, and predicted, weather conditions and fire fuels. Focusing on the remaining westernmost evacuation area of Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley), the fire behavior model predicted that, once the fire reached the identified MAP for the area, the top of the ridge line above the quarry, it would take four hours before the fire reached any structures.

The CS CART team, located at the CMHS shelter, began to take overflow of non-companion animals from the HSPPR, which was at capacity. CS CART was able to increase the capacity at CMHS by 25 animals.

CSPD moved its Command location to CSFD Station 18. The wireless and cellular service at this location proved problematic for CSPD personnel. A portable cellular tower, Cellular on Wheels (COW), was requested to provide capacity. City IT personnel also assisted at this location with setting up laptops and connections for Internet connectivity. Many factors involved caused this to be a time-intensive process that lasted into the afternoon of the following day.

The EOC received a large influx of resource requests to support the many locations and personnel who were actively working the fire. Numerous locations were routing food requests through the EOC (FDOC, CSPD Command, Staging Area, CSFD Operations personnel in the field, fuel personnel in the

field, CSPD officers at TCPs, backfill for personnel who were staffing stations). Additional requests were made for various equipment, supplies, maps, etc. These requests came from all locations at various times and frequencies. Due to closures at various City parks and on the Pikes Peak Highway, there were City staff members who were unable to go to their assigned work site beginning on Monday. The EOC utilized staff from the Pikes Peak Highway and Parks, Recreation and Cultural Services to assist with the logistics requests. Each staff member was equipped with a City Visa card and a City vehicle.

By mid-morning, agreements with Discover Goodwill of Southern and Western Colorado (Goodwill) were in place, and retail locations began to accept all non-food donations. Care and Share continued to be the point of contact for all non-perishable food. Care and Share worked directly with the EOC to provide food donations to first responders and agencies that were in need. Community members continued to show their generosity by dropping off food and hydration items at Coronado High School, as well as at locations throughout the City (fire stations, police stations, etc.). Personnel at Coronado High School were not equipped to manage this and public messages were sent out requesting the public to refrain from dropping off donations at this location, and take them to Care and Share or Goodwill.

Regularly scheduled City Council meetings were cancelled for Monday and Tuesday. Additional events, such as Bike-to-Work Day, were also cancelled. The City closed additional parks, trails, and open spaces and at least one pool before the end of the day. Numerous reports of closures, postponed sporting events, and community meetings, both City- and community-sponsored, were reported through www.springsgov.com and on television station news tickers.

A press conference was held at 1600 with much of the same information-sharing process as the 0800 press conference. There were no additional evacuations on Monday, so the information was mostly focused on the fire behavior during the day and what the overnight operations would entail.

A community meeting was held at CMHS at 1900 with leadership from the City, El Paso County, and the Type 1 IMT. The goal of the meeting was to provide timely information to all evacuated residents regarding the fire activity and existing evacuations. Evacuated residents expressed concern at this meeting about not being allowed back into their homes since the initial evacuation on Saturday, 23 June.

26 JUNE 2012 (TUESDAY)⁶

OVERVIEW:

The Red Flag Warning continued for a fourth day in a row. The fire maintained its southern and western border and continued to grow toward the north. The temperature in Colorado Springs reached an all-time high of 101 degrees.

A pre-evacuation order was given just after 1330 for the northern Mountain Shadows, Oak Valley, and Peregrine area.

Shortly after 1600, the fire reached the top of Queen's Canyon. This fire activity was the MAP for mandatory evacuation and, therefore, Mayor Bach issued a mandatory evacuation of northern Mountain Shadows/Peregrine at 1621 during the afternoon press conference. At this time, the weather was becoming more problematic as a large thunderstorm column was developing to the west of northern Mountain Shadows. Winds were becoming strong and gusting hard. Between 1707 and 1717⁷, the thunderstorm column collapsed and 65 mph winds drove the fire rapidly east and downhill into Colorado Springs.

Active fire within the northern Mountain Shadows/Peregrine area led to additional mandatory evacuations of several adjacent neighborhoods. Two additional shelters were opened in the Colorado Springs vicinity. Mutual-aid arrived from numerous agencies to assist with firefighting and law enforcement response. CSPD maintained security patrols inside the evacuated area and changed the security perimeter and TCPs to contain the entire evacuated zone.

The fire grew from 4,500 acres to 15,622 acres, with 1,516 acres within the Colorado Springs City limits. The number of City evacuees grew to 28,770 by the end of the day.

COLORADO SPRINGS RESPONSE**0000-1300**

First responders continued to monitor and address fire behavior throughout the early morning hours.

The weather forecast received at the morning briefing from the Type 1 IMT Incident Action Plan (IAP) noted, "Mostly sunny with late morning cumulus forming. A slight chance of high-based thunderstorms in the afternoon with little rain and gusty outflow winds up to 40 mph. Northwest half of fire - west 5-8 mph with gusts to 12 until 0900, becoming southwest 9-12 mph with gusts to 20 mph until 1800, some gusts as high as 25 mph. Southeast half of the fire - west 5-7 mph until 0800, upslope/valley 5 - 8 with gusts to 12 mph until 1000, then southeast winds increasing to 8 - 10 mph gusting 20 - 25 mph by afternoon." Using the Type 1 IMT and National Weather Service (NWS)-

⁶ A more detailed timeline for 26 June 2012 can be found in Appendix E.

⁷ This time range is based on numerous accounts from CSFD firefighters on the ground and resources in the air who reported the collapse.

projected forecasts for the day, the fire modeling continued at the FDOC. Based on this information, the modeling showed that the fire would be moving at an approximate rate of one-quarter mile per hour.

As in previous days, CSFD maintained two lookouts while also remaining in constant contact with the Type 1 IMT lookout. The CSFD lookouts were located in Crystal Park (Crystal Park lookout) and south of Highway 24 directly south of the Crystal Park lookout on the ridge (Ute lookout). The IMT lookout was located on Rampart Range Road, near the Navigators and Cedar Heights Water Tower.

The Policy Group convened at 0700.

A joint press conference was held at 0800 at Coronado High School. Coronado continued to be used as the media and first-responder staging areas. At this time, reports were provided that the fire had reached 5% containment. The TYPE 1 IMT continued to explain its plans regarding a continued focus on maintaining fire lines and critical infrastructure protection. The areas of concern for the City, based on the fire activity, were Cedar Heights to the south and ensuring that the fire did not cross Rampart Range Road to the north. City officials at the press conference announced that residents would be allowed to return, escorted, to the evacuated neighborhoods to retrieve emergency items.

Based largely on feedback received from the residents at the community meeting the night before, CSPD EOC staff developed plans to escort residents into the evacuated neighborhoods of Cedar Heights and southern Mountain Shadows. These efforts began in the early morning hours and were closely coordinated between CSPD and CSFD. CSFD personnel had been stationed in both neighborhoods, monitoring fire conditions and conducting structure protection, as needed.

Twitter posts were sent throughout the early morning after the press conference, noting that plans were under development to allow residents to return and retrieve emergency-essential items. Residents were very anxious to return home, but there were many factors that required close consideration before allowing access into the evacuated areas. Twitter messages provided updates as events throughout the morning changed for the personnel developing the plans for re-entry.

At 0900, CSPD noted that they were going to allow residents from Cedar Heights to return with escorts, while southern Mountain Shadows residents would not require an escort. As further consultation occurred between CSPD and CSFD personnel, it was determined, by 1000, that Cedar Heights' residents would not be allowed to return, due to the fire behavior to the north and west of the neighborhood. By 1052, CSPD began allowing evacuees from Mountain Shadows to return to their homes for 30 minutes to retrieve emergency items, after checking in with an officer at a TCP. At 1132, CSPD suspended the escorted returns into southern Mountain Shadows for emergency items due to fire behavior. The fire behavior was becoming erratic to the immediate west of the southern Mountain Shadows neighborhood and north of Cedar Heights. Earlier in the day, CSPD staff directed non-uniformed officers to wear their uniform to work should there be a need for additional staff to respond for evacuations and/or security.

The City's volunteer CAPS program provided significant resources to assist with public communications. Approximately 100 volunteers arrived at 0900 at the Type 1 IMT ICP, to obtain up-to-date reference material regarding the fire and then deployed to locations throughout the community. Each team of volunteers had an assigned lead.

The Pikes Peak Amateur Radio Emergency Service (PP ARES) is a group of trained amateur radio (HAM) operators who are also EOC volunteers. PP ARES members were utilized at the CMHS shelter, and in days to come at other area shelters, to provide real-time situational updates to the EOC.

The EOC worked closely with CSFD personnel at Station 9 on Garden of the Gods Road to establish a rehydration/feeding area for all first responder personnel. The Pikes Peak Fire Fighter's Association, Fire Rehab Services was requested to re-locate to Station 9 to continue feeding services for fire, law enforcement, emergency medical services, and other response personnel. Pikes Peak Fire Rehab is a regional support unit that was contracted by the City. Station 9 is located on a busy roadway and, so specific instructions were received by CSFD personnel regarding locations for first response personnel to park and how to access the Station parking lot. Notices were sent out via Dispatch, and through verbal communications, letting response personnel know that they could go to this location to receive food and hydration.

At 1228, an ENS message was sent to residents in Zone 2 (southern Mountain Shadows) reminding them that the area was still under mandatory evacuation and that they needed to leave immediately. At this time, as a precaution, pre-evacuation notices were under development for Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley).

1301-1800

The pre-evacuation notice was issued, via ENS, for Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley) at 1340. A press release was issued at the same time. Additional City Parks were also closed. Notifications of closures were immediately updated on the www.springsgov.com website.

Throughout the early afternoon, CSFD lookouts continued to provide weather updates. These lookouts also kept in close contact with the Type 1 IMT weather spotter. At 1426, the Ute lookout provided the following weather report: relative humidity 10.2%, wind speed of 5-6 mph with gusts up to 15mph, coming out of the S/SE.

At 1426, the Ute lookout reported fire activity in the Quarry above Cedar Heights that was starting to drop down into Williams Canyon. This information was then verified by the Crystal Park lookout, who also noted seeing flare-ups on the west side of Williams Canyon at 1429.

Approximately 30 minutes later, converging winds combined with continued low humidity caused the fire to develop a large column with a pyro-cumulus cloud on top. Eventually, the fire changed direction and made a substantial and rapid run to the east, toward the west border of USAFA. At this time, the fire had not breached the bottom of Queens Canyon or crested the eastern ridge above the

Pike View Quarry.

At approximately 1530, the lookouts reported increased fire activity in Queen's Canyon, moving toward the easternmost ridge, which was the MAP to initiate mandatory evacuation of Zone 3. At 1532, the Crystal Park lookout reported seeing fire on the northern ridge of Queens Canyon's western side. At 1535, Air Attack reported spotting the fire approximately 350 feet from the bottom of Queens Canyon. At 1605, the Ute lookout provided the following weather report: 96 degrees, relative humidity of 11.8, wind speed of 8 mph with gusts up to 18 mph, coming out of the south/southeast.

At 1604, the afternoon press conference was held at Coronado High School. The smoke from the fire could clearly be seen behind those that were providing updates, but the discussion at the press conference was much the same as those held on previous days. The Type 1 IC provided information on the firefighting efforts for the day and then each City and County official provided an update.

At 1608, fire was reported, via CSFD radio, on the east side of the most east-facing ridge of Queen's Canyon. Captain Steve Riker was located west of Wilson Tank and called BC Collas to confirm the evacuation order for Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley). BC Collas acknowledged and stated that he would confirm. At 1610, BC Collas called the FDOC and requested the mandatory evacuation of Zone 3. The FDOC contacted the EOC and relayed the request for the evacuation order. At the time that the evacuation order request was received in the EOC, the four City personnel who have the authority to issue a mandatory evacuation order were at the live press conference.

The EOC notified CSPD and CSFD personnel who immediately activated evacuation plans for Zone 3. As a result of the previous CSPD directive, the Police Operations Center (POC) was staffed with approximately 40 uniformed officers ready to engage in evacuation efforts. With the EOC located inside the POC, this resulted in quick coordination and immediate action. At the same time, Dispatch personnel were building the ENS message for Zone 3, while the PIO in the EOC drafted the appropriate language for the written press release.

Simultaneously, personnel in the EOC were attempting to contact Chief Carey, Chief Brown, Director Waters, and Mayor Bach to relay information regarding the request for mandatory evacuation. At approximately 1617, Chief Carey was contacted. The formal request for mandatory evacuation was then verbally approved. The Chiefs and Director Waters contacted Mayor Bach while the live press conference was still ongoing. At 1621, Mayor Bach interrupted the afternoon press conference to announce the mandatory evacuation of Zone 3. At this time, City leadership departed from the press conference and returned to the EOC to work the situation.

Meanwhile, at 1611, the FDOC requested outside resources and assigned additional CSFD personnel to work in northern Mountain Shadows and Peregrine. At 1620, CSFD radio transmissions from personnel west of the Wilson Tank in northern Mountain Shadows noted that fire had moved approximately 1/3 of the way down the eastern ridge of Queen's Canyon. At 1623, CSFD radio

transmissions from personnel west of the Wilson Tank in northern Mountain Shadows noted that the fire had jumped over two peaks and started to run to the northeast. CSFD personnel in northern Mountain Shadows were mobilized in the field just east of the Wilson Tank, preparing to take a stand against the fire. Shortly before 1630 hours, the fire began working over the east ridge of Queen's Canyon, and down towards Mountain Shadows in the valley just west of the Chamberlain Trail approximately 300-400 yards west of the Wilson water tank. Personnel noted that the fire was moving slowly down the mountainside as they prepared to stop the fire before it reached the neighborhood. A lookout was assigned at the Wilson Tank to provide updates as the fire continued down the hillside.

At the same time, CSPD officers were mobilized in the northern Mountain Shadows neighborhood by 1617. Evacuation and traffic control teams had previously been established and worked to immediately execute their plans. Within the neighborhood, PA announcements and door-to-door evacuation notifications were used. During the initial evacuation efforts, officers encountered numerous individuals who were requesting access back into the neighborhood to retrieve children and/or animals that were at home. Officers allowed these individuals entry with very strong instruction to leave as soon as they accomplished what they needed to.

At 1624, the official mandatory evacuation notice was given for Zone 3 via the ENS. At 1636, over the radio, CSFD "Task Force 1" requested confirmation that the evacuation had been ordered and stated that there were still a lot of homeowners in Peregrine. DC Dubay confirmed that the evacuation order went out approximately 15 minutes prior. At 1652, CSPD responded to numerous calls for service, requesting assistance with the evacuation of elderly, disabled and/or young children who had been left home alone. These requests continued throughout the rest of the night and were acted upon, as they were received.

At approximately 1700 hours, personnel in the EOC and FDOC began to develop additional evacuation zones and MAPs; as a result Zones 6-9 were built.

Shortly after 1700, CSPD assigned 5 officers to assist 17 American Medical Response (AMR) vehicles to evacuate 103 patients from the Mount Saint Francis Nursing Center. Additionally, two CSFD buses were assigned to assist. CSFD Station 9 was established as the fire Staging Area for incoming agencies and apparatus and used by the CSFD medical Lieutenant to coordinate the evacuation of the Mount Saint Francis Nursing Center and to offer/conduct medical clearance/Rehab of CSFD personnel coming off the fire.

CSFD firefighters in the area west of Wilson Tank watched a water-suppression helicopter making water drops on the fire front just west of the tank. At 1707, the helicopter made its final water drop, and the pilot made a hand motion to firefighters to "get out" of the area. CSFD personnel immediately moved to hard pavement east of the Wilson Tank and joined arriving CSFD apparatus and personnel. A number of personnel and apparatus were located throughout the northern Mountain Shadows area at this time. Personnel were assisting with structure protection efforts, such as removing brush, taking apart wood deck areas, and laying hose lines.

At 1711, hours Air Attack reported that the thunderstorm column had collapsed. As a result of this collapse, coupled with the subsequent 65 mph winds, the fire spread very rapidly east and swiftly downhill into the western portion of northern Colorado Springs. The fire front created adverse working conditions for both CSFD and CSPD. Personnel from both agencies worked in deteriorating conditions as they continued evacuation efforts within the neighborhood.

As the fire front was entering Mountain Shadows, CSU shut off gas service to approximately 4,200 homes. This complete service shut-off was necessary to protect personnel in the area. This included Peregrine, Mountain Shadows and Oak Valley Ranch. Electric service was also shut off for approximately 200 homes.

At 1723, winds began to blow from west to east, carrying heavy smoke and embers into the neighborhood. CSFD ordered all personnel to retreat to Chipeta Elementary School due to the aggressive fire entering the area, 15 minutes later, the flame front was heading directly toward Chipeta Elementary School and all CSFD personnel were required to retreat to the Verizon building on Garden of the Gods Road and Centennial Boulevard. This location was used as CSFD Incident Command for the remainder of the night and into the following day. At approximately the same time, CSPD evacuated their Incident Command from Station 18 and moved it to the CSPD Falcon Division.

1801-2400

After the flame front passed, at approximately 1800, CSFD resources re-entered the northern Mountain Shadows neighborhood to commence firefighting efforts. CSFD Command at the Verizon building positioned resources throughout Mountain Shadows to combat the numerous structure fires. During this time, additional fire personnel from outside the City were located within the neighborhood and many additional resources from outside the area arrived on scene. CSFD personnel who were working in the neighborhood made the best effort possible to engage all resources into a unified fire-fighting response.

Additional mandatory evacuation orders continued via the ENS. At 1822, Zone 4 (north Rockrimmon) residents were given mandatory evacuation orders. At 1937, the order for Zone 7 (southeast Rockrimmon) was given and at 1950, the mandatory evacuation notice was given for Zone 6 (south Pope's Valley, Woodmen Valley, Pinon Valley, Pine Cliff). The final mandatory evacuation notice was issued at 2146 for Zone 8 (Kissing Camels) via the ENS. These evacuation orders covered the western side of the City, west of I-25 and north of Garden of the Gods Road. Approximately 20,000 additional residents were included in this series of evacuations.

CSPD's evacuation plan included closing all west-bound lanes into the evacuated areas and closing I-25 north and south of the evacuated areas. No traffic was allowed onto I-25 at Interquest Parkway, Research Parkway, Briargate Parkway, and North Academy Boulevard. Evacuees were directed to travel east out of the area and onto I-25 North or South.

With the significant number of evacuations that had been announced within a very short period of time, the EOC coordinated efforts for additional sheltering and a meeting area for evacuees to obtain information. Shortly after 1800, the Springs Church in the former Phil Long Expo Center north of the Chapel Hills Mall was opened as an evacuation point. This was not a shelter, but a location where evacuees could receive information and obtain water and snacks while determining what to do next. The evacuation point was staffed with individuals from El Paso County Public Health (EPCPH) and from the Springs Church. The location was publicized widely on TV crawlers and via Twitter, but only a handful of evacuees visited this location. City buses and AMR were present in the immediate area to provide transportation from the evacuated neighborhood to and from the evacuation point at Springs Church, and to the shelter locations.

During this time, additional support efforts continued within the EOC. The Colorado Springs Information Technology (IT) Department recognized a need for additional bandwidth on the City's website to accommodate the increased traffic. The City's website is internal to the City network and, until this time, the website had proven capable for the increase in traffic as a result of the fire. Understanding that there would be a significant increase in public usage/access, as a result of the fire entering the City limits, and due to the increased usage of City staff accessing their remote Virtual Private Network (VPN), the City IT Department requested an immediate and emergent increase in bandwidth. This was accomplished within hours. At this time, City IT also provided staff, round the clock, in the EOC to provide technical support for all aspects of the incident.

With the increased bandwidth, the City developed a database on the springsgov.com website for evacuees who were in the fire-affected neighborhood. The information for this website was published widely with the intent for evacuees to register to receive announcements and updates specific to their personal experience in their neighborhoods. Over the course of the next few days, the City received more than 8,000 registrations on this website.

Local agencies from the Pikes Peak Region responded to the dramatic increase in evacuees by opening additional shelters for both people and their pets. At 1853, the ARC opened a second shelter in Colorado Springs at the Southeast YMCA and, at 2002, the ARC opened a third shelter in Monument at Lewis Palmer High School. These two shelters were opened in strategic locations at the north and southeast sides of town to accommodate the incoming evacuees. At 1909, the HSPPR opened a second shelter for small animals at the Freedom Financial Services Expo Center.

At approximately 2000, the United States Air Force Academy (USAFA), immediately north of the City limits, evacuated two of the living quarters on base and limited all other access and activities. The alternate housing for USAFA was Fort Carson, which is on the southeast outskirts on the City limits.

The media and CSFD staging locations were in the evacuated area at Coronado High School. After the evacuations were ordered, CSFD Staging was moved to Station 9 on Garden of the Gods Road, just west of I-25. Media staging was relocated to the University of Colorado at Colorado Springs (UCCS) Recreation Center Parking Lot and would remain at this location for the duration of the incident.

A press conference was held after 2030 at UCCS. During this media briefing it was evident - and many news stations broadcasted live images - that numerous structures were engulfed in active fire. During the press conference, noted by CSFD Chief Brown, firefighters were engaged in extreme firefighting efforts at the time, and the true extent of the fire would not be known for days.

Governor Hickenlooper flew over the affected area and joined City leadership to provide his insights and condolences at the press conference. He provided an overview of his experiences earlier in the day at the High Park Fire and his view of the Waldo Canyon Fire as he flew over the Mountain Shadows area.

Prior to, during, and after this live press conference, local, state and national news media provided non-stop coverage of the fire. Images of homes burning in the Mountain Shadows and Peregrine neighborhoods were displayed live throughout the night and into the next day. These images were readily accessible from areas outside the evacuation zone.

The final evacuation order for the evening was issued at 2146 for Zone 8 (Kissing Camels). Shortly after this, the CART animal shelter at the CMHS location reached capacity and announced that no additional animals would be accepted. The EOC requested national resources to assist with animal sheltering and those resources were on the way.

The parking lot at Tiffany Square, just off of I-25 and Woodmen Road, was used as the "rally" area for all law enforcement personnel, AMR, and some incoming fire resources. Colorado Department of Corrections (CDOC) Officers joined CSPD at approximately 2200 with 20 officers to assist with security and TCPs. AMR was onsite to conduct general health reviews of first responder personnel and to accept any patients that may have been picked up by law enforcement within the evacuation area. Face masks, lip balm, and eye drops were distributed at this location for personnel who were working in the smoke-filled evacuation zone. AMR later moved to the Costco parking lot on North Nevada to join law enforcement resources needing to drop off patients and/or receive medical checks. The City Transit Division staged buses at the Kmart parking lot at Fillmore Street and North Nevada Avenue and used this location for individuals and/or first responders to drop off evacuees. From this location, evacuees could be transported to a shelter.

At approximately 2200, southbound I-25 opened to the general public. Westbound roads off I-25 were closed throughout the evacuated area with law enforcement staffing TCPs. Only emergency personnel were allowed in the area at this time.

CSPD Investigations personnel began a process to determine if residents within the evacuation area could be accounted for and had been safely evacuated. Through this process, detectives were able to determine that no one had been in contact with occupants of 2910 Rossmere Street. An initial investigation ensued that would later determine that the couple who lived at this address were deceased.

The JIC and public communications staff continuously provided updates. Information was relayed in an attempt to relive some systems that were inundated (i.e., cell phone service). Information was also verified and published repeatedly to ensure that incorrect messages were corrected and that the correct messages were endorsed. The JIC eventually closed overnight, but PIOs remained at the City EOC overnight to ensure that accurate information was released as it became available.

In summary, the fire grew from 4,500 acres to 15,622 acres, with 1,516 acres within the City limits. A total of approximately 26,500 residents were evacuated from the City limits between 1600 and midnight.

27 JUNE 2012 (WEDNESDAY)

OVERVIEW:

Temperatures remained high for a fifth day and a Red Flag Warning was still in effect. Some cooler weather and rain were predicted, but only light rain fell in some areas. The fire grew approximately 1,000 acres on this day, and flare-ups continued along all edges on the fire and on “islands” that were created within the active fire zone. A thunderstorm column, similar to the previous day, developed in the afternoon and weather conditions became more erratic west of Peregrine and the USAFA. This prompted additional pre-evacuation notices within the City limits for part of Holland Park and Pleasant Valley.

El Paso County also issued pre-evacuation notices for the areas north of USAFA and south of the Douglas County Line Road and west of I-25. The fire behavior on the southwestern border continued to grow, prompting further mandatory evacuations in western El Paso and Teller counties.

No additional mandatory evacuations were ordered in the City, although pre-evacuation notices were issued. City evacuees remained at 28,770, and the total acres involved grew from 15,622 to a total of approximately 16,622 acres.

COLORADO SPRINGS RESPONSE

The early morning hours of 27 June brought many challenges to the first responders working in the Mountain Shadows area where active fire continued to be problematic into the daylight hours. Firefighters battled hundreds of house fires, while incorporating resources from many responding agencies. The Type 1 IMT provided firefighting resources to Mountain Shadows, while also continuing to work the active fire to the south, west, and north.

As the immediate response activity from supporting City departments/divisions in the EOC subsided in the early morning hours, personnel began to regroup and organize services for the day. Shortly after midnight, the CS CART animal shelter personnel at CMHS secured arrangements at the facility to increase the capacity for animals. The Springs Church evacuation point closed at 0100 after evacuees were re-located to alternate sheltering locations. Needs for fuel support were identified and a 24/7 schedule was implemented to support response personnel from all agencies. EOC and FDOC worked with CSU to review and develop plans for critical infrastructure protection in and around the burn area, and plans to reinstate utility services shut off during the evacuations. Mountain Metropolitan Transit announced, at 0136, that all fixed route and Front Range Express (FREX) service would not operate regular service. Metro Mobility was scheduled only to provide transport to scheduled medical appointments.

During the early morning hours, the Tiffany Square “rally point” began to demobilize. As previously noted, AMR moved to the North Nevada Costco, CSFD continued all staging operations at Station 9 on Garden of the Gods, and CSPD operated Command from the CSPD Falcon Division.

Morning papers and online media outlets published overhead photographs of the destroyed homes and devastated areas in their early morning editions. These pictures were obtained by individual(s) who flew over the fire area prior to the daytime institution of flight restrictions. At this time, the City was still actively engaged in firefighting and security protection efforts in these areas. The area was not yet safe for initial damage-assessment teams to enter; moreover, the City did not have reliable information as to the extent of the homes damaged and destroyed. Initial reports of the potential destruction were obtained by reviewing El Paso County Assessor's Office and City GIS data. At initial review, up to 700 structures were noted as potentially impacted. 614 properties were affected by heat signature, but these signatures did not necessarily correlate to destroyed homes. Heat could be picked up from ash or other material.

In Peregrine, a significant run of fire took place at 0700 hours between the backside of the subdivision and USAFA. Fifteen engines were ordered and positioned for structure protection in the upper Peregrine neighborhood. During the morning hours, CSFD transferred Command from the Verizon building where they had been operating all night, to the FDC – a fixed facility.

The City's Policy Group officially convened in the morning prior to the 0800 press conference. The Policy Group remained in meetings for the next several days, discussing detailed plans for informing the evacuees of their losses, re-entry into the evacuated areas, beginning recovery efforts, etc. During the 0800 press conference, it was announced that multiple structures were burned. Due to the active fire situation in the neighborhood, the City was in the very initial stages of identifying the homes that were damaged or destroyed. At this point, most information had been provided by on-scene firefighters who had been battling the active structure fires throughout the night and into the early morning hours.

Fire hot spots continued to require extinguishing throughout the morning and into the afternoon in the Mountain Shadows neighborhood. The afternoon weather was predicted to be problematic, causing further concerns for structure protection and access into the most affected areas of the fire.

CDOC officers continued to assist CSPD with security and TCPs. One hundred 800 MHz radios were requested from the state to provide to these incoming officers and other first responders from outside areas. CSPD requested help from the Colorado National Guard to provide assistance by securing checkpoints and perimeter security.

CAPS volunteers continued to obtain current information and maps from the Type 1 IMT in the morning. The volunteers were dispersed throughout the community and provided information to community members. CAPS volunteers expanded community-outreach efforts into the three shelters in the area. A team of two volunteers went to each shelter to provide updated information and answer questions from residents. CAPS volunteers continued to staff the check in/out table at the EOC, ensuring that all individuals who entered/exited the EOC signed in and out each shift.

Additional City Parks and Recreation events were cancelled throughout the City. Virtually all sporting

events, camps, community centers, fountains, pools, and parks within the City were closed.

The EOC continued to develop additional evacuation plans and added two more zones to the evacuation map: Zones 10 & 11. At 1142, pre-evacuation orders were given for Zone 9 (Holland Park) subsequently followed by pre-evacuation orders for Zone 5 (Pleasant Valley). These messages were sent via the ENS and later reiterated via City press releases. No further pre-evacuations or mandatory evacuations were announced within the City limits. No mandatory evacuations were lifted.

As the number of first responders in the City grew, the need for logistic support increased dramatically. While the Type 1 IMT was responsible for the 1,000 or more personnel assigned to the Waldo Canyon Fire, the City was responsible for supporting all the mutual-aid responders working within the City limits. This number rose overnight to more than 500. The City EOC Logistics Section staff arranged for continued food, fuel, supply and equipment support for this growing number of response personnel, geographically dispersed throughout the City limits.

The EOC requested additional staff from the State and neighboring jurisdictions to assist with the growing responsibilities for managing citywide coordination of response and the mounting task of re-entry and recovery. These requests were to assist with multiple facets of the EOC, to include general staff support, as well as support for the City communications functions at the City EOC, in conjunction with the JIC.

The City maintained the previously established feeding/rehabilitation area at CSFD Station 9 for all personnel. Access became easier for personnel due to road closures, but the increase in personnel to be fed became challenging for Pikes Peak Rehab Services, a local organization staffed by volunteers. Additional complications arose with agencies requesting food deliveries to personnel who were working at locations that could not be relieved. Some of these individuals were working in fire “hot zones” and food delivery individuals were required to have proper Personal Protective Equipment (PPE) to enter the locations.

CSPD personnel, and mutual-aid partners, managed TCPs and conducted security checks in the evacuated areas. Additionally, CSPD and CSFD escorted personnel from outside agencies into the fire-affected area to conduct mitigation and/or restore critical infrastructure. Some examples include CSU and cellular service providers.

CSPD remained on modified dispatch, responding to priority-one cases only. As a result, CSPD staffed all patrol cars with two officers. This was done for the safety of officers working in the fire-affected area, as a standard procedure for sending two officers to a priority-one call. CSPD continued to run Command from the Falcon Division and continued medical checks with AMR at the end of each shift. After consultation with City Safety, officers working in the fire area were required to fill out smoke-exposure forms at the end of each shift.

The City Policy Group met throughout the day to discuss a wide range of issues related to: the active

fire; existing and anticipated evacuations; obtaining accurate information related to the destroyed and damaged homes; notifying residents about the status of their homes; managing the public information related to the neighborhoods and homes; and procedures for re-entry into the evacuated areas. The Policy Group's goal was to provide the most accurate information possible, and as soon as possible to residents in the affected area. The Policy Group requested immediate accounts of the damage assessment from the CSFD Division of the Fire Marshall (DFM), by the afternoon. When contact was made with the DFM, staff explained that they had not yet been able to enter the area due to continuing extreme fire conditions. This would become a DFM priority as soon as fire and weather conditions would allow.

At 1330, the www.springsgov.com website database was in operation. A message was developed requesting those concerned about their home or business to fill out the online form; the City would make contact when additional information was known. Most affected areas were still too dangerous for initial assessment teams to enter and collect information.

Beginning in the early afternoon, CSFD DFM personnel entered the Mountain Shadows neighborhood and began conducting the initial damage assessment process. Two teams traveled by truck throughout the neighborhood. These personnel were "Red Card"-certified and carried necessary PPE and safety equipment for the active fire that still existed in the neighborhood. Several GIS and address databases were used to assist in identifying the impacted properties.

Due to the hot spots within the neighborhood and, in many cases, in the destroyed homes, DFM staff was able to assess only the "shell" of the structures. Most assessments took place from the street. Many of the destroyed homes were burned to the foundation, with little to no residual identifying marks. Many homes in the neighborhood had wood mailboxes. As expected, these burned in the conflagration, leaving no address identifiers. Staff made notes during this initial assessment that were taken back to the FDC to compare with database and GIS data. Staff reviewed and compared these data, noting areas and homes that would need to be revisited the next day to verify there was a loss.

At 1400, a flame front blew through the Peregrine neighborhood near Blodgett Peak. Fire crews were forced to retreat for a short time before re-entering the neighborhood. CSFD and mutual-aid fire departments continued to fight the fire along Blodgett Peak alongside the USFS Strike Team, and monitor the interior City burn site for flare-ups. The continuing thunderstorm behavior pushed the fire from Blodgett Peak into the residential area west of the Mount Saint Francis Nursing Center. This thunderstorm acted much like the previous day's event, albeit smaller, causing the fire to blow into the Peregrine area. This was quickly contained and managed by the multiple fire task forces working the area. Several homes were affected by this firestorm, but crews on scene were able to extinguish these fires after the fire front passed.

President Obama contacted Governor Hickenlooper and Mayor Bach to offer his support and to inform them that he would arrive on Friday, 29 June 2012, to visit the area and thank firefighters and first responders for their hard work and dedication. The CSPD and mutual-aid partners were focused

on the security related to the evacuated areas and asked the EPSO to lead planning the President's motorcade.

As the day progressed, the Policy Group continued to meet and review initial information regarding the destroyed/damaged homes. DFM staff explained their concerns with the data collected thus far and the necessity to accurately depict information about each house. DFM staff explained that they would have to return to the neighborhood the next day to re-evaluate the data.

The daily press conference was held at 1600. Updates were provided, but no new information was released to the public at this time. Fire personnel were busy battling spot fires and flare-ups along Blodgett Peak. Law enforcement personnel from several agencies were providing security at TCPs and within neighborhoods. Policy Group personnel were working to devise a plan to personally notify those who lost their homes.

Governor Hickenlooper signed Executive Order D2012-020 later in the day declaring the Waldo Canyon Fire a disaster emergency.

In the evening, the Colorado Springs Fire Marshall announced that all commercial fireworks displays within Colorado Springs for the 4th of July would be cancelled. At the time of the cancellation, nine fireworks displays were denied permits due to extreme weather conditions and the lack of resources to provide public-safety services at these events.

Throughout the day and into the night, CSPD sent officers to the Mountain Shadows area to re-check homes that were initially noted as evacuation refusals. Officers checked these homes to verify the status of the structure and to determine if there were any concerns regarding residents who had not evacuated.

28 JUNE 2012 (THURSDAY)

OVERVIEW:

Weather conditions were a little more favorable on this day, with no Red Flag Warning. Containment of the fire within the City burn area was maintained as "hot spots" were monitored and controlled.

First responders continued to conduct structure protection in the Mountain Shadows and Peregrine neighborhoods. The Cedar Heights neighborhood also remained a concern with the Type 1 IMT, Division Zulu.

No additional evacuations were ordered in the City. City evacuees remained at 28,770 and the total acres involved grew from 16,622 to 16,750 total acres.

COLORADO SPRINGS RESPONSE

During the early morning hours, CSFD responded to several areas in the Mountain Shadows and Peregrine areas where embers were blowing into the neighborhood and endangering homes. Crews quickly extinguished these flames.

The HSPPR notified the EOC that it was at capacity with 314 animals. City CART at the CMHS shelter was able to accept additional non-companion pets to assist with this overflow. Meanwhile, the American Humane Association volunteers made contact with CS CART to announce that they were in Colorado Springs, but their large truck broke down, and it would take additional time before they would be operationally ready to shelter pets.

At the 0800 Press Conference, Mayor Bach announced that "hundreds" of homes were destroyed and that staff was working on confirming the data and determining how the information would be relayed to those affected.

DFM staff returned to Mountain Shadows on several occasions, beginning early in the morning to verify the information that had been already documented and to address discrepancies identified throughout the process. DFM was notified that residents would be told later in the day about their homes, and quick and accurate data were extremely important.

The EOC reached a new peak of activity. City officials in the EOC continued to develop plans for lifting evacuations in coordination with CSU, CSFD, CSPD, and EPCPH. Plans for recovery began in tandem with the existing response efforts, bringing in numerous officials from local, state and federal agencies. The EOC also became a "hub" for partner agencies that would arrive in the morning to observe the updates during the 0800 briefing by the Type 1 IMT AREPs. At peak times, approximately 85-100 people were present during the day in the EOC. Most individuals had a valid reason to be present, whether it was an operational position in the EOC or waiting for a meeting with someone from the EOC. Space, noise level, providing logistical support (i.e., food), and tracking individuals

became more difficult.

With key decisions regarding re-entry and recovery operations a primary focus for City leadership, along with the active fire still burning adjacent to the City, decisions were made rapidly on a variety of issues, but were not, or could not, be immediately communicated to all of the EOC personnel and to those in other locations throughout the City. At times, City personnel responsible for taking action on the decisions were made aware of them during the regularly scheduled press conferences.

The Policy Group continued to meet and review the preliminary DFM data. By early morning, the Policy Group had information related to streets where there were multiple homes destroyed, and it was apparent that there were some areas where multiple homes were affected and other areas where only one home in the vicinity was damaged or destroyed. Initial reports indicated that 30-35 streets were impacted. The Policy Group continued to plan for how to provide this information to residents in the most accurate and personal method possible.

The Policy Group members focused on a priority to provide information, in person, to those impacted and make themselves available to answer questions. Even with an initial list of the damaged and destroyed homes, accurate contact data did not exist for residents in these homes. A review was conducted of existing public data sources, and it was quickly determined that there would be no way to reach out directly to the residents of the affected homes. Incomplete contact data exists in a variety of data sets for this type of notification. Some databases included the El Paso County Assessor's Office, the Emergency Notification List, and the self-registration database posted the day before on www.springsgov.com.

After further review and consideration, the decision was made to hold a public meeting. The destruction in the neighborhood was inconsistent in some areas and on some streets, while entire blocks of homes were destroyed in other areas. After much consideration, the Policy Group made plans to hold a public meeting for residents who lived on the affected streets. The process for notifications was extremely important to the Policy Group who spent several hours working on how the meeting would be facilitated in order to impart the least impact on the affected residents.

The DFM staff continued to review the initial lists and surveyed the neighborhood using all means possible to verify existing information and ensure that the most accurate list of damaged and destroyed homes would be made available to the residents at the evening meeting.

During the mid-morning hours, based on the fire activity and outlook, CSPD and CSFD developed plans to lift some of the mandatory evacuations later in the evening. Plans were made to ensure that there was accurate staffing for the TCPs and to maintain security within the evacuated areas. CSFD personnel continued to assess the areas directly impacted by the fire, and those adjacent, to determine when neighborhoods would be safe for re-entry.

At 1526, a press release was issued announcing the details of the "Waldo Canyon Fire Impact Meeting." The meeting was scheduled to begin at 2000 at UCCS in the Gallogly Events Center. The

UCCS events center was chosen because it was large enough to hold thousands of people. The meeting was intended for “residents only” of the impacted streets. The initial meeting announcement contained a list of 34 impacted streets. About an hour later, an additional street name was provided, bringing the total number of streets to 35. The check-in process for the meeting was scheduled to begin at 1800. City Metro Transit was arranged to pick-up evacuees from each shelter location at 1800. Residents were required to provide identification to attend, and the media was asked to respect their privacy and wait until after the meeting to contact anyone. To help facilitate this, a press conference was scheduled at 2100 at the UCCS media staging area so residents could attend the press conference and provide interviews after the meeting, if they were so inclined.

Mayor Bach announced at the 1600 press conference that initial reports indicated that 346⁸ homes were destroyed on 26 June in the Mountain Shadows neighborhood. Mayor Bach further explained that a meeting was scheduled at 2000 at UCCS for residents who lived on streets where a house was severely damaged or destroyed and reiterated the information contained in the press release.

A detailed plan was devised for the community fire-impact meeting. More than 100 City and UCCS employees and volunteers were on site to assist residents with check-in and to route the residents to the correct location. These individuals guided residents from the parking lot into the buildings, while answering questions and providing information. Care and Share provided boxes of non-perishable food and other items to residents. A large spontaneous food donation was made to Station 9 earlier in the evening for first responders, but this could not be used at this location and was diverted to UCCS for the residents. CSPD Victim Advocates were on site, along with Chaplains from CSPD and CSFD, ARC and Aspen Pointe mental health professionals to provide assistance.

As residents arrived, they completed a form requesting contact information. Identification was used to verify residence. Some evacuees did not have identification and, in other cases, friends and family arrived to receive information for evacuees who were no longer in town or unavailable to attend. These exceptions were considered on a case-by-case basis, and entry was generally allowed. Approximately 4,000 individuals attended this meeting that began at 2000. Mayor Bach and his immediate leadership staff spoke to the residents, providing background information and an overview of the evening’s meeting. The group was divided into several breakout groups assigned to each Policy Group member.

As the breakout groups convened, a list of the destroyed and damaged homes was provided and City staff answered questions. There were several instances where a resident was provided information about his/her home and thought that the information was incorrect. City staff noted these exceptions and would later send DFM, CSPD, or CSFD staff into the neighborhood to check on the address in question. Residents had many questions about next steps in the process, to include when they would be able to gain access to their properties, steps in the recovery process, rebuilding, and more.

⁸ This was the initial number reported to the public, and as noted previously, has changed.

A press conference was held after the community meeting at approximately 2100. Updates were provided regarding the number of homes destroyed. City officials announced that there were a few potential inaccuracies that needed to be verified before releasing the list to the public. Additionally, City staff announced its commitment to attempt personal contact with all residents who were not at the community meeting, prior to publically releasing the list of damaged or destroyed homes. A target to release the list by mid-morning the following day was announced. At the end of the press conference CSPD Chief Carey announced the discovery of remains of one person on Rossmere Street. Residents who wanted to talk to the press conducted on-camera interviews after the official press conference.

At about the time that the community meeting began at UCCS, the first mandatory evacuations were lifted at 2000. These areas included the southeast area of Rockrimmon, including Golden Hills and Tammaron subdivisions, Pine Cliff, Kissing Camels east of 30th street from Gateway Road to Garden of the Gods, Holland Park, and the apartment complex at Garden of the Gods and 30th Street. All other areas remained under mandatory evacuation: Cedar Heights; West of 30th from Gateway Road to Garden of the Gods Road; Pinon Valley; Mountain Shadows; Peregrine; and the balance of Rockrimmon - northwest of Woodmen Road/Rockrimmon Boulevard and Vindicator Drive.

A Presidential Disaster Declaration was announced in the late evening for El Paso and Larimer Counties. The Presidential Declaration activated an array of Federal programs to assist in the response and recovery effort.

Throughout the early evening, CSPD and mutual-aid agencies at TCPs and within the evacuated areas started allowing business owners to return and residents to retrieve items. Officers at the TCPs handled these requests on a case-by-case basis.

Late in the evening and into the early morning hours, CSFD personnel entered the Mountain Shadows neighborhood to verify information on specific homes that were brought to the attention of City personnel during the community meeting. Some discrepancies were noted and these changes were reflected in the master list of affected addresses.

29 JUNE 2012 (FRIDAY)

OVERVIEW:

The fire containment remained steady. CSPD confirmed that there were two fatalities in the evacuated area. The mandatory evacuation for the first affected neighborhood, Cedar Heights, was lifted later in the evening.

Fire growth again was minimal, with most of the activity being isolated to the interior "islands." Threats of thunderstorms were still present throughout the day. All other evacuations remained in place; total acres involved grew minimally from 16,750 to 17,073.

No additional evacuations were ordered in the City.

COLORADO SPRINGS RESPONSE

Beginning at approximately 0700, uniformed officers from the HSPPR were available to enter evacuated areas in pairs to pick up animals that were left behind during evacuations. Residents were directed to contact the HSPPR main number to make arrangements.

At the 0800 press conference, a question/answer session at Station 9 with first responders was announced for later in the day. During the press conference, City officials stated that they would post a map and a list of the damaged and destroyed addresses by mid-morning. The public asked questions regarding re-entry into the fire-affected area. In response, City officials related that the neighborhood still had active fire present, making re-entry very difficult, if not impossible, at the time. CSFD was still engaged in monitoring and responding to hot spots and fire flare-ups in the neighborhood.

Another factor affecting re-entry was safety concerns related to utilities service. On the evening of 26 June, gas service was shut off to approximately 4,200 homes in the Peregrine, Mountain Shadows and Oak Valley Ranch neighborhoods. In order to render the homes safe, CSU was required to go throughout the neighborhood and fix any leaks in the gas pipes before returning to each individual home to reconnect the gas and pressurize the lines. CSU announced that crews were able to get in during the previous afternoon to begin assessments. CSU also announced that it was investigating the possibility of allowing residents back into their homes without active gas service. CSU was exploring possible mutual-aid help from XCEL Energy to speed up the repair process.

During the early morning hours, City leadership reviewed the list of attendees from the community meeting and attempted personal contact with those who experienced a total loss, but who were unable to attend the meeting. The list of affected homes was again checked in the morning against the discrepancies that were identified during the community meeting and compared with the "ground truth" available in the neighborhoods. The list of addresses was constantly revised for accuracy.

Channel 5 KOAA completed a live broadcast with the CAPS Coordinator and a few volunteers and, as a result, CAPS received a flood of new volunteers. Also, the community started delivering large quantities of donations to Holmes Middle School. A group of volunteers was designated to receive and sort these donations and redistribute them to first responders or to Care and Share, Goodwill, etc. After sorting, donations for first responders were delivered daily to Station 9. This was the last day that CAPS volunteers went into the community to conduct outreach. Volunteers continued to provide staff assistance in the EOC.

At 0930, Commerce City Drive from East Woodmen Road to Pine Creek Drive was opened to residents and businesses.

At 1000, CSPD Victim Advocates staffed a hotline to talk with anyone who had lost a home. The intent was to have a trained professional available to speak with those who had not yet been personally contacted regarding the status of their home. City leadership made steady progress during the day in contacting individual residents and the release of the maps/addresses was delayed.

At 1030, fire conditions in Mountain Shadows and Peregrine became problematic for a period of time. CSU, HSPPR Officers, and other workers were told by fire personnel to retreat from the area. They would be allowed to re-enter after a few hours to continue their work.

President Obama arrived in Colorado Springs shortly after noon. The EPSO took the lead on planning the President's motorcade, but CSPD and a select number of key officials accompanied the President on his visit. During the latter part of his visit, President Obama was taken into the Mountain Shadows neighborhood, with fire personnel, to view the destruction.

The Policy Group met throughout the day to determine the safest and fastest way to allow residents back into their neighborhood to view their homes. The Policy Group discussed the fact that the destroyed homes were unstable with smoldering ash, steel, broken concrete, downed fences, broken furniture and hardware strewn about. Additionally, there was the concern that active fire was still burning immediately adjacent to the neighborhood. This concern was so great that firefighters evacuated CSU and HSPPR personnel mid-morning. Security in the area was also a concern as it would be very difficult to provide accountability for individuals entering and exiting the neighborhood.

After considering all options, the Policy Group decided that safety of the residents was of the upmost importance and developed a plan to bring in residents by bus to view their homes/home sites. Initial plans for this viewing included staggering residents into multiple small groups. To accomplish this, it was understood that multiple buses and routes would be required. Staff in the EOC finalized this plan, working with the intention of making the event as non-intrusive as possible for the residents.

The concept of this initial site visit by bus was announced at the 1600 Press Conference.

A late evening press briefing was held at 2000 to discuss further evacuations that were lifted. These evacuations were based on the safety inspections conducted throughout the day by CSU and were not specific to areas or zones. A press conference was held to show a detailed map of which streets were cleared for return. Most areas were allowed to return, with the exception of a few streets outside Mountain Shadows, Oak Valley, and Peregrine.

The official press release regarding damaged homes, to include the list of addresses and the map was released at 2006.

At 2035, Cedar Heights' residents were allowed to return home after being evacuated six days earlier.

The first email was sent at 2224 to approximately 8,600 residents who registered for information on the www.springsgov.com website. This email provided the recipients with similar information to the public press release, urging anyone who had not personally been contacted regarding the status of their home to call for additional information.

30 JUNE 2012 (SATURDAY)

OVERVIEW:

There was limited growth in the fire for a fourth day. Mandatory evacuation of the Woodmen Valley neighborhood was lifted in the evening. Colorado National Guard deployed and assisted with traffic control and security in the evacuated areas.

Growth of fire was again very limited. Only 586 additional acres were involved, all within the interior islands. Total acres grew from 17,073 to 17,659.

COLORADO SPRINGS RESPONSE

The Colorado National Guard deployed more than 150 soldiers with vehicles to augment CSPD in security and checkpoint staffing.

The 0800 Press Conference was held with few major updates.

Staff in the EOC finalized plans for the site visit by bus scheduled for the following day. Facilities and equipment were secured and detailed plans were made to ensure that security and behavioral health support personnel would ride on each bus with residents. Streets were broken down into manageable numbers of homes, and a schedule was devised to accommodate entry into the neighborhood. In order to ensure that small groups were taken on each visit, it became apparent that the process might take more than one day.

A joint City-El Paso County Disaster Recovery Center opened at 0900 to provide a "one-stop" location for residents who lost their homes to receive relevant recovery information from local, state, and federal agencies.

The Policy Group met throughout the morning and discussed initial feedback regarding the home visits by bus. Policy Group members were concerned that the bus visits would not be a sufficient method to allow residents to view their property and it may create more issues that it would resolve. One of the greatest concerns for the Policy Group was safety of the returning residents. The cause of concern came from the potential need to re-evacuate the area if the fire were to become a problem, and especially in the neighborhoods with smoldering ash and debris. The other primary concern was for the protection of evacuated properties. Opening up the neighborhood might invite unwanted persons into the neighborhood where homes were vulnerable. City leadership consulted legal counsel regarding these concerns and discussed developing a waiver. Ultimately, the decision was made to control access into the neighborhood, but to allow residents to spend the day in the area.

A press conference was scheduled for 1400 to discuss the details of the bus tours for residents. At this conference, Officials instead released information related to the altered re-entry day activities being planned.

At 1345, a press release was issued with new guidance for residents to enter the neighborhood unattended during the hours of 1000 - 1800. Two check-in locations were established, a north division and a south division. Residents were required to bring identification and proof of residency. A safety sheet was prepared to inform residents of the hazardous conditions they would likely encounter and residents were encouraged to wear protective clothing and shoes. The press release also announced that entry into destroyed homes would not be allowed; residents with intact homes would be allowed to enter and clean out their refrigerators, obtain items needed for the near future, secure their homes, etc.

Based on this new guidance, planning for the day was revised. The two entry locations were established with multiple "drive-through" lanes for residents to check in. A registration form was created for residents to download, print, and fill out prior to their arrival. A plan was devised to have numerous behavioral health volunteers and City personnel staff multiple check-in lanes to make entry as fast as possible.

Planning for the re-entry day continued into the night to ensure that proper reference material, support supplies, staff, and PPE were available and provided to residents and staff working the event.

The 1600 press conference divulged additional details for residents who would be entering the Mountain Shadows neighborhood for the day. Additional updates were provided regarding the fire behavior, progress and outlook.

As the fire behavior continued to improve, the EOC and FDOC locations developed a schedule to close overnight.

1 JULY 2012 (SUNDAY)

OVERVIEW:

Residents of the hardest hit Mountain Shadows neighborhood were allowed to return for the day to visit their homes/home sites. First responders, City and County Officials, Salvation Army mobile canteens, ARC Emergency Response Vehicles, and behavioral health workers conducted roving patrols within the impacted area to provide support and security to the more than 4,000 individuals who entered.

Additional evacuation orders were lifted later in the evening for Oak Valley Ranch, Pinon Valley, Peregrine, and the Grand Centennial Apartments.

Progress on containment of the fire continued to be positive, with only minimal creeping occurring along the northern perimeter.

COLORADO SPRINGS RESPONSE

City personnel, behavioral health specialists, public health staff, and volunteers arrived at 0530 at the two checkpoints, Eagleview Middle School and the Verizon Building. At this time, residents had already arrived for the 0800 check-in and were waiting in their cars for entry into the area. Each entry point was set up with multiple lanes for residents to drive through and check in. Each lane was staffed with two individuals who had lists of the affected addresses/streets in the neighborhood, safety handouts, trash bags, and gloves.

TCPs were maintained around the perimeter of the neighborhood, and additional stationary and roving CSPD and National Guard patrols were located within the neighborhood. Each vehicle entering the neighborhood was issued a dashboard placard with information on the residence being visited. Security patrols were instructed to challenge any vehicle that did not have a visible placard.

Within the neighborhood, numerous Colorado Springs and partner-agency personnel were present and provided "roving patrols." CSPD police officers in both marked and unmarked vehicles drove through the neighborhood focusing on security. CSFD provided crews on apparatus and individuals in Command vehicles to drive through the neighborhoods, specifically those that were hardest hit, to contact residents and to provide assistance, as needed. CSFD and CSPD Chaplains drove through the neighborhood to provide emotional support. Behavioral health specialists from Aspen Pointe were located at the check-in/-out locations and were mobile within the neighborhood, stopping to talk with residents. The ARC provided mobile Emergency Response Vehicles stocked with snacks and hydration.

In addition to mobile patrols and resources, two dumping stations were established within the neighborhood. Salvation Army volunteers staffed these locations throughout the day and provided snacks and hydration to residents dropping off their trash.

Residents were allowed to enter the neighborhood at approximately 0730. Each car completed a registration form and was provided with a filled-out placard, safety information, trash bags and gloves. Residents were allowed to drive into the neighborhood unescorted for the day. They were allowed to come and go and could exit only at one of the two designated checkpoints. All cars were cleared of the entry lines by 1000.

Beginning at 1700, CSPD officers and National Guard personnel moved through the neighborhood asking the few remaining residents to depart the area no later than 1800. Care and Share positioned vehicles at each exit location and provided non-perishable food and supplies to those in need. Aspen Pointe behavioral health specialists collected placards from each vehicle as it departed and “checked out” the residents.

At 1815, a news release was issued, lifting mandatory evacuations for several areas effective at 2000. These neighborhoods included: Oak Valley Ranch; Pinon Valley; Peregrine; Grand Centennial Apartments; all business along Centennial Boulevard and 30th Street. Centennial Boulevard also opened at 2000. Many of these returning residents were notified that they would have electricity and water, but no gas service, at their homes.

2 JULY 2012 – 10 JULY 2012 (MONDAY – TUESDAY)

OVERVIEW:

Containment of the fire continued and weather conditions became more favorable. Restoration of vital utility services was a key priority. As critical utility service was restored in the affected neighborhoods, residents were allowed to re-enter their neighborhoods and homes. The re-entry was announced on a street-by-street basis throughout the affected neighborhoods, until all streets were released from the mandatory evacuation on Sunday, 8 July 2012.

COLORADO SPRINGS RESPONSE

The following eight days signified the end of the fire response, while recovery efforts were underway in earnest. This section, as with the rest of this document, contains information related only to the conclusion of the fire activities – to include resident re-entry – and does not include information regarding the numerous aspects of recovery being addressed during this time frame.

2 July

The fire continued to burn in the interior islands. Minimal rain did not produce much moisture for the burn area. Winds, although gusty and erratic at times, posed little problem, and the fire-relief efforts were not hampered.

At noon, mandatory evacuation was lifted for a limited number of homes on Eileen Court, Centauri Road, Boardwalk Drive, and Corporate Plaza Drive, along with homes between 4510 and 4795 Granby Circle. Full utilities service had been restored to these homes.

A press conference was held at 0800 and 1600.

3 July

Numerous thunderstorms continued to build in and around the fire area. This increase in weather activity had a positive impact and added significant moisture. Containment was now over 60%.

The City issued a press release lifting evacuation orders for an additional 331 residents south of Champagne Drive and Capra Way. Residents in homes located on Champagne Drive, Flying W Ranch Road (south of Champagne Drive), Hearthstone Lane, Alderstone Way, Stoneridge Drive, Capra Way, Ramsgate Terrace, Fieldstone Road, Braeburn Way, Cameo Way, Denby Way, Ellery Lane, Alpine Meadows Lane, Granby Circle and portions of Lions Gate Lane were allowed to return as of 1800 hours. These residents were also returning to homes with no gas service.

CSPD and National Guard continued to monitor the activities within the evacuation and re-entry areas.

A press conference was held at 0800 and 1600.

4 July

Fire activity dropped significantly due to the previous day's moisture. Weather conditions remained the same. Due to fire and weather conditions, all fireworks demonstrations in the City of Colorado Springs were cancelled and the ban on fireworks remained in place. Additional police were assigned to patrol the City, and CSFD officers were authorized to issue summons to violators of the fireworks ban.

By 1700, 256 more homes were released for re-entry. Mountain Shadow residents on Ashton Park Place, Chambrey Court, Charing Court, Chase Point Circle, Darien Way, Green Valley Heights, Huffman Court, Kirby Court, Regal View Court, Regal View Road, 2305-2395 Rossmere Street, Twin Harbor Heights, Vanreen Drive, Vantage Ridge Court, Vantage Vista Drive, Via Verona View, Wilson Road (limited), and Wolf Ranch Road, were all allowed to return home.

These, and all prior areas released, were cautioned that a pre-evacuation status was still in place.

Total acres involved from 30 June to 4 July, grew from 17,659 to 18,247.

No media briefings occurred with the Type 1 IMT.

5 July

The last press conference was held at 0800 with members from the Type 1 IMT. 95% containment was announced at this time with only a few areas of smoke visible throughout the City. Rain showers from the previous couple of days helped to dampen the fire. The forecast included continued rain. This forecast made it unlikely that any significant fire activity would occur over the next few days, but firefighters remained vigilant and alert.

A second re-entry day was held for residents of Mountain Shadows to assist with access for critical needs and to assist with the recovery process.

Colorado Springs began to move into its "Monsoon Season" and rain activity was predicted to pick up beginning Friday, 6 July, and continue at least through 9 July. This raised concern for flooding in and around the burn area and the City initiated the first of many flood mitigation meetings with City personnel.

At 1700, the City released the mandatory evacuation orders for additional streets and homes located on Alabasater Way, Aubrey Way, Brogans Bluff Drive (west of Rossmere Street), Flying W Ranch Road, Lanagan Street, Linger Way, Rossmere Street, Sandray Court, Sceptor Way, Tallesen Court, Trevor Lane, and Wilson Road (west of Rossmere Street).

6 July

Fire activity continued to be low. The transition from a Type 1 IMT to a Type 3 IMT was scheduled for

the following day. Monsoon seasonal rains began in the evening, but without great effect on the burn area.

76 additional homes were released for re-entry. Residents returned to homes on Wilson Road, Jenner Court, Brogans Bluffs Drive, Karamy Court, Tamora Way, Ravina Court, at 1700.

7 July

Fire activity remained very low. Sporadic rains continued, but without any impact on residents within the burn area.

The City released 20 additional homes for re-entry. Residents residing on Majestic Drive, south of Hot Springs Court, and 2515-2549 Hot Springs Court were allowed in at 1700.

8 July

Reports from the Type 3 IMT indicated that 100% containment of fire should occur within the next couple of days. Fire activity remained low, and rain continued.

The City allowed residents of Courtney Drive and Harbor Pine to re-enter by 1430. Two homes on Harbor Pine Street were not yet ready for habitation due to water and gas line issues. These were the final two homes to be released for re-entry.

9 July

No significant fire activity was reported on 9 July. Flash-flood warnings continued throughout the day.

10 July

The CSFD lifted the City burn ban at approximately 1700 on 10 July, citing recent precipitation that increased moisture levels. While the burn ban was lifted, it was also noted that the City would enter into fire restrictions beginning the next morning.

At 2000, the Waldo Canyon Fire was declared 100 % contained.

SECTION 2: CAPABILITY REVIEW

This section offers a review of findings related to the City of Colorado Springs' response to the Waldo Canyon Fire, as provided in the Colorado Springs Initial AAR. Further information and documentation review has resulted in the addition of more strengths and recommendations. The City is committed to implementing these recommendations to become better prepared, should another disaster strike our community in the future. It cannot be overstated that the information included in this report is specific to the City of Colorado Springs and does not include an analysis of the many interactions and interconnectivities of all the agencies that worked on this massive fire spanning two counties.

This section is organized using the Target and Core Capability frameworks described in the Department of Homeland Security's (DHS) National Preparedness Guidelines.⁹ The capability review, published in the Initial AAR, is included in this section. An analysis of each Initial AAR finding has been provided for more context as it pertains to the strength or the recommendation. Each capability section also includes a review of strengths and recommendations identified during the final analysis of the City's response to the fire. This review provides more detail than the strengths and accomplishments described generally in the Initial AAR.

Further review was not provided on the following capability areas:

- Capability 6: Volunteer and Donations Management;
- Capability 12: Emergency Public Warning;
- Capability 13: Medical Surge;
- Capability 14: Medical Supplies Management and Distribution; and
- Capability 15: Mass Care.

These five capabilities are not included in the City's Final AAR because (1) they are not examined in greater detail than the initial AAR and (2) they fall outside of the direct purview of the City. The City plays a role in some aspects of these capabilities, but is generally not the lead agency responsible for enacting recommendations and therefore they are not covered in this report.

⁹ <http://www.dhs.gov/national-preparedness-guidelines>

CAPABILITY 1: COMMUNICATIONS

Definition: Communications interoperability is the ability of public safety agencies (police, fire, EMS) and service agencies (public works, transportation, hospitals) to talk within and across agencies and jurisdictions via radio and associated communications systems, exchanging voice, data and/or video with one another on demand, in real time, when needed, and when authorized. Source: DHS Target Capability List version 2.0.

The City of Colorado Springs is a member of the Pikes Peak Regional Communications Network (PPRCN), which maintains the key infrastructure of the 800 MHz radio system throughout the City. PPRCN recently integrated into the Colorado Statewide Digital Trunked Radio System (DTRS), enabling PPRCN radios to operate on the Statewide DTRS network. This integration enables first responders and other agencies traveling outside the PPRCN to bring their radios to the PPRCN area and communicate instantly. Cellular phones are also commonly used by public safety and service agencies to communicate during an incident.

STRENGTHS OF COMMUNICATIONS:**Initial AAR Strengths: Communications**

Item	Strength / Analysis
1.1	Radio training, workshops, and exercises related to interoperable communications have been conducted in a focused manner over the past two years, furthering the knowledge and abilities of first responders in the City. Colorado Springs personnel have been active participants in the South Central Region (SCR) Communications Capability Working Group (CWG). The SCR CWG used grant funding over the last two years to update and revise plans and conduct training and exercises related to multi-jurisdictional interoperable communications. Additionally, a radio operations training video was produced and widely distributed to all PPRCN users.
1.2	One-hundred 800 MHz portable radios were requested, received, programmed, and distributed to mutual-aid first responders during the early stages of the incident, allowing for immediate interoperability. When the fire entered the City on Tuesday afternoon, it was apparent that mutual-aid resources from around the state would be needed for fire and law enforcement support. Not all mutual-aid agencies have the same channels on their radios. In anticipation of the mutual-aid arrivals, 800 MHz radios were requested from the State of Colorado cache. These radios were delivered within one operational period and programmed by the City's radio shop to match the local PPRCN channels.
1.3	The PPRCN infrastructure did not suffer a significant loss of integrity during the incident, even with a significant increase in radio traffic. The PPRCN system is very robust and handled radio traffic with very few "busy" tones, compared to the overall amount of information. When there were busy tones, they were

Item	Strength / Analysis
	cleared in seconds and had very little impact on the overall incident.
1.4	VHF radio caches were available for use and proved beneficial in communicating with the IMT. The CSFD Wildfire Suppression Program maintains a cache of VHF radios that are compatible with the National Fire Interagency Cache (NFIC). These radios are compatible with other fire agencies and are used during deployments and/or when mutual-aid responds to the City. These radios were used by CSFD to communicate with members of the Type 1 IMT.

Final AAR Strengths and Analysis: Communications

Item	Strength / Analysis
1.a	Radio infrastructure was not compromised and redundancy existed. PPRCN radio towers were in the direct path of the fire beginning on Saturday, 23 June. Resources were immediately directed to mitigate the area surrounding the towers and actions were taken throughout the course of the fire to ensure that the infrastructure was protected.
1.b	PP ARES personnel provided a direct communications link between the EOC and the shelters. PP ARES was used to provide situational awareness at the ARC shelters. Onsite PP ARES personnel, with radios, allowed for immediate requests for information to be filled. This became especially beneficial on the evening of 26 June when two additional shelters were opened and there was a swift influx of evacuees into the shelters.

RECOMMENDATIONS FOR COMMUNICATIONS:

Initial AAR Recommendations: Communications¹⁰

Item	Issue / Analysis / Recommendation
1.5	Issue) A Communications Unit Leader (COML) was not utilized each operational period. Analysis) A COML on an incident provides coordination for many different aspects of the incident's interoperable communications. The COML manages radios, phone systems, computers, and networks. During the incident, CSFD provided a COML for two operational periods. This position facilitated the connection of radio systems and patches for incoming agencies. Once this position was dissolved, issues occurred where radio communications problems were not immediately resolved. Recommendation 1) A COML should be assigned under the ICS to ensure that an incident-wide Communications Plan is developed distributed, and maintained throughout the incident. Recommendation 2) Conduct training to ensure that there are personnel able to fulfill the COML position for multiple operational periods.

¹⁰ Initial AAR recommendations are noted in bold. All new recommendations will be in regular font.

Item	Issue / Analysis / Recommendation
1.6	Issue) Cellular and wireless service in the WUI area of Colorado Springs has sporadic connectivity. Analysis) As noted in 1.d, the cellular and wireless connectivity in the WUI area is sporadic, based on terrain and the service provider. This lack of connectivity resulted in significant concerns at the Type 1 IMT location. This is also a concern for other areas of the WUI where an incident could occur. Recommendation) Work with cellular providers to improve long-term service along the WUI.
1.7	Issue) A large incident, multi-agency communications plan template (ICS 205) has not been developed. Analysis) An ICS 205 provides a template for how radio communications will be used during an incident. An ICS 205 identifies each agency, radio frequency, and mode of use during an incident. Developing a pre-plan, including likely mutual-aid partners, assists in the rapid integration of agency communications during a complex incident. Pre-planning will also determine equipment needs prior to an incident. Recommendation) Develop a large incident, multi-agency communications plan (ICS 205) incorporating VHF and 800 MHz radio systems that can be easily adapted during a future incident.

Final AAR Recommendations: Communications

Item	Issue / Analysis / Recommendation
1.c	Issue) Immediate and direct communications with City employees, to include first responders in the field did not always occur. Analysis) City employees were geographically dispersed throughout the area. Some employees were assigned to the incident directly in support functions and/or in the field, others were managing day-to-day operations at their work location; and some could not work because their work site was in an evacuation zone. Regardless of location, information related to the incident, specifically the City's direct involvement, was not provided at regular intervals and in a manner that could be accessed by all employees from their disparate locations. While the City did produce, distribute, and post letters to employees, these could not be accessed by all employees in the field and did not provide the tactical information that many employees needed. Most City employees do not have Department-issued smart phones to access their City email accounts for updates and information at remote locations and/or on the weekends and evenings. Recommendation) Develop a system to notify City employees of critical incident updates using both personal and work-issued equipment and varied methods (i.e., text messages and email to personal email accounts).
1.d	Issue) Lack of cellular service on the west side of Colorado Springs, specifically at Holmes Middle School and CSFD Station 18, resulted in a loss of service for City personnel. Analysis) Holmes Middle School was selected as the ICP location for the Type 1 IMT due to its proximity and access to the fire, its building capabilities, and the adjacent property that could be used to house large equipment personnel. Wireless service was poor to non-existent in this area. As a result, staff working in and around this location could not communicate via existing

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Item	Issue / Analysis / Recommendation
	City-issued equipment (both cell phones and data cards). CSFD and CSPD attempted to establish MCPs at this location in order to have immediate access to the Type 1 IMT but, ultimately, were forced to re-locate due to these service issues. A COW was ordered and established in the area later during the incident, but this did not assist with boosting the signals for all carriers. <u>Recommendation 1)</u> Review existing City cellular contract and the associated coverage in the WUI area. <u>Recommendation 2)</u> Review coverage maps and contact vendors, as needed, to discuss deficiencies in cellular service in the WUI area. <u>Recommendation 3)</u> Establish contacts and/or contracts with vendors to provide immediate emergency services and equipment during an incident. Test these services for coverage prior to an incident.
1.e	<u>Issue)</u> Communications to the EOC became problematic after the fire entered the City on the afternoon of 26 June. <u>Analysis)</u> Phones in the EOC were not programmed to roll over to other phones and, therefore, created problems related to reaching staff in the EOC. If an individual was on the phone and could not answer an incoming call and/or if someone stepped away from his or her phone, it would ring continuously. This created many challenges for external personnel who were trying to contact the EOC and were unable to talk to someone. <u>Recommendation)</u> Create an incoming phone number to the EOC that can roll over to multiple lines.

CAPABILITY 2: PLANNING

Definition: Planning is the mechanism through which federal, state, local and tribal governments, non-governmental organizations (NGOs), and the private sector develop, validate, and maintain plans, policies, and procedures describing how they will prioritize, coordinate, manage, and support personnel, information, equipment, and resources to prevent, protect and mitigate against, respond to, and recover from catastrophic events. Source: DHS Target Capability List version 2.0.

The City of Colorado Springs has invested significant time and effort in developing a variety of emergency response plans. These plans are:

1. Colorado Springs Emergency Operations Plan (EOP)
2. Colorado Springs Emergency Operations Center (EOC) Activation Plan
3. Colorado Springs Wildland Urban Interface Evacuation (WUI) Appendix to the EOP
4. Colorado Springs Catastrophic Incident Annex to the EOP
5. Colorado Springs Continuity of Operations Plan (COOP)
6. Colorado Springs Resource Management Plan

STRENGTHS OF PLANNING:**Initial AAR Strengths: Planning**

Item	Strength / Analysis
2.1	A comprehensive WUI Appendix to the Colorado Springs EOP was developed in 2008 and revised in June 2012, prior to the Waldo Canyon Fire. The WUI Appendix was developed as a collaborative effort of several City departments. The plan includes detailed information regarding messaging to the public, transportation, evacuation, and re-entry. This plan was used heavily during the Waldo Canyon Fire.
2.2	Training and exercise are learning opportunities in which plans are developed and/or significantly revised. Throughout the last several years, the CSOEM has developed emergency management plans and provided training on the plans. As the plans are revised, subsequent training has occurred. Plan management and training and exercise are a continuous process that CSOEM manages.
2.3	Contracted Subject Matter Experts (SMEs) have worked closely with the City on the development of several plans and facilitated training and exercises on the plans. The addition of external expertise assisted in the creation of very comprehensive plans. The CSOEM leveraged grant funding and other in-kind opportunities to develop comprehensive emergency management plans for the City. These plans are adaptable and will continue to be updated with lessons learned from this incident and others.

Final AAR Strengths and Analysis: Planning

Item	Strength / Analysis
2.a	Public Safety collaboration and coordination. Leadership from the City's Public Safety agencies, CSFD and CSPD, has worked diligently over the recent years to collaborate and coordinate. Training and exercise events, as well planning meetings, have occurred regularly among the agencies. This history of collaboration was evident during the initial response on the first day of the fire with excellent coordination of evacuations and the immediate fire response.
2.b	Evacuation Zones and Management Action Points (MAPs) were developed at the initiation of the EOC/FDOC activation. Using weather conditions and fire behavior predictions, EOC staff developed evacuation zones and corresponding MAPs. MAPs signified the "trigger" points for the evacuation of the corresponding zone. Fire "lookouts" were established to monitor these MAPs and communicate with the ICP, which then initiated evacuations of the established zones. Through early identification, GIS personnel in the EOC developed and printed detailed maps early in the incident.
2.c	Critical infrastructure sites were identified, mitigation and response was swiftly conducted when the fire threatened this infrastructure. Early identification of critical infrastructure sites (water and radio towers) near the Cedar Heights neighborhood proved beneficial in allowing personnel adequate time to conduct mitigation efforts surrounding these locations and to watch these sites during immediate response efforts.
2.d	Personnel were rotated in many areas/departments using the same individuals. <i>Note: this strength was also noted as a recommendation for some areas of the incident where it took multiple days before the same personnel were used. This is an example of a strength and subsequent recommendation that was implemented during the course of the incident.</i> As staffing patterns were established, City departments maintained the same personnel for each operational period. Rotating the same personnel in positions during opposite operational periods created consistency and institutional knowledge of the event. This also created consistency in personnel working in positions assigned to other locations and functions throughout the incident.

RECOMMENDATIONS FOR PLANNING:**Initial AAR Recommendations: Planning**

Item	Issue / Analysis / Recommendation
2.4	<u>Issue</u>) Emergency management plans require continuous updating. <u>Analysis</u>) Emergency management plans require continuous updating as conditions change in the environment and as lessons are learned after events. It is imperative that plans be reviewed and updated on a regular basis to ensure their relevance. After each large incident and/or exercise that tests the plan, revisions, where applicable, must be made to the plan to

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Item	Issue / Analysis / Recommendation
	reflect all lessons learned. Recommendation Plans need to be revised to reflect the significant lessons learned from this incident.
2.5	Issue Training and exercise are necessary to learn and test plans. Analysis As plans are revised, important information and guidance in the plan changes, and this information needs to be provided to all employees and partner agencies that are affected. To ensure that the changes are communicated, training needs to occur first so that all affected individuals are aware of the changes. After training has occurred, the plans need to be tested. Testing the plan will determine if the plan is valid and/or that additional change is warranted. Recommendation Once plans are revised, training and exercises need to occur to validate the revised plans.
2.6	Issue Job checklists/aids were not widely used during the Waldo Canyon Fire. Analysis Job checklists/aides exist for EOC positions and other ICS positions that were active during the Waldo Canyon incident response. However, checklists and aides were not widely distributed and used. Recommendation 1 Create job checklists/aides to be used in conjunction with the plans. Recommendation 2 Revise existing job checklists/aides. Recommendation 3 Conduct training and exercises on the job checklists/aides.
2.7	Issue Plans need to be developed and reviewed in coordination with key partner agencies. Analysis It is imperative that community and government agencies be included in the development of all emergency management plans. The interdependencies that exist among CSOEM and community and government partner agencies are instrumental in an effective response to an incident of this magnitude. Recommendation Ensure that all plans are developed and exercised in conjunction with key community and governmental partner agencies.

Final AAR Recommendations: Planning

Item	Issue / Analysis / Recommendation
2.e	Issue Accurate, detailed documentation was not captured throughout the City's response to this incident, beginning on the first day and lasting throughout. Analysis City responders focused on the immediate needs related to fighting the fire, evacuating residents, protecting property, and informing the public. During this initial response, and for the duration of the incident, real-time detailed, accurate documentation was not always recorded. On most incidents, documentation can be completed immediately following an individual's response but in this incident, multiple operation periods spanning 18 days prevented responders from "catching up" on documentation at the end of each shift/operational period. This type of documentation is important to ensure that tracking decisions and responses is recorded in an accurate and timely fashion. Recommendation 1 Through the City's CAPS volunteer program, train volunteers to work as scribes for key personnel during the incident. These scribes can document and share information, as necessary, in real time with other agencies and personnel. <i>Note: This recommendation is linked with recommendation 1.c regarding providing real-time</i>

Item	Issue / Analysis / Recommendation
	<i>communication with City employees.</i> <u>Recommendation 2)</u> Provide additional training to first responders on the use of ICS forms. ICS forms assist the facilitation of information flow during events such as this. <u>Recommendation 3)</u> Ensure that ICS forms are readily available to personnel during an incident.
2.f	<u>Issue)</u> Long-term staffing rotation was not planned for on the first day of the incident. <u>Analysis)</u> During this first day/operational period, City agencies working all aspects of the fire focused on initial response. This initial response included identifying and calling in mutual-aid resources to backfill personnel engaged in working the incident. A detailed staffing and rotation plan was not conceived during the first day for the anticipated long-term potential of this incident. <u>Recommendation 1)</u> In accordance with ICS, develop a multi-operational period staffing plan for each City Department to ensure that there is adequate rest and coverage for personnel for the duration of the incident. <u>Recommendation 2)</u> To the extent necessary, conduct ICS training for individuals to ensure that there is coverage in key positions for multiple operational periods.
2.g	<u>Issue)</u> There was an under-utilization of existing plans and procedures during the Waldo Canyon Fire. <u>Analysis)</u> During emergencies there are never circumstances that allow all plans to be utilized, as the event dictates modifications and changes in response actions. However, emergency management plans were underutilized, at times, during this event. <u>Recommendation)</u> As previously noted, conduct more frequent training on all CSOEM plans and provide continued exercises in order to test the plans and practice activating the plans.

CAPABILITY 3: COMMUNITY PREPAREDNESS AND PARTICIPATION

Definition: Community Preparedness and Participation is the capability that ensures community members are aware, trained, and practiced on how to prevent, protect/mitigate, prepare for, and respond to all threats and hazards Source: DHS Target Capability List version 2.0.

The City of Colorado Springs has engaged in community preparedness activities by:

1. Engaging community members in training and education (i.e., public speaking events, preparedness training, and wildfire safety and mitigation);
2. Partnering with residents to conduct wildfire mitigation work on their properties;
3. Developing and distributing written educational materials;
4. Engaging the media with preparedness messaging; and
5. Involving residents in emergency response evacuation drills and exercises.

STRENGTHS OF COMMUNITY PREPAREDNESS AND PARTICIPATION:**Initial AAR Strengths: Community Preparedness and Participation**

Item	Strength / Analysis
3.1	WUI evacuation drills were conducted in Cedar Heights (2009), Discovery/Comstock, Mountain Shadows, and Broadmoor Bluffs neighborhoods during calendar year 2011. CSOEM, CSFD, and CSPD partnered with Homeowner Associations (HOAs) in the above-mentioned neighborhoods to conduct evacuation drills. These evacuation drills involved sending ENS messages to the participants, providing evacuation information, real-time evacuation for residents with CSPD and CSFD personnel conducting mock response procedures and, ultimately, a debrief with the residents, in conjunction with first responders.
3.2	Wildfire education and mitigation efforts have been conducted for several years with residents along the WUI. The CSFD Wildfire Mitigation Section works in stewardship with 86 homeowner associations and neighborhood organizations. This project exemplifies how neighborhoods can reduce their wildfire risk without clear-cutting their property. These projects have been successful in balancing the existing environmental characteristics of property, while reducing the fuel loading in order to modify fire behavior.
3.3	Training is conducted approximately four times per year for community members, providing information related to preparedness education for incidents such as a wildfire. CSOEM and the DFM have a demonstrated history of providing preparedness education to residents through a variety of programs. CSOEM has conducted Citizen Emergency Response training (CERT) for the past several years. Unlike traditional CERT "team" training, this training focused on how residents can prepare themselves, their families, neighbors, and/or community to take care of themselves during an emergency. Additionally, CSOEM has presented preparedness information at a variety of public speaking events, when requested. The DFM provides fire safety and wildfire mitigation information through a variety of means,

Item	Strength / Analysis
	to include public meetings and school presentations throughout the year.
3.4	Colorado Springs designed and distributed approximately 33,000 copies of a comprehensive Emergency Preparedness and Safety Guide. This guide can also be found online at: http://www.springsgov.com/Files/Preparedness%20Guide10_web.pdf . The Colorado Springs Emergency Preparedness and Safety Guide contain pre-incident emergency preparedness information related to evacuation and specific hazards that exist in Colorado Springs, to include wildfire in the WUI.

Final AAR Strengths and Analysis: Community Preparedness and Participation

Item	Strength / Analysis
3.a	Cedar Heights and Mountain Shadows residents previously participated in an evacuation drill with first responders. First responders noted that the Cedar Heights and southern Mountain Shadows evacuations were conducted in an efficient manner and noted that the evacuation drills conducted in 2008 and 2011 were helpful in preparing both residents and first responders. These drills provided all participants with a point of reference when the evacuations were executed.
3.b	Mobilizing CAPS community volunteers. CAPS volunteers played a key role in supporting public communications outreach and staff support in the EOC. Volunteers increased their capacity each day throughout the incident, growing in numbers and adding responsibilities as they were identified.

RECOMMENDATIONS FOR COMMUNITY PREPAREDNESS AND PARTICIPATION:

Initial AAR Recommendations: Community Preparedness and Participation

Item	Issue / Analysis / Recommendation
3.5	Issue) Community preparedness training is an ongoing initiative. Analysis) Community preparedness training and messaging is an ongoing project that requires continuous updating and adjustment to meet the needs of a potential incident and a diverse audience. While the City has a history of providing training and education related to emergency preparedness, this needs to be revisited on a regular basis and adjusted, as needed, to ensure that all potentially affected community members are reached. Recommendation) Develop additional methods to deliver community preparedness training/messaging throughout the community in order to reach a broad and diverse audience.
3.6	Issue) Community volunteers have not historically been used to assist with community preparedness activities in the City. Analysis) CAPS volunteers were mobilized on Monday, 25 June, to assist with community-education efforts related to the fire. As the CAPS programs grows, there are numerous

Item	Issue / Analysis / Recommendation
	volunteers who possess the skills to assist with pre-incident community preparedness training and education. Recommendation) Utilize community volunteers to develop and conduct community preparedness activities.

Final AAR Recommendations: Community Preparedness and Participation

Item	Issue / Analysis / Recommendation
3.c	Issue) Community requests to volunteer were overwhelming at times. Analysis) The Colorado Springs community demonstrated overwhelming support for local government and first responders beginning on the first day of the Waldo Canyon Fire. Personnel assigned to work the incident were not in a position to manage the influx of donations and/or volunteers at their various work sites, while still focusing on their response efforts. Community volunteers are essential to providing a surge capacity during an incident such as this and could have been utilized in a variety of locations. In many circumstances, training is required before a volunteer can provide meaningful service during an incident; after an incident begins, is not the time to provide this training. In other cases, “just in time” training can be provided to the volunteer to fulfill many support functions. In this case, there is still a need to provide oversight and organization for the volunteer(s). Recommendation 1) Work with the CAPS program to identify and train volunteers who would be able to engage in pre-incident training and fulfill specific roles during an emergency response. Recommendation 2) Develop a local Volunteer Organizations Active in Disasters (VOAD) chapter that can mobilize community organizations during a disaster. These organizations can be the conduit for volunteer mobilization during an incident.

CAPABILITY 4: OPERATIONAL COORDINATION¹¹**(INCLUDES BOTH EOC MANAGEMENT AND ON SITE INCIDENT MANAGEMENT)**

Definition: Emergency Operations Center (EOC) Management is the capability to provide multi-agency coordination (MAC) for incident management by activating and operating an EOC for a no-notice event. EOC management includes EOC activation; management, direction, control, and coordination of response and recovery activities; coordination of efforts among neighboring governments at each level and among local, regional, state, and federal EOCs; coordination of public information and warning; and maintenance of the information and communication necessary for coordinating response and recovery activities.

Definition: Onsite Incident Management is the capability to effectively direct and control incident activities by using the Incident Command System (ICS) consistent with the National Incident Management System (NIMS).” Source: DHS Target Capability List version 2.0.

The Colorado Springs EOC was activated at approximately noon on Saturday, 23 June 2012, after the fire was first reported. Multi-agency personnel in the EOC began to immediately organize and support response activities, such as developing the evacuation zones, coordinating incident logistics, developing public information messages, tracking finances, etc. The EOC remained operational throughout the duration of the wildfire incident, scaling services as necessary to accommodate the support requests.

Onsite Incident Management/ICS is a systematic tool that can be used for the command, control, and coordination of emergency response. ICS is flexible and scalable, providing for a common response framework for people from similar or different organizations to work together on an incident of any size. City of Colorado Springs employees have been receiving formal training on ICS for many years. Most first responders use ICS on a daily basis. Onsite Incident Management for the Waldo Canyon fire, in the Colorado Springs vicinity, took place in two district structures: the Type 1 IMT and the City of Colorado Springs.

STRENGTHS OF OPERATIONAL COORDINATION:**Initial AAR Strengths: Operational Coordination**

Item	Strength / Analysis
4.1	The EOC was activated during the onset of the fire and existing policies and procedures were followed to include calling in key positions; determining the need for evacuations; developing maps of the fire/evacuation areas; providing logistical support to first responders; and coding time and labor for finance. The EOC provided a critical support mechanism to first responder personnel who were

¹¹ Changed this capability from the Initial AAR to include On Site Incident Management.

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Item	Strength / Analysis
	actively engaged in working the incident from the beginning. Evacuation orders and messaging were initiated and disseminated directly from the EOC.
4.2	Geographic Information Systems (GIS) staff in the EOC provided excellent, up-to-date mapping services throughout the incident. City GIS provided critical support to all personnel working the incident by developing maps, as requested. Maps were created to depict fire progression and evacuation areas, as well as to first responders, with detailed information regarding specific neighborhoods and evacuation areas. These maps were printed in the EOC on plotter-sized paper and distributed to locations throughout the incident area and were saved as PDF files that could be emailed.
4.3	The EOC provided staffing, albeit limited in depth, from each key City organization and non-profit and/or local government agency, a “one stop shop” resource for those working the incident. The EOC staffing included personnel from all agencies who were actively working the incident. If an agency was not present in the EOC, contact information was generally available and personnel were available to respond, as needed.

Final AAR Strengths and Analysis: Operational Coordination

Item	Strength / Analysis
4.a	The FDOC was activated immediately. The FDOC provided support to ensure that CSFD stations were backfilled with additional resources and mutual-aid when personnel were diverted to assignments related to the fire.
4.b	A time-reporting code was established at the onset of the incident for City personnel. A time reporting code was established with instructions for City personnel to code their time to the “Waldo Canyon Fire.” Initiating this process on the first day of the incident proved invaluable for capturing accurate data later for the Finance Section to match the Fire Management Assistance Grant (FMAG).
4.c	Immediate activation of the Red Cross shelter at Cheyenne Mountain High School (CMHS), the El Paso County Animal Response Team (EP CART), the Colorado Springs Community Animal Response Team (CS CART), and the Humane Society of the Pikes Peak Region (HSPPR). Activating these shelters for residents and their pets created an immediate option for evacuees. Existing relationships and coordination among these organizations proved to be very beneficial in establishing a division of duties and staffing multiple locations. The EP CART at the Penrose Equestrian Center accepted large animals, and the CS CART managed the shelter for companion animals at CMHS. The HSPPR accepted animals from evacuees who chose not to stay at the shelter. Location and jurisdiction did not impact which service an evacuee was able to access.
4.d	Co-location of the CSFD and CSPD Command Posts at Holmes Middle School with the Type 1 IMT. Note: The physical co-location of the two command posts is a considered strength.

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Item	Strength / Analysis
	<i>As noted in the Communications Capability, cellular and wireless connectivity was a significant concern.</i> While brief, the co-location of the CSFD and CSPD Command Posts at Holmes Middle School was an ideal situation for sharing information and resources. CSFD and CSPD were able to engage in seamless communications between the two operations, while having direct access to the Type 1 IMT. This co-location was also beneficial to the EOC in providing logistical support to one location for these two operations. This reduced the number of locations needing maps, food, supplies, etc.
4.e	Utilizing City staff from Departments that were closed/impacted by the response to the fire. Staff members from the Pikes Peak Highway and Parks, Recreation and Cultural Services were diverted to the EOC to assist with logistics. Diverting these staff to the EOC proved very beneficial because duty assignments were paid to these hourly employees who did not have a work location to go to for multiple days. These staff also provided a significant benefit to the logistics section, because they arrived with City vehicles and Visa cards allowing them to make purchases and deliver supplies, maps, etc., to offsite locations.
4.f	Requesting Mutual-Aid for personnel in the EOC. The nature of this geographically-dispersed incident drew trained personnel to a variety of locations and work sites. Mutual-aid staff were requested to augment and backfill key roles in the EOC. This mutual-aid solution provided much needed relief for EOC staff, while adding expertise from jurisdictions around the state.

RECOMMENDATIONS FOR OPERATIONAL COORDINATION:

Initial AAR Recommendations: Operational Coordination

Item	Issue / Analysis / Recommendation
4.4	Issue) Detailed organization charts were not developed and used as part of the incident response and depth in positions was not identified early. <i>Note: This information is also noted for Section 8: Public Safety and Security Response and Section 9 Fire Incident Response Support.</i> Analysis) ICS organization charts exist for the EOC and for the ICP, but these were not formally developed during the incident response. Roles and responsibilities were generally followed during the response, but a formal organizational chart did not designate personnel for the various functions they were assigned. Having a designated organization chart, with established roles and responsibilities for personnel, would help others to know which specific roles are active in the incident response. Moreover, it would aid individuals to know what his or her role is in relation to the greater incident. Once roles are identified, it is imperative to ensure that personnel redundancy exists for key positions. Recommendation 1) Develop a comprehensive organization chart early during the incident to ensure that span of control in positions is appropriate for the incident and is adequate for

MITIGATION STRATEGIES

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Item	Issue / Analysis / Recommendation
	effective incident management. Recommendation 2) Early in the incident develop staff depth in key positions.
4.5	Issue) A staffing rotation plan was not in place for several City departments/divisions at the onset of the fire. Analysis) The duration of the fire created a need for staff to work for multiple days and operational periods at a time. Personnel who had been trained were sent to respond to their location and it was not known how long they would be assigned. By Sunday, 24 June, it became apparent that City employees would be working this incident for multiple days/operational periods and that relief staff would need to be called in. This staffing plan needs to be identified early in the incident to ensure that relief staff have sufficient notice and are trained to perform their assigned functions. Recommendation 1) Develop an immediate staffing rotation plan to ensure rest times for staff during extended incidents. Recommendation 2) Provide training to City personnel and volunteers to ensure that they are equipped to provide the necessary staff relief/support.
4.6	Issue) The EOC was not always used in the capacity for which it was designed. Analysis) The EOC is designed to provide a support and resource management function to first responders and other personnel working an incident. Finance, logistics, operations, and planning support for an incident should be coordinated by the EOC. In several circumstances, individuals called whom they knew to get what they needed. This process directly conflicted with the principles of ICS and the intent of the EOC. Recommendation) Provide further comprehensive training to staff on their respective roles in the EOC and on the interface with the Incident Command Post (ICP).
4.7	Issue) Equipment in the EOC is outdated and slow, which resulted in a degradation/delay of service. Analysis) The Colorado Springs EOC was located in the community room of the Police Operations Center (POC) during this incident. During the EOC activation, computers performed poorly, requiring significant IT support. The slow nature of the computers hampered the ability to produce and rapidly share GIS maps. Recommendation) Replace all computer equipment in the EOC and ensure that is updated regularly.
4.8	Issue) Information sharing between the EOC and dispersed locations was problematic. Analysis) Information sharing between the Colorado Springs EOC and other locations required personal contact to share relevant information. Regular contact was established during the early days of the fire with key locations, such as the IMT and the local EOCs, but communications among locations became difficult once the fire entered the City on the afternoon of 26 June. EOC personnel were focused on the multiple tasks at hand and were often not readily available to provide information and updates to other locations. Recommendation) Ensure that the EOC has liaison personnel for all geographically disparate areas of the incident (partner agency EOCs, IMT, ICP, etc.) and conduct regular liaison briefings to ensure that EOC staff has the most recent information from the field and vice

Item	Issue / Analysis / Recommendation
	versa.

Final AAR Recommendations: Operational Coordination

Item	Issue / Analysis / Recommendation
4.g	Issue) First responder personnel did not always have full situational awareness regarding the incident and the response. <i>Note: At times, this was a noted success and on other occasions a deficiency. The Waldo Canyon Fire lasted for multiple operational periods and because the lack of IAPs was noted on numerous occasions, it is listed here as a recommendation, but there are other locations involved when an IAP was considered a success.</i> Analysis 1) In accordance with NIMS, an IAP is developed for all incidents that span more than one operational period. IAPs were developed for each operational period at the IMT level and at the City for the Waldo Canyon Fire response. These IAPs were presented at a variety of locations to include the EOC, FDOC, Fire and Police Command and the Type 1 and/or 3 IMT locations. IAPs were also shared between the IMT and the City. IAPs were not consistently shared between these locations and the first responders in the field. Analysis 2) Due to the multi-jurisdictional nature of this incident, managing the dissemination of multiple IAPs became problematic. It was not necessary for all personnel to be briefed on the content of each IAP, but information in each IAP was relevant for specific locations and did not pertain to all responders within the City. As an example, the IMT IAP contained information related to firefighting efforts in Teller County. Recommendation) Ensure that a mechanism is in place to deliver current IAPs, to include maps, to each staging location and ensure that personnel at those locations are trained in how to read and present a prepared IAP, extracting relevant information out of multiple IAPs for the intended audience.
4.h	Issue) Separating the physical locations of the CSFD and CSPD Command Posts caused a lack of seamless communications between police and fire Command operations. Analysis) As a result of connectivity issues, CSFD moved its ICP to the FDC, and CSPD moved its ICP to Fire Station 9. Each moved the Command functions indoors where they could readily access landlines and other equipment (copy machines, printers, email) to assist their operations. This separation of ICPs resulted in a variety of difficulties. An additional location where information, supplies, food, etc., was needed and it made seamless communications between the two Commands problematic. Recommendation) Predetermine locations near the WUI that could accommodate both CSFD and CSPD Command. Ensure that these locations have adequate connectivity, equipment, and facility space to conduct joint operations.

CAPABILITY 5: CRITICAL RESOURCE LOGISTICS AND DISTRIBUTION

Definition: Critical Resource Logistics and Distribution is the capability to identify, inventory, dispatch, mobilize, transport, recover, and demobilize, and to accurately track and record available human and material critical resources throughout all incident management phases. Source: DHS Target Capability List version 2.0.

The EOC handled the majority of resource and logistics requests for Colorado Springs' response to the Waldo Canyon Fire. Logistics requests were made by, and through, a variety of field locations. The bulk of the logistics requested during the incident was related to feeding operations and resource supply requests for first responders and EOC staff members.

STRENGTHS OF CRITICAL LOGISTICS AND DISTRIBUTION:**Initial AAR Strengths: Critical Logistics and Distribution**

Item	Strength / Analysis
5.1	The Logistics Section of the EOC was able to successfully provide critical resource logistics support, as requested by responders, by using existing contracts, developing new contracts/relationships, and leveraging donations. When requested, the Logistics Section fulfilled many of the necessary requests for supplies and/or assistance during the incident. When practical and manageable, donations were managed and distributed to all the incident locations. <i>Note: This is also listed as a recommendation below, because the EOC was not aware of all donations made to the various locations involved in the incident.</i>
5.2	The City has capacity to use P-Cards (Visa) to make large purchases, as necessary, and can make changes to credit limits, in order to manage the ever-changing financial aspect of logistics. The City contracting staff was available and assisted with increasing Visa credit limits, as needed, for EOC logistics personnel who were making purchases throughout the duration of this incident.

Final AAR Strengths and Analysis: Critical Logistics and Distribution

Item	Strength / Analysis
5.a	CAPS Volunteers assisted with sorting and distributing donations, toward the end of the incident, at the Type 1 IMT. The community outreach efforts of the CAPS volunteers were spotlighted in the local media and, as a result, the Type 1 IMT received an immediate influx of donations at Holmes Middle School. Each morning CAPS volunteers would arrive at the IMT and sort the donations left at the front doors. Many items were intended for first responders, such as rehydration, snacks, sunscreen, lip balm, etc. Volunteers dropped off items to first responders at Station 9. If this

Item	Strength / Analysis
	was not practical, the donations were taken to agencies that were responsible for redistribution of donations (e.g., Goodwill and Care and Share).

RECOMMENDATIONS FOR CRITICAL LOGISTICS AND DISTRIBUTION:

Initial AAR Recommendations for Change: Critical Logistics and Distribution

Item	Issue / Analysis / Recommendation
5.3	Issue) After the fire entered the City limits on Tuesday afternoon, the logistical support required for the Colorado Springs response to the incident grew exponentially. Analysis) Beginning on the evening of 26 June, numerous mutual-aid partners joined Colorado Springs in various aspects of response. These responders required food, hydration lodging, and equipment from the Colorado Springs EOC. Staff were not pre-identified and trained to meet this influx of required support. Recommendation) The EOC Logistics Section should be staffed, and organized from the beginning of the incident to ensure that all requests can be met promptly.
5.4	Issue) Trained volunteers were not available to fulfill logistics support positions in the EOC. Analysis) CAPS volunteers were utilized to provide staffing at the check-in point for the EOC beginning on 25 June and performed admirably. CAPS volunteers were used in a limited function in the EOC because they had not received prior training. Their training in advance of an incident will ensure that they can be utilized in pre-planned support roles at the beginning of an incident. Recommendation) CAPS volunteers should be organized and trained to provide logistics support for future events.
5.5	Issue) Food/rehydration was not always adequate and available to all personnel, especially those who were working in active fire areas. <i>Note: This issue was at times considered a strength and varied depending on the location of the personnel requiring food/rehydration.</i> Analysis) Providing adequate feeding and rehydration for personnel at a variety of locations was challenging for many reasons. Numerous locations within the City, some in fixed locations (EOC, FDOC, Fire Command) and others in the field (Cedar Heights, Mountain Shadows, CSPD Command) and the number of responders and times were ever-changing daily. Recommendation 1) The Food Unit is responsible for feeding all mutual-aid and first responders. Plans need to be developed to ensure that food with adequate caloric content is provided to first responders at all hours and can be delivered to those working on fire lines, at TCPs, and to those on roving security patrols. Recommendation 2) Ensure that personnel have provisions, especially rehydration, on apparatus sufficient for a 24-hour period. Recommendation 3) Coordinate early with the Salvation Army to develop a feeding plan for all areas and locations of the incident. This plan needs to include timelines and a process for reporting how many personnel in the field and at each location require food.

Item	Issue / Analysis / Recommendation
	Recommendation 4) Develop a plan for delivering food to personnel working in active fire zones. Delivery personnel need appropriate PPE and vehicles.

Final AAR Recommendations: Critical Logistics and Distribution

Item	Issue / Analysis / Recommendation
5.b	Issue) Vendor and internal City requests were duplicated at times. Analysis) During activation, the EOC is responsible for coordinating and fulfilling all resource requests related to the incident. There were many instances during this incident when internal departments and external vendors received duplicate requests from multiple individuals in different locations. As an example, fuel trucks were requested directly from the field and through the EOC. This creates confusion for all parties and is an unnecessary drain on resources. Recommendation 1) Provide training and resource materials (e.g., flow charts) that document the resource ordering process during EOC activation. Recommendation 2) Ensure, to the extent possible, that all vendors and/or City departments are aware of this process and redirect resource requests to the EOC that are not from the EOC.
5.c	Issue) Spontaneous donation management was an unmanageable task at times. Analysis) Coordinated management of donations became unmanageable as they were dropped off at many active locations throughout the incident. The donations were of a variety that may/may not be used immediately by first-responder personnel. Personnel working on the incident did not have the ability to sort donations to determine what could be used and which items would need to be redistributed. Many restaurants and community members provided generous donations of all kinds, but they were not always immediately used at the location where they were dropped off. Coordinated donations were much more effectively utilized and distributed. Recommendation 1) Update the CSOEM donations management plan. Recommendation 2) Utilize trained CAPS volunteers to assist with the donations management process. Recommendation 3) See 3.7 preceding. Develop a local VOAD chapter that can mobilize community organizations during a disaster. These organizations can become the conduit for donations management, and volunteer mobilization during an incident.

CAPABILITY 7: RESPONDER SAFETY AND HEALTH

Definition: Responder Safety and Health is the capability that ensures adequate trained and equipped personnel and resources are available at the time of an incident to protect the safety and health of on scene first responders, first receivers¹², and skilled support personnel. This capability is a critical component of safe overall emergency management. Source: DHS Target Capability List version 2.0.

Responder Safety and Health is a capability that transcends many areas of a wildfire response. This capability is applicable to all personnel working to support efforts related to the fire response. Key to the success of this capability is ensuring that personnel are trained and equipped to work in the environment in which they will be operating. Additionally, there is the issue of behavioral health of the personnel who are most often working extraordinary hours to complete required tasks to support the emergency.

STRENGTHS OF RESPONDER SAFETY AND HEALTH:**Initial AAR Strengths: Responder Safety and Health**

Item	Strength / Analysis
7.1	No major injuries were sustained by first responders, first receivers, and support personnel during the incident. Considering the duration, complexity, long hours, strenuous labor, and extreme weather conditions, it is a testament to the health, commitment, training, and adherence to safety procedures that no injuries occurred.
7.2	Law enforcement officers were medically checked at the conclusion of each shift when working directly in the active fire/evacuation zone. Beginning on the evening of 26 June, and continuing for the duration of the incident, law enforcement officers were medically checked by AMR at the conclusion of each shift. Additionally, officers were directed to complete a City Safety incident report for each completed shift. These forms are standard for employees to fill out when exposed to a hazard in the workplace and they provide the necessary documentation should a worker's compensation case be filed.
7.3	Personal Protective Equipment (PPE), specifically masks for first responders, was cached and immediately available for use. Masks for first responders had been purchased and cached for personnel to ensure immediate access during an incident. While the caches existed and were made available to first responders, it was not widely known where and how to access them.

¹² Acute care providers, including surgeons, anesthesiologists, emergency medicine physicians, prehospital providers, and nurses with emergency, operating room, critical care, and trauma backgrounds possess the skills and experiences best suited to serve as first receivers who provide the initial care to disaster victims.

7.4	A long history of training, with an emphasis on safety, helped ensure personnel recognized hazards and prevented significant injury or death. Pre-incident, ongoing City departmental training has included a focus on safety. Fire personnel used tools such as LCES (Lookouts - Communications - Escape - Routes) and the Incident Response Pocket Guide (IRPG) to communicate identified hazards and take appropriate actions to mitigate threats.
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Final AAR Strengths and Analysis: Responder Safety and Health

No additional strengths are noted in this report for Responder Safety and Health.

RECOMMENDATIONS FOR RESPONDER SAFETY AND HEALTH:

Initial AAR Recommendations: Responder Safety and Health

Item	Issue / Analysis / Recommendation
7.5	<u>Issue)</u> PPE caches of masks were not readily available for all responders that needed them and only a few individuals knew the quantity and location of the caches. <u>Analysis)</u> Despite the fact that masks for law enforcement officers and support personnel (e.g., fuel truck drivers) were stored in caches throughout the City, knowledge of the location and quantity of masks in the caches was known to only a few individuals. These caches were depleted during the incident response and should be rotated and replaced, as needed. <u>Recommendation)</u> Update information regarding PPE caches and ensure that the caches are readily available in a time of need.
7.6	<u>Issue)</u> Working personnel did not receive appropriate rest between operational periods and breaks/rehabilitation. <u>Analysis)</u> For CSFD, the existing three-platoon shift schedule was in place until Wednesday, June 27, and when coupled with a mandatory call-back, caused many personnel to work multiple consecutive 24-hour shifts, often with little, if any, rest. <u>Recommendation)</u> Develop a plan to ensure that emergency response personnel receive adequate rest, work consistent shifts, and receive breaks and rehabilitation (food and supplies). <u>Fire Recommendation):</u> During significant incidents covering multiple operational periods, assign dedicated personnel to the incident and apply an alternative work schedule for them. Depending on the incident type, this alternative work schedule could be consistent with what is used for both wildfire deployments and by federal IMTs incorporating a 2:1 (16:8 hour) work/rest ratio. <u>Rehabilitation):</u> See Capability 5: Critical Resource Logistics and Distribution.
7.7	<u>Issue)</u> The Waldo Canyon Fire conflagration was an incident that may have created psychological stress for some first responders. <u>Analysis)</u> The fire conflagration that occurred on 26 June and the subsequent structure fires is an event that most first responder personnel have not previously experienced. There are many opportunities for an incident such as this to leave lasting images and impressions.

Item	Issue / Analysis / Recommendation
	After incidents of this significance, a critical stress de-brief and/or peer support can often help personnel to identify any lingering trouble that they may be experiencing and seek the relevant assistance. Recommendation) Evaluate the need for post-incident critical stress debrief and/or peer support for first responders and support personnel.
7.8	Issue) Two key safety positions, Incident Safety Officer (ISO) and Accountability Officer (AO), were not assigned during this incident. Analysis) As a result of no designated AO for fire response, overhead personnel were not always aware of which personnel and apparatus were under their authority. Without a specific individual or group identified for the ISO and AO roles, the responsibility fell to the Incident Commander, Structure Protection Branch Director and Group/Division Supervisors. An AO and ISO should have been assigned; relying on others to simultaneously perform this along with their other duties is problematic. Recommendation) An ICS Organization Chart needs to be developed for the incident to ensure that there is an ISO and an AO assigned. These two positions will account for all safety needs for personnel who are working the incident.

Final AAR Recommendations: Responder Safety and Health

No additional recommendations are noted in this report for Responder Safety and Health.

CAPABILITY 8: EMERGENCY PUBLIC SAFETY AND SECURITY

Definition: Emergency Public Safety and Security Response is the capability to reduce the impact and consequences of an incident by securing the affected area, including crime/incident scene preservation issues as appropriate, safely diverting the public from hazards, providing security support to other response operations and properties, and sustaining operations from response through recovery.

Source: DHS Target Capability List version 2.0.

The CSPD led law enforcement and public safety and security response aspects of the Waldo Canyon Fire within the City limits. CSPD provided security at TCPs for all evacuated areas, roving security patrols within evacuated areas, crime scene investigation, and security during re-entry.

STRENGTHS OF EMERGENCY PUBLIC SAFETY AND SECURITY:**Initial AAR Strengths: Emergency Public Safety and Security**

Item	Strength / Analysis
8.1	Moving to 12-hours shifts and using the online special event sign-up proved to be extremely beneficial in organizing personnel. Beginning on 25 June, CSPD moved from 8-hour shifts to mandatory 12-hour shifts for all personnel. This was beneficial in that it provided two shift changes each day, rather than three and allowed personnel to remain in their assignments. The special event sign-up was implemented several days into the event after numerous CSPD personnel requested to work additional hours to support the incident. Utilizing the special event sign-up process served as a centralized database.
8.2	The WUI Appendix was beneficial in that it provided information on areas of concern, evacuation decision points, traffic management, messaging, available resources, legal authorizations, etc. As previously discussed in item 2.1, the WUI Appendix included detailed information related to transportation, evacuation, and re-entry. This plan was used extensively during the Waldo Canyon fire.
8.3	Law enforcement received Mutual-Aid (MA) resources from a variety of agencies as support and as a surge capability. Once the evacuation expanded on Tuesday afternoon, CSPD required immediate public safety MA to assist all the TCPs, roving security patrols, and return visits to check on evacuated homes. MA was provided by local, state and federal agencies.

Final AAR Strengths and Analysis: Emergency Public Safety and Security

Item	Strength / Analysis
8.a	CSPD executed evacuations, using multiple methods of notification, for two neighborhoods, without incident. During the first day of the fire, CSPD officers formed teams and traveled throughout

	neighborhoods conducting notifications door-to-door and via PA systems. Any refusals to evacuate were noted and provided to dispatch. The early evacuations and notifications were good practice for officers who would later conduct the mass evacuations on Tuesday afternoon.
8.b	All CSPD sworn personnel were required to wear uniforms to work and be operationally ready to deploy for evacuations. Beginning Tuesday, 26 June, sworn personnel were required to wear their uniforms to work. Being prepared, in uniform, allowed sworn personnel to immediately deploy to assist with evacuation efforts on Tuesday afternoon.

RECOMMENDATIONS FOR EMERGENCY PUBLIC SAFETY AND SECURITY:

Initial AAR Recommendations: Emergency Public Safety and Security

Item	Issue / Analysis / Recommendation
8.4	Issue) Residents were not always confident that security patrols were being conducted in the evacuated areas. Analysis) CSPD provided 24/7 security patrols in the evacuated, and pre-evacuated, areas. In many circumstances, officers checked individual homes and secured the homes when doors and windows were found open. It is important to inform the public that these patrols are in place so that the residents feel comfortable leaving their homes when an evacuation is ordered. Recommendation) Advise the public that CSPD is providing security in the evacuated and pre-evacuated areas 24 hours a day.
8.5	Issue) Personnel were not always rotated consistently with regard to position and operational period. Analysis) When personnel were rotated in the same position/assignment during the incident, they developed an institutional knowledge that carried from shift to shift. This proved beneficial at the locations where this occurred. At times, this was not the practice, and it took longer for the personnel to gain the operational awareness necessary to progress with their shift. Recommendation) Ensure that consistency in personnel can be maintained throughout the incident as this builds event-specific institutional knowledge that assists with each operational period.
8.6	Issue) There were not a sufficient number of public safety personnel to staff every road block and intersection during the mass evacuations of Tuesday afternoon. Analysis) CSPD was able to immediately deploy more than 75 uniformed officers to assist with the mass evacuations of Tuesday afternoon, but this was not enough to staff each TCP and intersection. Non-sworn City personnel were immediately available to support the CSPD response. Legal determinations need to be made as to what functions and roles non-sworn City personnel can assume during a mass evacuation. Recommendation) Explore the possibility of training and utilizing additional City staff to

Item	Issue / Analysis / Recommendation
	provide support to law enforcement officers working on the safety and security aspects (i.e. Streets Division assisting with road blocks, traffic direction).
8.7	Issue) Detailed organization charts were not developed and used as part of the incident response and depth in positions was not identified. Analysis) Refer to Capability 4: EOC Operations, item 4.4. Recommendation) Refer to Capability 4: EOC Operations, item 4.4.
8.8	Issue) Advanced ICS training will assist first responders with the knowledge, skills, and abilities to engage in advanced concepts of incident command, such as building the detailed organization charts previously noted. Note: This is also covered in Section 9: Fire Incident Response Support Analysis) First responders have taken required ICS courses and have trained in real-world and training/exercise events. Advanced ICS courses provide training on more complex incidents. Understanding the complex nature of these events and how ICS organizes personnel is much more relevant with the recent exposure to the Waldo Canyon incident. Providing advanced ICS training at this time will give personnel an opportunity to receive the training and apply the knowledge of their recent experiences. Recommendation) Conduct advanced ICS training for first responders and Command and General staff.

Final AAR Recommendations: Emergency Public Safety and Security

Item	Issue / Analysis / Recommendation
8.c	Issue) CSPD Command was moved to six locations during the incident. Analysis) CSPD was forced to move its Command location six times during the incident as a result of multiple issues related to space, connectivity and proximity to other command operations. This continuous movement resulted in a significant loss of time for personnel organizing command and control of the law enforcement aspects of the incident. Recommendation) Pre-determine locations that can be used, preferably along with CSFD, for CSPD command. These locations must have existing infrastructure to support the needs of a command center.
8.c	Issue) Burglaries to homes and vehicles occurred in the evacuated areas. Analysis) Emphasis was placed early on for traffic control and securing the perimeter of the evacuated areas, but the same emphasis was not always placed on providing roving security patrols within the perimeter. More roving security patrols may have deterred or prevented some of the criminal activity in the evacuated zones. Recommendation) Deploy more resources to provide inter-perimeter patrol at the onset of the evacuation order to include voluntary, pre-evacuation, and mandatory evacuation notices. These roving patrol resources would be deployed along with evacuation traffic control.

CAPABILITY 9: FIRE INCIDENT RESPONSE SUPPORT

Definition: The Fire Incident Response Support capability provides coordination and implementation of fire suppression operations, which include the following tasks: assessing the scene, assigning resources, establishing ICS, communicating the status of the situation, requesting additional resources, establishing a safe perimeter, evacuating persons in danger, rescuing trapped victims, conducting fire suppression, determining the cause of the fire(s), and ensuring the area is left in a safe condition.

Source: DHS Target Capability List version 2.0.

The CSFD was the lead agency for Fire Incident Response in the Waldo Canyon Fire. While the CSFD provided resources to the Type I IMT, the CSFD Structure Protection Branch resources remained under the CSFD Structure Protection Branch Director. Numerous agencies assisted CSFD with mutual-aid through backfilling fire stations and in fire suppression efforts.

STRENGTHS OF FIRE INCIDENT RESPONSE SUPPORT:**Initial AAR Strengths: Fire Incident Response Support**

Item	Agency	Strength / Analysis
9.1		Personnel operated in adverse conditions amidst an urban conflagration for many hours/days, saving many homes, and no serious injuries occurred. <i>Note: This is also covered in Capability 7: Responder Safety and Health</i> Considering the duration, complexity, long hours, strenuous labor, and extreme weather conditions, it is a testament to the health, commitment, training, and adherence to safety procedures that no injuries occurred.
9.2		While there was a large loss of structures, the aggressive firefighting resulting from the CSFD's culture, training, experience, and equipment prevented the loss of many more. After reviewing data for the total number of residences directly affected and those that were destroyed, the average "save" rate is estimated at more than 80%. This is a direct result of the efforts of the CSFD and the mutual-aid partners that assisted in fighting this fire.
9.3		The urban conflagration covered a vast geographic area which posed a tremendous challenge for resources during the initial attack phase. Despite this unique and previously un-experienced situation, all fire companies aggressively engaged the fire throughout the Mountain Shadows neighborhood without the usual resource support available at a typical structure fire. Dedicated personnel are one of the primary strengths in this incident. This strength is reflected in many areas, where personnel were forced to work in unprecedented conditions while using their extensive training and experience.
9.4		Recently the CSFD re-aligned the reporting relationships for the two fire stations that are primarily responsible for the Wildfire Suppression Program. This resulted in a single chain of command, reporting to one District Chief, and accountability for all aspects of the

Item	Agency	Strength / Analysis
		program. The re-alignment of the Wildfire Suppression Program resulted in a streamlined focus on training. In recent years, the CSFD Wildfire Suppression Program has focused its training plan for the department on structure protection. These tactics were employed throughout this incident.

Final AAR Strengths: Fire Incident Response Support

No additional strengths are noted in this report for Fire Incident Response Support.

RECOMMENDATIONS FOR FIRE INCIDENT RESPONSE SUPPORT:**Initial AAR Recommendations: Fire Incident Response Support**

Item	Issue / Analysis / Recommendation
9.5	Issue) Coordination of arriving resources through an established staging area with the on-scene IC was often ineffective or non-existent which prevented accurate accountability of all crews/personnel operating in the area that was Immediately Dangerous to Life and Health (IDLH). Analysis) Personnel accountability is a critical function and a standard practice at all working incidents. This incident, however, created unforeseen challenges in tracking personnel and assignments, due to the incident's scope, the number of work sites, functional groups, and confusion of having all CSFD personnel on duty. Recommendation) Develop a comprehensive personnel accountability tracking system for large-scale incidents and mandatory recall situations.
9.6	Issue) Detailed organization charts were not developed and used as part of the incident response and depth in positions was not identified. Analysis) Refer to Capability 4: EOC Operations, item 4.4. Recommendation) Refer to Capability 4: EOC Operations, item 4.4.
9.7	Issue) Advanced ICS training will assist first responders with the knowledge, skills, and abilities to engage in advanced concepts of incident command, such as building the detailed organization charts previously noted. Analysis) Refer to Capability 8: Public Safety Security Response, item 8.8. Recommendation) Refer to Capability 8: Public Safety Security Response, item 8.8.

Final AAR Recommendations: Fire Incident Response Support

No additional recommendations are noted in this report for Fire Incident Response Support.

CAPABILITY 10: EVACUATION AND RE-ENTRY

Definition: Evacuation is the capability to prepare for, ensure communication of, and immediately execute the organized and managed evacuation of the at-risk population (and companion animals) to areas of safe refuge in response to a potentially or actually dangerous environment. In addition, this capability involves the safe re-entry of the population. Source: DHS Target Capability List version 2.0.

Colorado Springs developed a WUI Evacuation Appendix to the Colorado Springs Emergency Operations Plan (EOP) in 2008. This plan was reviewed and revised in June 2012, prior to the Waldo Canyon Fire.

STRENGTHS OF EVACUATION AND RE-ENTRY:**Initial AAR Strengths: Evacuation and Re-Entry**

Item	Strength / Analysis
10.1	Evacuation zones and Management Action Points (MAPs) were identified early in the incident based on fire behavior and subsequently modified throughout the incident. Developing MAPs and evacuation zones allowed for pre-planning to occur for each evacuation zone, in advance of the evacuation order.
10.2	Resident evacuation drills provided a beneficial opportunity for response personnel and residents to test their response to an evacuation prior to this incident. As discussed under Capability 3: Community Preparedness and Participation, resident participation in community evacuation drills was critical training for first responder personnel and community members.
10.3	Flexibility and dedication of all personnel conducting, and assisting with, evacuations were pivotal in executing the orders and successfully controlling the movement of evacuees. Personnel assigned to execute the mass evacuations on Tuesday afternoon were faced with an unprecedented situation. The evacuation plan that had been developed allowed for four hours to evacuate the northern Mountain Shadows/Peregrine neighborhood. The collapse of the thunderstorm column abbreviated this response time frame by three hours. Regardless, personnel demonstrated unfaltering resolve as they executed the evacuation plan under these unforeseen and indescribable conditions.
10.4	Allowing the Humane Society of the Pikes Peak Region (HSPPR) into the evacuated zone to retrieve animals relieved stress for evacuees and potentially saved the lives of companion animals. HSPPR officers returned to homes, on request, beginning on 29 June to retrieve animals left behind during the evacuation. There were numerous success stories where officers were able to reunite animals with their owners.
10.5	Allowing residents to return to the Mountain Shadows area quickly and spend the day with their homes, with neighbors and first responder personnel, was much appreciated by those affected.

Item	Strength / Analysis
	Residents were allowed entry into the fire-affected neighborhood on 1 July. This day was the absolute earliest that first responders, specifically fire personnel, deemed the neighborhood safe for entry for residents. First responders and other personnel were available as roving patrols in the neighborhood to provide assistance. Much discussion took place before allowing residents to self-enter the neighborhood, but in the end there were no reported safety issues and residents reported being very happy to have the opportunity to return, even for one day.

Final AAR Strengths and Analysis: Evacuation and Re-Entry

Item	Strength / Analysis
10.a	Closing of City Parks and Open Space locations. The early closure of City Parks and Open Space in the fire-affected areas and in other areas of the City resulted in reducing potential hazards and the number of individuals in public areas. Reducing this hazard allowed City personnel to focus on the response to the fire.
10.b	Allowing residents to bypass TCPs to return home to get children and other emergency items during the mass evacuations on 26 June. During the mass evacuation on Tuesday afternoon, TCPs were set up to block re-entry into the evacuated neighborhood. During the evacuation, numerous residents stopped at the TCPs and expressed a need to return home (e.g., to retrieve children who were home alone, medications, pets). A spontaneous decision was made by the CSPD Command to allow these residents entry into the neighborhood. It is believed that this decision resulted in saving responders from additional work that would have come from residents trying to return when the area was less stable.
10.d	Several strengths related to the initial re-entry day are noted: 1. Conducting "drive-through" check-in. 2. Providing masks, trash bags, snacks, and hydration to residents. 3. Providing roving patrols of behavioral health specialists, CSFD and CSPD chaplains, law enforcement officers, and fire personnel for the entire day. The initial re-entry day planning took into consideration many factors related to safety, security, public health and mental health. The neighborhood was not yet completely stable with the fire burning to the west, utility shut-offs, smoldering ash and debris. Drive through check-in points were used to move the greatest number of individuals into the area in the least amount of time. Trash bags and other items were provided to residents, along with information sheets, to give the most education and resources possible regarding potential dangers that would be encountered. Probably the most successful aspect of the day was the roving police and fire patrols, many of whom worked on the evening of 26 June. These personnel provided educational information and emotional support to those in need on this initial re-entry day.

RECOMMENDATIONS FOR EVACUATION AND RE-ENTRY:**Initial AAR Recommendations: Evacuation and Re-Entry**

Item	Issue / Analysis / Recommendation
10.6	Issue) Evacuation boundaries were not always clear. Analysis) Evacuation boundaries were not always readily identifiable based on the cross-streets and borders of the evacuation zone. This was even more problematic during re-entry when there were often no definitive boundaries, only street names. Residents tend to identify with their neighborhood name more than the boundaries that support it. Recommendation 1) Consider using street names as borders as well as using the names of neighborhoods. Recommendation 2) Ensure that maps of the evacuated areas are made available immediately through a variety of methods and modes (e.g., media, handouts at public locations, etc.).
10.7	Issue) First responders in the field responsible for enforcing the mandatory evacuations did not always know the exact boundaries and did not always receive the information immediately. Analysis) Decisions related to evacuation were made quickly once the fire breached a MAP. Personnel were geographically dispersed, creating a need to provide information rapidly to remote locations. Recommendation) Ensure that first responders have immediate access to maps and decisions regarding evacuations. Information sharing can be achieved by the recommendations suggested under item 1.c in Capability 1: Communications. Explore the ability to provide evacuation maps to smart phones and other portable devices.
10.8	Issue) Business owners and residents made numerous valid, emergency-related requests to enter the evacuated area. Analysis) Requests to enter the evacuated area were presented in a variety of locations and to a variety of individuals. Many re-entry requests were short-term to gather items necessary to business continuity or emergency items in residences. These requests were often fielded at TCPs and officers had to contact their chain of command to seek permission. The lack of a clearing-house/task force to field these requests created additional work for all the officers staffing TCPs in the field. Recommendation) Establish a re-entry task force early in the incident after the initial evacuations are ordered. This task force would be the single point of contact to assess the need for anyone wishing to gain entry during the mandatory evacuation and once the evacuation has been lifted.
10.9	Issue) Residents who attended the community meeting on 28 June at UCCS were not grouped by neighborhood when they were provided the information regarding the status of their homes. Analysis) Residents who attended the community meeting at UCCS were assembled in a large group and then divided into sub-groups. The group divisions did not allow for neighborhood residents to remain together for the notification of their homes' status. Feedback from the

Item	Issue / Analysis / Recommendation
	attendees noted that they would like to be grouped with their neighbors, regardless of the status of their homes. Peer support was the most important aspect of this interaction. Recommendation) When separating individuals for large meetings and/or announcements (such as the UCCS community meeting on 28 June), divide the attendees by geographical neighborhood.

Final AAR Recommendations: Evacuation and Re-Entry

Item	Issue / Analysis / Recommendation
10.e	Issue) Documentation of rapid door-to-door evacuations and refusals is extremely difficult to track during mass evacuations. Analysis) When CSPD conducted evacuations on Saturday, 23 June, there was adequate time to document each home contacted and/or any irregularity at the address (e.g., refusal, special needs). This process became more problematic on the afternoon of 26 June. Easy-to-use applications exist for hand-held devices that can be used in the field by law enforcement officers to quickly note the status of each house visited during an evacuation order. This accurate documentation will result in a reduction of duplication for officers who may need to revisit homes to check on the status of residents. Recommendation) Review the capabilities of evacuation software applications designed for public safety and implement relevant solutions for law enforcement.
10.f	Issue) Aerial photographs provided information related to the damaged and destroyed homes prior to the City being able to confirm the information on the ground. Analysis) City leadership was dedicated to providing personally delivered, accurate information to residents directly impacted by the fire. The ongoing media coverage and close-up views of homes burning on the evening of 26 June provided residents with their first look at the destruction in the affected neighborhoods. The zoom lenses of media cameras provided immediate and identifiable information for some. The following morning brought aerial before-and-after-photos of the devastated areas. Residents could look at these photos and determine if their homes were affected. For City officials, the identification process was cumbersome and tedious with personnel conducting damage assessment throughout the neighborhood, attempting to assemble the addresses affected in a neighborhood that, in some areas, was left with little to no identifying markers (e.g., street signs, house numbers on mailboxes, houses that were a total loss). Recommendation) Review the available options for gathering data as soon as possible on an affected area. This may include contracting flight services to take aerial photos and/or overlaying this information on existing data layers.

CAPABILITY 11: EMERGENCY PUBLIC INFORMATION

Definition: The Emergency Public Information and Warning capability includes public information, alert/warning and notification. It involves developing, coordinating, and disseminating information to the public, coordinating officials, and incident management and responders across all jurisdictions and disciplines effectively under all hazard conditions. Source: DHS Target Capability List version 2.0.

At the onset of the Waldo Canyon Fire, a Joint Information System (JIS) of agency Public Information Officers (PIOs) was established to deliver accurate and timely information to the public. The JIS was located at a Joint Information Center (JIC) housed at the El Paso County Sheriff's Office (EPSO). As the fire moved into Colorado Springs, the City Communications Office shared the lead in the JIC with the Type 1 IMT PIOs to disseminate information to the public.

STRENGTHS:**Initial AAR Strengths: Emergency Public Information¹³**

Item	Strength / Analysis
11.1	Conducting the press conferences at established times each day provided a reliable source of information. Holding the press conferences at consistent times throughout the fire provided for a reliable source of information for the public. The Policy Group met before each press conference and was able to provide relevant and timely updates.
11.2	The public information phone numbers that were answered in the JIC provided a good opportunity for immediate response and customer service to community members. Note: The establishment of a phone bank was a positive action, but there are recommendations noted in the section below as to how this can be improved upon in future incidents. The JIC established, and staffed, a phone bank throughout the incident for the public to call when asking questions. Communications staff and local PIOs who volunteered through the Crisis Communications Network (CCN) answered phones in the JIC and spoke directly with residents and members of the community who had questions or concerns. This direct link to the public allowed for the provision of excellent direct customer service.
11.3	Twitter was effective in providing immediate information to the public and, through monitoring the PIOs in the JIC could easily correct any misinformation. PIOs in the JIC linked numerous Twitter accounts (@SpringsGov, @CSFDPIO, @CSPDPIO, @mayorstevebach, @EPCSheriff, @EPCPIO) and utilized a single hashtag #waldocanyonfire to ensure that one message was being sent during the fire. Twitter was also closely monitored to ensure that any incorrect information was immediately corrected. Twitter followers of CSFD and Colorado Springs rose exponentially during the fire.

¹³ The information provided in this section is reflective of the City PIOs only, and is not reflective of the views of the many other agencies in the JIC.

Final AAR Strengths and Analysis: Emergency Public Information

Item	Date	Strength / Analysis
11.a		Public information was provided at regular intervals early and throughout the day from the onset of the incident. The press conferences on the first day were flexible and continuously evolved, adding the appropriate key players from various agencies to ensure that the information provided was comprehensive and complete. Rapidly changing information was provided frequently at these press conferences, as well as through social media (Twitter) and by the ongoing coverage from local media outlets.
11.b		Activation of the JIS/JIC in the early morning. <i>Note: The establishment of a JIC was a positive action, but there are recommendations noted in the section below as to how this can be improved in future incidents.</i> Managing public information during a fast-moving, multi-agency incident is extremely important. A multi-agency JIC was established the morning after the fire began with representatives from multiple agencies working the fire. Having representatives from multiple agencies resulted in the consolidation of information flow to and from the JIC to the public.
11.c		Creating a media staging area at Coronado High School and UCCS, away from incident operations. The media staging areas at Coronado High School and the UCCS provided a location where the media parked vehicles and awaited scheduled press conferences. This location was in close proximity to the ICP location(s) of City first responders allowing for operations to continue unimpeded, while providing access for the media to key officials at regularly scheduled times.
11.d		CAPS volunteers assisted with disseminating information to the community. Volunteers set up information tables at six grocery stores near evacuated areas where they provided daily updated information. This proved successful in getting information out to the community in various ways.

RECOMMENDATIONS:

Initial AAR Recommendations: Emergency Public Information

Item	Issue / Analysis / Recommendation
11.4	<u>Issue)</u> A JIC plan was not in place for the City prior to this incident. <u>Analysis)</u> The absence of a pre-existing JIC plan resulted in internal confusion regarding the delineation of roles of each City PIO and how this relates to the overall functions of the JIC. Consistent information sharing between PIOs in the field, EOC and JIC was a challenge. <u>Recommendation 1)</u> Develop a City Crisis Communications Team that works with the regional Crisis Communications Network (CCN) to refine public information plans and procedures. <u>Recommendation 2)</u> Consolidate all public-information functions and personnel under the Colorado Springs Communications Department.

Item	Issue / Analysis / Recommendation
	Recommendation 3) Develop a JIC plan for the City, ensuring that this plan defines roles and responsibilities for all JIC functions and how City PIOs will organize under this structure. Recommendation 4) Work with regional CCN to help participants identify and receive PIO and JIC training as needed.
11.5	Issue) There were not enough trained PIOs to fulfill the functions of the JIC and the Communications section of the EOC. Analysis) Trained PIOs were recruited from the CCN and utilized in the JIC and in the EOC. The demand for individuals to assist with public information was so great that additional personnel were requested from around the state to assist in staffing positions. Recommendation) Coordinate the provision of PIO training with City staff to ensure that there is depth in this position and identify additional trained local PIOs to supplement City Communications staff as necessary.
11.6	Issue) Messages during the mass evacuation on Tuesday afternoon did not contain all relevant information related to the execution of the evacuation. Analysis) Additional information could have been provided to residents that would have resulted in more streamlined evacuation procedures, especially during the evacuations on Tuesday afternoon. Additional information that could have proved helpful for residents included items such as reducing cell phone use to ensure emergency service was available, when needed, and communicating traffic plans such as contra flow out of the affected neighborhoods. Recommendation) Develop pre-scripted evacuation messages and provide more detail in the messages, especially whether the evacuation is emergent or not. If the evacuation is emergent, reiterate pertinent information such as: - Traffic plan information such as contra flow out of a neighborhood or on main arteries. - Use text messaging instead of cell phones to allow for emergency calls. - Take one car to keep your family together and help reduce traffic and cell phone congestion
11.7	Issue) Closed captioning was not available on all network stations during the incident. Analysis) Not everyone who is deaf or hard of hearing understands American Sign Language (ASL). The Federal Communications Commission (FCC) requires media outlets to provide closed captioning for networks. Recommendation) Work with local media and advocates for the deaf and hard of hearing community to provide closed captioning and interpreters during emergency incidents.

Final AAR Recommendations: Emergency Public Information

Item	Issue / Analysis / Recommendation
11.e	Issue) During this first day of the fire, early reports indicated four or more names for the fire (Pyramid Fire, Pyramid Mountain Fire, Waldo Fire, Waldo Canyon Fire). Analysis) This incident included an extremely fast-moving fire that immediately impacted two counties, multiple municipalities, and the USFS. Due to the nature of this event, the need to disseminate information to the public was a priority. As a result, agency-specific PIOs from

Item	Issue / Analysis / Recommendation
	Colorado Springs and El Paso County coordinated early messaging, but this was not confirmed with representatives from the USFS, the agency with ultimate jurisdiction over the fire. Recommendation) This confusion was remedied within the day and the correct name of the fire, Waldo Canyon Fire, was quickly disseminated at press conferences, news tickers, and Twitter. In the future, the fire name will be confirmed with the agency responsible for the fire (in this event, the USFS) prior to releasing information referring to the incident name.
11.f	Issue) The JIC location was not adequately equipped to handle the information requirements of this event. Analysis) The conference room where the JIC was located contained a minimal number of landline phones, minimal televisions for media monitoring, no recording capabilities for the televisions, and no physical dividers for all the personnel in the room resulting in noise. These factors created several limitations for JIC staff. Recommendation) Create a fixed-facility JIC location within a City building that has adequate equipment and connectivity for all organizations that may need to respond to a multi-agency incident. Of key importance for this facility is: - Landline telephones with predetermined telephone numbers. - Capability to monitor multiple television stations simultaneously and to record press conferences and other key information reported by the media.
11.g	Issue) The JIC did not have the ability to record press conferences and replay critical information to ensure accuracy. Analysis) The JIC did not have the technology to record the press conferences and/or other relevant media updates provided during the incident. Critical information was often relayed at the press conferences for the first time, and the JIC would immediately begin to receive phone calls requesting clarification. Without the ability to play back the press conference, JIC staff was put in a position of having to validate the information from other sources, taking more time away from their responsibilities. Recommendation) Ensure that there are multiple televisions with the ability to record live television from multiple networks in the JIC.
11.h	Issue) The JIC did not always have accurate maps, with neighborhood information included, when evacuations were announced. Analysis) Accurate, detailed maps of the evacuation zones for evacuation and re-entry were critical for members in the JIC who were responding to information requests. Recommendation) Devise a plan to ensure that plans can be immediately emailed to the JIC and provide the JIC facility with the equipment necessary to print the maps on plotter paper. For redundancy, develop a plan for hand-delivery of maps to the JIC facility that should be located in close proximity to the EOC.

SECTION 3: CONTACT INFORMATION

For any further information related to this report or for information regarding ongoing Waldo Canyon recovery efforts, please contact the Colorado Springs Office of Emergency Management.

Colorado Springs Office of Emergency Management

Name: Bret Waters

Title: Director

Street Address: 375 Printers Parkway

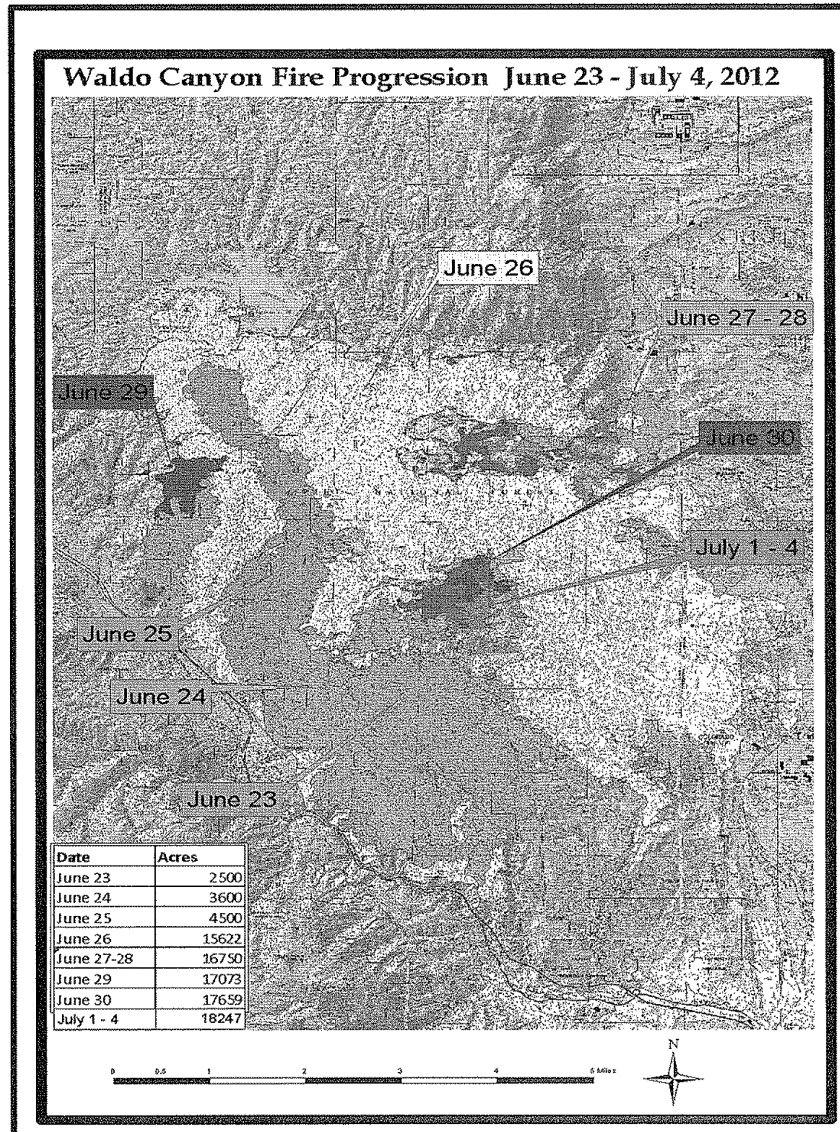
Colorado Springs, CO 80910

719-385-7229 (office)

e-mail: bwaters@springsgov.com

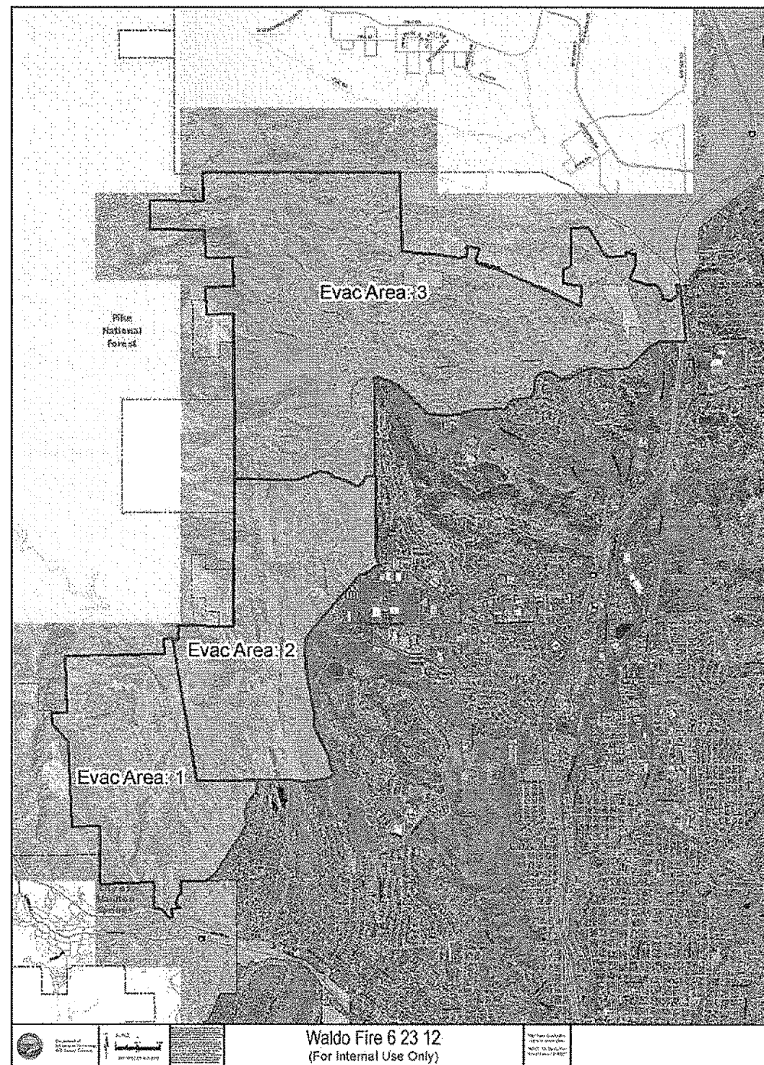


APPENDIX A: FIRE PROGRESSION MAP



APPENDIX B: COLORADO SPRINGS EVACUATION ZONES

Initial Evacuation Zones developed on 23 June 2012 (1-3):



Evacuation Zones revised and developed on 24 June 2012 (1-5):

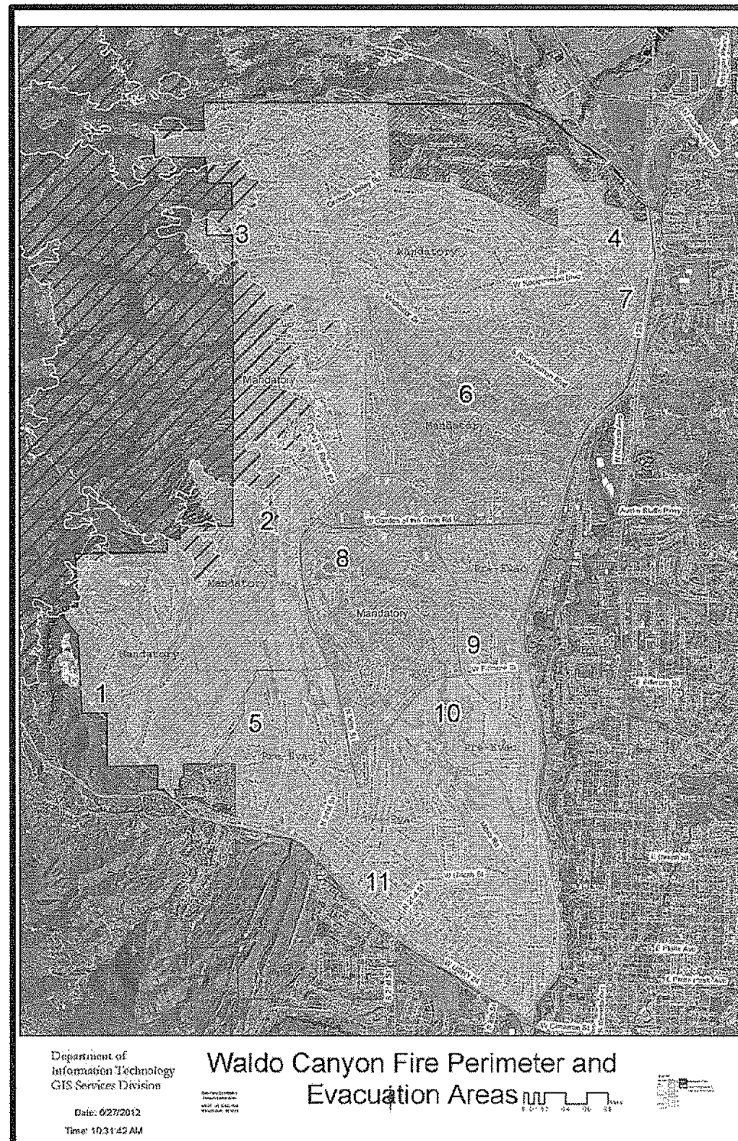


Department of
Information Technology
GIS Services Division
CITY OF COLORADO SPRINGS

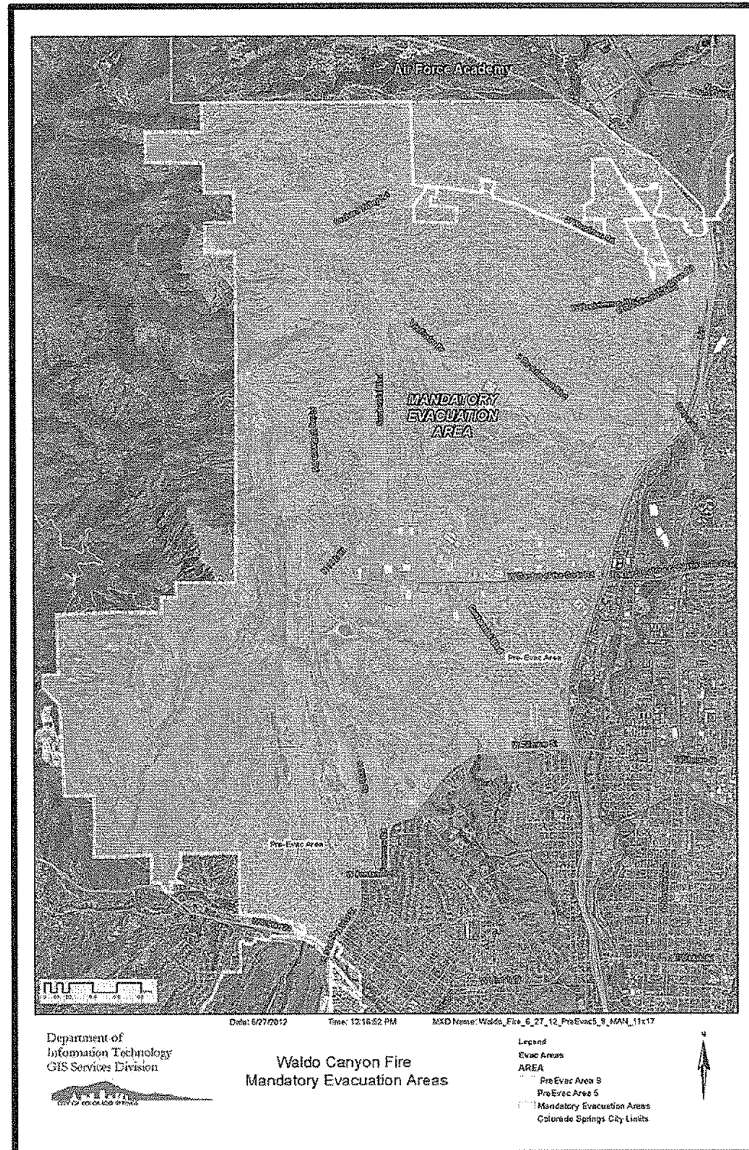
Waldo Canyon Fire Perimeter and
Evacuation Areas
May/June 16/24 2012
Time 9:14

Legend
Evacuation Zone 1
Evacuation Zone 2
Evacuation Zone 3
Evacuation Zone 4
Evacuation Zone 5
Fire Perimeter

All Evacuation Zones (1-11):



APPENDIX C: FINAL COLORADO SPRINGS EVACUATION MAP



APPENDIX D: RESPONSE ORGANIZATIONS

The organizations listed in the table below are representative of the preliminary assessment of organizations that supported the City of Colorado Springs' response to the Waldo Canyon Fire. Further assessment will likely find that there are additional agencies that should be added to this list.

Community Organizations	
American Red Cross	Goodwill
Care and Share	Humane Society of the Pikes Peak Region
Catholic Charities	Pikes Peak United Way
Colorado Volunteer Organizations Active in Disaster (COVOAD)	Salvation Army
Community Advancing Public Safety	Samaritan's Purse
Community Animal Response Team	The Navigators
Governmental Organizations	
Air Force Academy	El Paso Teller E-911 Authority
Civil Air Patrol	Fort Carson
Colorado Army and Air National Guard	Mountain Metropolitan Transit Bus Service
Colorado Department of Transportation	National Weather Service
Colorado National Guard	Natural Resource Conservation Service
Colorado Springs Utilities	Pikes Peak Community College
Colorado Water Conservation Board	Pueblo Chemical Depot
District 11 Transportation	Pikes Peak Regional Building Department
El Paso County Assessor's Office	Small Business Association
El Paso County GIS	United States Forest Service
El Paso County Public Health	United States Geological Society
Facilities	
Cheyenne Mountain High School	Lewis Palmer High School
Chipeta Elementary School	Penrose Equestrian Center
Coronado High School	Southeast YMCA
Eagleview Middle School	The Springs Church
Freedom Financial Services Expo Center	University of Colorado at Colorado Springs (UCCS)
Holmes Middle School	Verizon Wireless, Garden of the Gods
Emergency Management	
Colorado Department of Local Affairs	
Colorado Division of Emergency Management	
Colorado Division of Homeland Security and Emergency Management	
Colorado Office of Emergency Management	
Colorado Springs Office of Emergency Management	
El Paso County Emergency Services Division	
Federal Emergency Management Agency	
Great Basin Type 1 Incident Management Team	

MITIGATION STRATEGIES

Final After Action Report (AAR)

Waldo Canyon Fire

Fire	
Air Force Academy Fire Dept.	Golden Fire Dept.
Arvada West Fire Protection District	Green Mountain Falls Chipita Park Fire Dept.
Aurora Fire Dept.	Hanover Fire Protection District
Beulah Valley Volunteer Fire Dept.	Littleton Fire Department
Black Forest Fire/Rescue	Manitou Springs Fire Dept.
Boone County Fire Dept.	National Fire Protection Association
Broadmoor Fire Protection District	Northeast Teller County Fire Protection District
Calhan Fire Protection District	Palmer Lake Volunteer Fire Dept.
Cascade Volunteer Fire Dept.	Peterson Air Force Base Fire Department
Cheyenne Mountain Air Force Station Fire Dept.	United States Army Pueblo Chemical Depot
Cimarron Hills Fire Dept.	Pueblo County Sheriff's Office
Colorado Center Metro District	Pueblo West Fire Dept.
Colorado Springs Fire Department Explorers	Rye Fire Protection District
Crystal Park Volunteer Fire Dept.	Security Fire Dept.
Colorado Springs Utilities Wildland Fire Team	South Metro Fire Rescue Authority
Denver Fire Dept.	Southwest Highway 115 Volunteer Fire Dept.
Donald Westcott Fire Protection District	Stratmoor Hills Fire Dept.
El Paso County Wildfire Suppression Team	Tri-Lakes Monument Fire Protection District
Falcon Fire Protection District	West Metro Fire Protection District
Fort Carson Fire and Emergency Services	West Park Fire Dept.
Fountain Fire Dept.	Wheat Ridge Fire Protection District
Law Enforcement	
Alcohol Tobacco and Firearms (ATF)	El Paso County Sheriff's Office
Aurora Police Department	Federal Bureau of Investigation (FBI)
Colorado Department of Corrections	Fountain Police Department
Colorado State Patrol	Pueblo County Sheriff's Office
Department of Homeland Security Federal Police	Pueblo Police Department
Drug Enforcement Administration (DEA)	University of Colorado at Colorado Springs (UCCS)
El Paso County District Attorney's Office	Police Dept.
Medical/Behavioral	
Air Life Denver Ambulance	Memorial Hospital Transport Team
American Medical Response-Canon City	Mount St. Francis Nursing Center
American Medical Response-El Paso County	Rocky Mountain Mobile Medical
American Medical Response-Denver	Rural Metro Ambulance
American Medical Response-Pueblo	Silver Key Transportation
Aspen Pointe	Spanish Peaks
Calhan Ambulance Service	Mount St. Francis Transportation
Fountain Fire Department Ambulance	Stratmoor Hills Fire Department Ambulance
Hanover Fire Department Ambulance	Ute Pass Regional Ambulance District (UPRAD)
Medical Reserve Corps of El Paso County	Memorial Hospital Transport Team

APPENDIX E: 26 JUNE 2012 DETAILED TIMELINE

Time	Activity
7:00PM 25 June	The IMT Meteorologist issued the weather forecast for Tuesday, 26 June 2012: - Mostly sunny with late morning cumulus forming. A slight chance of high-based thunderstorms in the afternoon with little rain and gusty outflow winds up to 40 mph. - Northwest half of fire - west 5-8 mph with gusts to 12 until 0900, becoming southwest 9-12 mph with gusts to 20 mph until 1800, some gusts as high as 25 mph.
8:00AM	Morning press conference was held at Coronado High School.
9:00AM	Based on the National Weather Service (NWS) weather forecast, the Fire Department Operations Center (FDOC) created fire behavior modeling showing the fire moving at an approximate rate of ¼ mile per hour.
10:52AM	CSPD began allowing evacuees from Mountain Shadows to return to their homes for 30 minutes, after checking in with an officer at a checkpoint, to retrieve essential emergency items.
11:32AM	CSPD suspended the escorted returns into southern Mountain Shadows for emergency items due to fire behavior.
1:39PM	Pre-evacuation notice was issued for Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley).
2:26PM	CSFD weather spotter in the Cedar Heights area provided the following weather report: relative humidity 10.2%, wind speed of 5-6 mph with gusts up to 15mph, coming out of the S/SE.
2:29PM	Crystal Park Lookout reported seeing flare-ups on the west side of Williams Canyon.
3:45PM	Air Attack reported spotting the fire approximately 350 feet from the bottom of Queens Canyon.
3:52PM	Crystal Park Lookout reported seeing fire on the northern ridge of Queens Canyon's western side.
4:04PM	Afternoon press conference began at Coronado High School.
4:05PM	CSFD weather spotter in the Cedar Heights area provided the following weather report: 96 degrees, relative humidity of 11.8, wind speed of 8 mph with gusts up to 18 mph, coming out of the S/SE.
4:08PM	Fire was reported on the east side of the most east facing ridge of Queen's Canyon. Captain Steve Riker was located east of Wilson Tank and called Battalion Chief (BC) Collas to confirm the evacuation order for Zone 3. BC Collas acknowledged and stated that he would confirm.
4:10PM	BC Collas requested the mandatory evacuation of Zone 3.
4:11PM	CSFD's FDOC began to request additional outside resources for northern Mountain Shadows and assigned additional CSFD personnel to work in northern Mountain Shadows and Peregrine.
4:20PM	CSFD radio transmissions from personnel west of the Wilson Tank in northern Mountain Shadows noted that fire had moved approximately 1/3 of the way down the eastern ridge of Queen's Canyon.

MITIGATION STRATEGIES

Final After Action Report (AAR)

Waldo Canyon Fire

Time	Activity
4:21PM	Mayor Bach interrupted the afternoon press conference to announce the mandatory evacuation of Zone 3.
4:23PM	CSFD radio transmissions from personnel west of the Wilson Tank in northern Mountain Shadows noted that the fire had jumped to the top of the next ridge over (two peaks over and starting to run to the northeast).
4:24PM	The mandatory evacuation notice was given for Zone 3 (northern Mountain Shadows, Peregrine, Oak Valley) via the Emergency Notification System (ENS).
4:36PM	Task Force 1 requested confirmation that the evacuation had been ordered and stated that there were still a lot of homeowners in Peregrine. Chief Dubay confirmed that the evacuation order went out approximately 15 minutes prior.
5:00PM	Evacuation Zones 6, 7, 8, and 9 were developed and mapped.
5:07PM	A helicopter made its final water drop on the area west of northern Mountain Shadows/Peregrine.
5:08PM	CSFD personnel located near the Wilson Water Tank moved to hard pavement near the Wilson Tank.
5:11PM	Air Attack reported that the column had collapsed.
5:23PM	CSFD ordered all personnel to retreat to Chipeta Elementary School due to the aggressive fire entering the area.
5:38PM	CSFD ordered all personnel at Chipeta Elementary School to retreat to the MCI building on Garden of the Gods and Centennial due to the fire front that was raging through the neighborhood.
6:00PM	CSFD resources reentered the northern Mountain Shadows neighborhood to commence firefighting efforts.
6:22PM	The mandatory evacuation notice was given for Zone 4 (north Rockrimmon) via the ENS.
6:53PM	Pikes Peak American Red Cross (PPARC) opened a second shelter in Colorado Springs at the Southeast YMCA.
7:09PM	Freedom Financial opened to shelter pets.
7:37PM	The mandatory evacuation notice was given for Zone 7 (southeast Rockrimmon) via the ENS.
7:50PM	The mandatory evacuation notice was given for Zone 6 (south Pope's Valley, Woodman Valley, Pinon Valley, Pine Cliff) via the ENS.
8:02PM	PPARC opened a third shelter in Monument at Lewis Palmer High School.
8:30PM	An evening press conference was held at UCCS to provide information regarding the recent events of the column collapse and subsequent firestorm in northern Mountain Shadows.
9:46PM	The mandatory evacuation notice was given for Zone 8 (Kissing Camels) via the ENS.

APPENDIX F: DEFINITIONS

Alert: Alert refers to any text, voice, video, or means, whereby an authorized official provides situational awareness to the public about a potential or ongoing emergency situation. An alert does not necessarily require immediate actions, but typically issued in connection with immediate danger.

Agency Representative (AREP): This ICS position serves as the point of contact for an assisting or cooperating agency which has been delegated authority to make decisions on matters affecting that agency's participation at the incident.

Amateur Radio Emergency Services (ARES): The use of designated radio frequency spectrum for private recreation, non-commercial exchange of messages, wireless experimentation, self-training, and emergency communications. ARES consists of licensed amateurs who register their qualifications and equipment with local ARES leadership and volunteer for communications duty in public service when disaster strikes.

Cell on Wheels (COW): A mobile cell site that consists of a cellular antenna tower and electronic radio transceiver equipment on a truck or trailer, designed to be part of a cellular network.

Command: The act of directing, ordering or controlling by virtue of explicit statutory, regulatory or delegated authority.

Command Staff: An incident command component that consists of a Public Information Officer, Safety Officer, Liaison Officer and other positions as required, who report directly to the Incident Commander.

Community Advancing Public Safety Program (CAPS): CAPS provides opportunities for volunteers (18 and older) to take an active role in the community's public safety efforts. The CAPS program matches volunteers' interests, experience and skills with a meaningful and unique opportunity to contribute to the community. Opportunities are available at both internal operations and at field locations.

Community Animal Response Team (CART): Group of trained members who perform animal (pet and livestock) rescue, evacuation, and sheltering operations during emergencies and disasters.

Colorado Office of Emergency Management (COEM): Operating under the Department of Public Safety, Division of Homeland Security and Emergency Management, COEM is responsible for the state's comprehensive emergency management program, which supports local and state agencies.

Community Wildfire Protection Plan (CWPP): A CWPP identifies and prioritized areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on

Crisis Communications Network (CCN): Multi-agency network of crisis communicators in the Colorado Springs area.

Delegation of Authority: The transfer of authority for suppression actions on a wildland fire is accomplished through the execution of a written delegation of authority from the agency administrator with responsibility for the land area involved to the incident commander who will be assigned responsibility for implementing the agency's strategic direction for management of the incident.

Disaster: A severe or prolonged incident which threatens life, property, environment or critical systems.

Disaster Recovery Center (DRC): A DRC is a readily accessible facility or mobile office where applicants may go for information about FEMA or other disaster assistance programs, or for questions related to his or her case.

Department of Local Affairs (DOLA): The Department of Local Affairs (DOLA) serves as the primary interface between the State and local communities. The department provides financial support to local communities and training and technical assistance to elected community leaders in the areas of governance, housing, property tax administration, and emergency management.

Emergency Notification System (ENS): A public safety communications system used to communicate with groups of people in a defined geographic area. The system uses a database of telephone numbers and associated addresses, which, when tied into geographic information systems (GIS), can be used to deliver recorded emergency notifications to a selected set of telephone service subscribers.

Emergency Operations Center (EOC): An EOC is a central coordination point for all policy decisions, resource allocation, operations, and public information dissemination, in coordination with the JIC – if established - during a large-scale incident. The EOC functions as the information collection point for maintaining situational awareness and a common operating picture for all agencies involved in the response to a large-scale incident. An EOC is responsible for the strategic overview, or "big picture", of the disaster, and does not normally directly control field assets, instead making operational decisions and leaving tactical decisions to lower commands.

Emergency Operations Plan (EOP): The EOP assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency that exceeds the capability or routine responsibility of any one agency. The EOP sets forth lines of authority and organizational relationships, and shows how all actions will be coordinated and describes how people and property will be protected in emergencies and disasters. The EOP identifies personnel, equipment, facilities, supplies, and other resources available - within the jurisdiction or by agreement with other jurisdictions - for use during response and recovery operations.

Federal Emergency Management Agency (FEMA): FEMA is an agency of the United States Department of Homeland Security, initially created by Presidential Reorganization Plan No. 3 of 1978 and implemented by two Executive Orders on April 1, 1979. The agency's primary purpose is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities. The governor of the state in which the disaster occurs must declare a state of emergency and formally request from the president that FEMA and the federal government respond to the disaster.

Fire Department Operation Center (FDOC): When a single major incident or multiple large incidents are occurring, the CSFD FDOC will be activated to manage/coordinate uncommitted CSFD resources and mutual-aid requests. If activated, the EOC will provide resource support to the incident(s), coordinating with the FDOC, as needed.

Fire Management Assistance Grants (FMAG): FMAG is federal financial assistance available to States, local and tribal governments, for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands. FMAG is requested by a local fire agency through the State Emergency Management Agency.

GEOCAST: Refers to the delivery of information to a group of destinations in a network identified by their geographical locations. It is a specialized form of multicast addressing used by some routing protocols for mobile ad hoc networks.

Hazard: Something that has the potential to be the primary cause of an incident.

Human-caused: Incidents caused by human activity, which include but are not limited to chemical, biological, radiological, nuclear, explosive and technological, including cyber, hazards, whether accidental or intentional.

Incident: An occurrence or event, natural or manmade, that requires a response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies and other occurrences requiring an emergency response.

Incident Action Plan (IAP): An oral or written plan containing general objectives reflecting the overall strategy for managing an incident. It may include the identification of operational resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods.

Incident Command or Incident Commander (IC): The IC is the person responsible for all aspects of an emergency response; including quickly developing incident objectives, managing all incident operations, application of resources as well as responsibility for all persons involved. IC sets priorities

and defines the organization of the incident response teams and the overall IAP.

Incident Command Post (ICP): The ICP is a temporary facility that signifies the physical location of the tactical-level, on-scene incident command and management organization. It typically comprises the Incident Commander and immediate staff and may include other designated incident management officials and responders from Federal, State, local, and tribal agencies, as well as private sector, nongovernmental, and volunteer organizations. ICPs may be mobile, rather than temporary (see Mobile Command Post).

Incident Command System (ICS): ICP is "a systematic tool used for the command, control, and coordination of emergency response" according to the United States Federal Highway Administration. A more detailed definition of an ICS according to the United States Center for Excellence in Disaster Management & Humanitarian Assistance is "a set of personnel, policies, procedures, facilities, and equipment, integrated into a common organizational structure designed to improve emergency response operations of all types and complexities. ICS is a subcomponent of the National Incident Management System (NIMS), as released by the U.S. Department of Homeland Security in 2004."

Incident Management System (IMS): An IMS is formalized and institutionalized and addresses the principles of command and basic functions of planning, operations, logistics, finance and administration. An IMS is modular, scalable, interactive and flexible; it includes common terminology, manageable span of control, unified command, consolidated action plans, multi-agency coordination and integrated communications. Examples include the National Incident Management System (NIMS), ICS, or a multi-agency coordination system.

Incident Management Team (IMT): An IMT is a comprehensive resource (a team) to either augment ongoing operations through provision of infrastructure support, or when requested, transition to an incident management function to include all components/functions of a Command and General Staff. An incident such as a wildland fire is initially managed by local fire departments or fire agencies, but if the fire becomes complex additional resources are called in to address the emergency, and higher levels of management training and capability are required. IMTs are "typed" according to the complexity of incidents they are capable of managing and are part of an Incident Command System.

- **Type 3 IMTs** are deployed as a team of 10-20 trained personnel, representing multiple disciplines who manage major and/or complex incidents requiring a significant number of local, state, or tribal resources. They manage incidents that extend into multiple operational periods. A Type 3 IMT may initially manage more complex incidents that later transition to a National Level IMT.
- **Type 1 IMTs** are a Federally or State-certified team. Type 1 is the most robust IMT with the most training and experience. Sixteen Type 1 IMTs are now in existence, and operate through interagency cooperation of federal, state and local land and emergency management agencies.

Job Aids: A checklist or other visual aid intended to ensure that specific steps for completing a task or assignment are accomplished.

Joint Information Center (JIC): The JIC is the facility whereby an incident, agency, or jurisdiction can support media representatives. Often co-located - even permanently designated - in a community or state EOC the JIC provides the location for interface between the media and the PIO. Most often the JIC also provides both space and technical assets (Internet, telephone, power) necessary for the media to perform their duties. A JIC very often becomes the "face" of an incident as it is where press releases are made available as well as where many broadcast media outlets interview incident staff. It is not uncommon for a permanently established JIC to have a window overlooking an EOC and/or a dedicated background showing agency logos or other symbols for televised interviews. The National Response Coordination Center (NRCC) at FEMA has both, for example, allowing televised interviews to show action in the NRCC behind the interviewer/interviewee while an illuminated "Department of Homeland Security" sign, prominently placed on the far wall of the NRCC, is thus visible during such interviews.

Joint Information System (JIS): Mechanisms that integrate information and public affairs into a cohesive organization designed to provide consistent, coordinated, accurate, accessible, timely, and complete information during a crisis or incident.

Jurisdiction: A state, territory, region, tribal government, county, parish or municipality. A range or sphere of authority. Public agencies have jurisdiction at an incident related to their legal responsibilities and authority.

Liaison: Person that liaises between two organizations to communicate and coordinate their activities. Generally, they are used to achieve the best utilization of resources or employment of services of one organization by another.

Logistics Section: Under ICS, the section responsible for providing facilities, services, and material support for the incident.

Lookouts – Communications – Escape Routes – Safety Zones (LCES): LCES is a system response to fire line safety.

Management Action Points (MAPs): Geographic points on the ground or specific points in time where an escalation or alternative of management actions is warranted. Timely implementation of the actions when the fire reaches the action point is generally critical to successful accomplishment of the objectives.

Mitigation: The activities designed to reduce or eliminate risks to persons or property or to lessen the actual or potential effects or consequences of a disaster. Mitigation measures may be implemented prior to, during or after a disaster. Mitigation measures are often informed by lessons learned from prior disasters. Mitigation involves ongoing actions to reduce exposure to, probability of, or potential loss from hazards.

Mobile Command Post (MCP): The MCP signifies the physical location of the tactical-level, on-scene incident command and management organization. It typically comprises the Incident Commander and immediate staff and may include other designated incident management officials and responders. Typically, the ICP is located at or in the immediate vicinity of the incident site and is the focus for the conduct of direct, on-scene control of tactical operations.

Multijurisdictional Incident: An incident requiring action from multiple agencies that each have jurisdiction to manage certain aspects of the incident.

Mutual-Aid: Assistance in firefighting or public safety operations by agencies, without regard for jurisdictional boundaries.

Mutual-Aid Agreement (MAA): An agreement among emergency responders to lend assistance across jurisdictional boundaries. This may occur due to an emergency response that exceeds local resources, such as a disaster or a multiple-alarm fire. Mutual-aid may be *ad hoc*, requested only when such an emergency occurs. It may also be a formal standing agreement for cooperative emergency management on a continuing basis, such as ensuring that resources are dispatched from the nearest fire station, regardless of which side of the jurisdictional boundary the incident is on. Agreements that send closest resources are regularly referred to as "automatic -aid agreements."

Multi-Agency Coordination (MAC): MAC is part of the standardized Incident Command System. MACs provides the basic architecture for facilitating the allocation of resources, incident prioritization, coordination and integration of multiple agencies for large-scale incidents and emergencies

National Incident Management System (NIMS): NIMS is a systematic, proactive approach to guide departments and agencies at all levels of government, NGOs, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment.

National Wildfire Coordinating Group (NWCG): NWCG is an operational group designed to coordinate programs of the participating wildfire management agencies.

Non-Governmental Organization (NGO): NGOs are legally constituted organizations created by people who operate independent of government. The term refers to organizations that are not a part of a government and are not conventional for-profit businesses. In cases in which an NGO is funded totally or partially by governments, the NGO maintains its non-governmental status by excluding government representatives from membership in the organization.

Notification: Notification refers to any process where Federal, State, local, tribal, and NGOs, department, and/or agency employees and/or associates are informed of an emergency situation that may require a response from those notified.

Office of Emergency Management (OEM): The OEM is responsible for providing mitigation, preparedness, response, recovery, and coordination for large-scale emergencies and disasters, both natural and human-caused, for the purpose of saving lives and preventing property damage

Operational Period: A defined period of time in which a specific set of objectives are established for managing incident activities and for which specific resources and personnel are assigned to those activities, as determined by the IC.

Operations Section: Under ICS, responsible for all tactical incident operations and implementation of the IAP. The Operations Section normally includes subordinate Branches, Divisions, or Groups.

Personal Protective Equipment (PPE): PPE is protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury. The hazards addressed by PPE include physical, electrical, heat, chemical, biohazard, and airborne particulate matter.

Policy Group: Elected and key officials having authority over the jurisdiction.

Preparedness: The range of deliberate, critical tasks and activities necessary to build, sustain and improve the operational capability to prevent, protect against, mitigate against, respond to and recover from disasters. Preparedness is a continuous process.

Presidential Disaster Declaration: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (referred to as the Stafford Act - 42 U.S.C. 5721 et seq.) authorizes the President to issue "major disaster" or "emergency" declarations before or after catastrophes occur. Emergency declarations trigger aid that protects property, public health, and safety and lessens or averts the threat of an incident becoming a catastrophic event. The Governor of the affected state must request the Declaration.

Prevention: Actions to avoid an incident or to intervene to stop an incident from occurring. Prevention involves actions to protect lives and property. It involves identifying and applying intelligence and other information to a range of activities that may include such countermeasures as deterrence operations; heightened inspections; improved surveillance and security operations; investigations to determine the full nature and source of the threat; public health and agricultural surveillance and testing processes; immunizations, isolation, or quarantine; and, as appropriate, specific law enforcement operations aimed at deterring, preempting, interdicting or disrupting illegal activity, and apprehending potential perpetrators.

Procedures: Detailed description of activities that support implementation of a plan(s).

Public Information: Public information refers to any text, voice, video, or other information provided by an authorized official, including general information and crisis and emergency risk communication activities.

Public Information Officer (PIO): PIOs are the communications coordinators or spokespersons of certain governmental organizations (i.e. city, county, school district, state government and police/fire departments). The primary responsibility of a PIO is to provide information to the media and to the public, as required by law and according to the standards of their profession.

Recovery: Recovery programs are designed to assist victims and their families, restore institutions to suitable economic growth and confidence, rebuild destroyed property, and reconstitute government operations and services. Recovery actions often continue long after the incident. Recovery programs include mitigation components designed to avoid damage from future incidents.

Red Card: A card issued to persons showing their incident management and trainee qualifications to fill specified fire management positions in an incident management organization.

Red Flag Warning: The National Weather Service issues Red Flag Warnings & Fire Weather Watches to alert fire departments of the onset, or possible onset, of critical weather and dry conditions that could lead to rapid or dramatic increases in wildfire activity. A Red Flag Warning is issued for weather events which may result in extreme fire behavior that will occur within 24 hours.

Response: The response of an entity to a disaster or other significant event that might impact the entity. Activities, tasks, programs, and systems can include the preservation of life, meeting basic human needs, preserving business operations, and protecting property and the environment. An incident response can include evacuating a facility, initiating a disaster recovery plan, performing damage assessment, and any other measures necessary to bring an entity to a more stable status.

Staging Area: Temporary locations at an incident where personnel and equipment are kept while waiting for tactical assignments. The resources in the Staging Area are always in available status. There may be more than one Staging Area at an incident. Staging Areas should be located close enough to the incident for a timely response, but far enough away to be out of the immediate impact zone.

Structure Protection: The protection of homes or other structures from wildland fire.

Volunteer. A person who is a member of a volunteer organization and, in the event of a disaster, provides volunteer services through the organization.

Warning: Warning refers to any text, voice, video, or other information provided by an authorized official to provide direction to the public about an ongoing emergency situation that requires immediate actions to protect life, health, and property. A warning requires immediate actions and is typically issued when there is a confirmed threat posing an immediate danger to the public.

APPENDIX G: COLORADO SPRINGS WALDO CANYON FIRE FAST FACTS

The following information is provided as a reference for information specific to the City of Colorado Springs. As with many other aspects of this document, this information does not take into account the larger

Total Evacuations:

Evac Zone	Neighborhood(s)	Evac Date	Return Date	Residents Affected	Buildings Affected	Notes
1	Cedar Heights	6/23	6/29	406	213	
2	Southern Mountain Shadows	6/23	Multiple	1,875	840	Streets in Mountain Shadows were released street by street, day by day, until 8 July.
3	Northern Mountain Shadows/Peregrine/Oak Valley	6/26	Multiple	7,090	2,565	Peregrine: 7/1 Oak Valley: 7/1 N. Mountain Shadows: See above.
4	Northern Rockrimmon	6/26	6/29	8,250	2,987	
5	Pleasant Valley	N/A	N/A	2,865	2,178	Pre-Evacuation Only
6	Woodmen Valley/Pinon Valley/Pine Cliff	6/26	Multiple	5,114	1,955	Pine Cliff: 6/28 Woodmen Valley: 6/29 Pinon Valley: 7/1
7	Southeast Rockrimmon	6/26	6/28	3,820	1,434	
8	Kissing Camels	6/26	6/28	2,215	1,314	
9	Holland Park	N/A	N/A	3,995	1,601	Pre-Evacuation Only
10	Old Colorado City	N/A	N/A	3,156	1,686	Pre-Evacuation Only
11	Mesa/Indian Heights	N/A	N/A	13,270	9,558	Pre-Evacuation Only
Total				52,056	26,331	

Total number of residents evacuated: 28,770

Total number of buildings in the evacuated areas: 11,308

Total Acreage Burned:

Jurisdiction	Acreage
National Forest Service	14,422
El Paso County	2,309
City of Colorado Springs	1,516
Total	18,247

Destroyed and Damaged Homes:

The initial number of destroyed homes announced to the public was 346. This number was later reduced by one due to a destroyed home with two driveways that were initially thought to be two homes. This reduced the official number of destroyed and damaged homes to 345. Two additional homes were initially categorized as “not livable”, but were later demolished and added to the count of destroyed homes. The final number of destroyed homes remains 347.

A total of 46 homes were damaged.

Financial Impact:

The following City expenditures were submitted for reimbursement for the Waldo Fire:

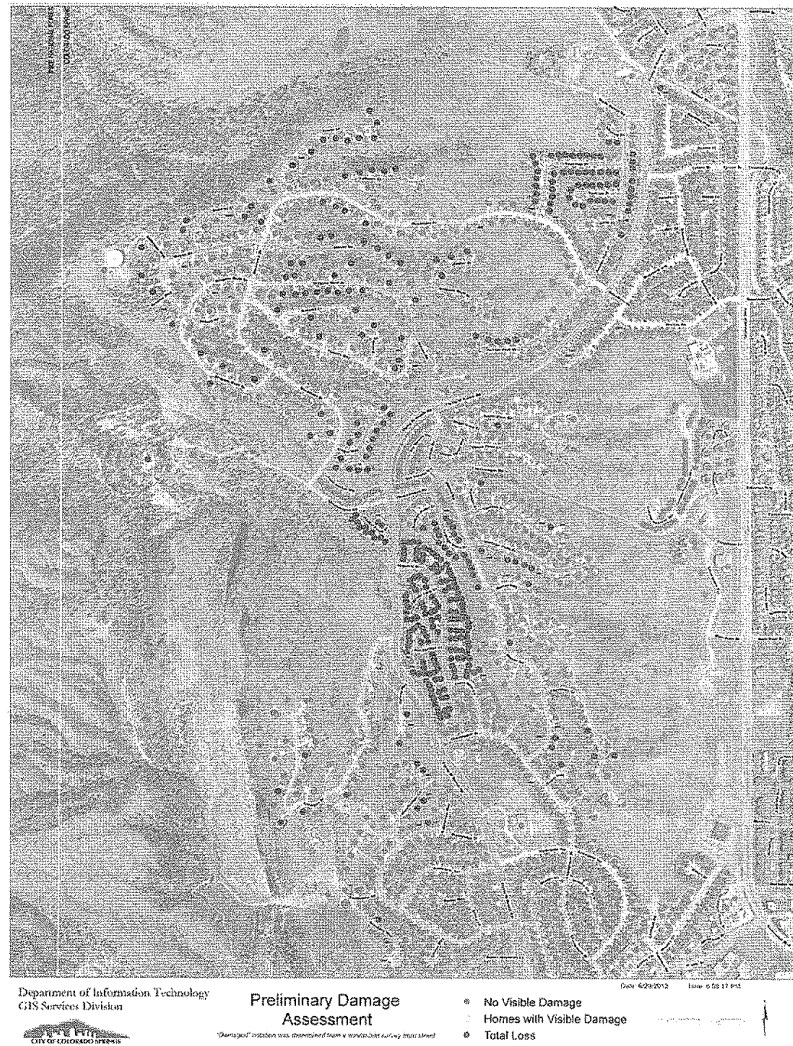
- Public Assistance (non-suppression activities) - \$1,432,126
- FMAG (suppression activities) - \$1,280,384

These figures are based on allowable actual expenditures. The figures do not include any regular salaries or other items (e.g., vehicle maintenance, video costs) that were paid during the incident since they are not considered an allowable expense.

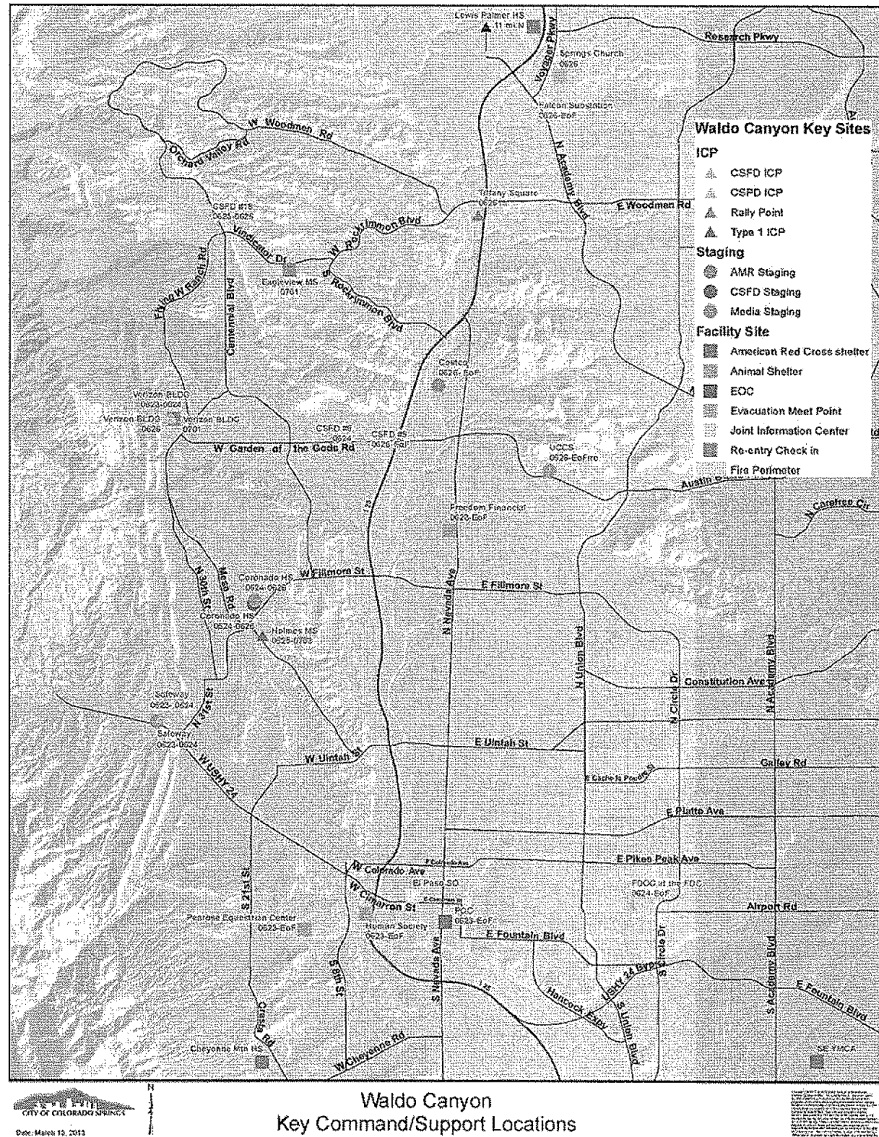
City Personnel:

1,302 sworn and civilian staff members provided direct and indirect support, to the Waldo Canyon Fire response.

APPENDIX H: MAP OF DESTROYED/DAMAGED HOMES



APPENDIX I: MAP OF COLORADO KEY COMMAND/SUPPORT LOCATIONS



APPENDIX J: SENATORS BENNET AND UDALL LETTER TO SECRETARY VILSACK

United States Senate
WASHINGTON, DC 20510

October 11, 2012

The Honorable Tom Vilsack
Secretary, United States Department of Agriculture
1400 Independence Ave., S.W.
Washington, DC 20250

Dear Secretary Vilsack,

This was a historic wildfire year for Colorado; twice within three weeks we broke the previous record for the most destructive wildfire in state history. While large destructive fires like High Park and Waldo Canyon dominated the national news, there were fires burning in almost every area of the state, including the 14,000-acre Pine Ridge Fire in Mesa County, 10,000-acre Weber Fire in Montezuma County, and 45,000-acre Last Chance Fire in Washington County.

These Wildland-Urban Interface (WUI) fires were unprecedented in size and impact. However, this was not the first time – nor will it be the last time – we face these kinds of fires. High Park and Waldo Canyon are unfortunately just the latest in a series of high-impact WUI fires in Colorado's Front Range since the late 1980s, some of which include Left Hand Canyon, Buffalo Creek, Hayman, Fourmile Canyon and Crystal.

Recent estimates indicate that 40 percent of Colorado's population lives in the WUI, even though less than 4 percent of the state's geographic area is WUI. Lives, communities and natural resources continue to be exposed to the impending risk of wildfire. The unprecedented nature and pattern of these fires call for a systematic and scientific analysis to learn how we as a society can do better. Our goal is to make sure that the lessons learned — positive and negative — are captured and acted upon appropriately. Reports from the incident management team have suggested that a combination of dry and windy conditions, steep rugged terrain and altered fuels all contributed to the extreme fire behavior witnessed during these fires.

We must examine the factors that led to the level of intensity and damage, and learn what we can do to reduce future risks.

The short- and long-term human and financial tolls of large, high-impact fires can create ripple effects that can impact local communities and regional economies for many years. Identifying and understanding those personal and economic costs can help target assistance and capacity-building efforts. Also, identifying and understanding human behaviors and trends can provide important guideposts for other WUI communities at impending risk of a wildfire and the organizations that assist those communities.

We are asking for a comprehensive and scientific review of several different elements of these fires, including, but not limited to, the following research questions:

- For the High Park Fire, what was the influence of beetle-kill trees on fire behavior and severity?
- For both the High Park and Waldo Canyon fires, where did forest and fuels treatments occur and what types of treatments were conducted? On lands in both fire areas, what was the effectiveness of various fuels treatments, including prescribed fire, in stopping or slowing the fire, reducing fire intensity and reducing soil damage?
- What influence did Community Wildfire Protection Plans play in the management and losses of this fire? What can be learned from the treatment program that can be applied to future treatment strategies in the WUI?
- What are the long-term ecological trajectories of areas burned in this fire event?
- What are the total direct and indirect costs that accrue over time from these fires? For example, the Western Forestry Leadership Coalition estimated that the 'true' cost of the Hayman Fire was estimated to exceed \$207 million while the direct fire suppression cost comprised only \$43 million.
- What can we learn about how burned areas are redeveloped? What are the costs of reinvesting in the burned areas, including property, infrastructure, natural resource values and ecosystem function?
- What role did fire brands and direct heating from the flame front play in structure loss during this fire?
- What are the motivations and incentives that cause homeowners to take action or not take action on their property to mitigate the risk of wildfire?
- What is the relative effectiveness of different forms of post-fire stabilization and restoration treatments – such as natural revegetation, plantings, seeding and mulching – on water quality, species diversity, impacts to soil, riparian areas? What influence will post-fire rehab have on vegetative and ecological trajectories?

This type of systematic, in-depth analysis to understand the social, economic, organizational and ecological impacts of these fires is essential to effectively addressing the future of fire management in the WUI and to mitigating the impact of these large catastrophic events.

We look forward to working with you on this focused program of work. We also ask that you consider working in partnership with some of our excellent Colorado-based research institutions, including the USDA Rocky Mountain Research Station, the Southern Rockies Fire Science Network, Colorado Forest Restoration Institute, the Western Fire Research Center, and the National Institute for Standards and Technology.

Sincerely,



Mark Udall
U.S. Senator



Michael Bennet
U.S. Senator

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UNIT 2:

TECHNICAL TOOLS TO SUPPORT FIRE-ADAPTED COMMUNITIES

TERMINAL OBJECTIVE

The students will be able to

- 2.1 *Identify how technical tools that support development of a fire-adapted community (FAC) can be used in their locality.*

ENABLING OBJECTIVES

The students will be able to:

- 2.1 *Give examples of how national codes and standards can be integrated into a Community Wildfire Protection Plan (CWPP) to support an FAC.*
 - 2.2 *Describe the technical tools that can be used to support a CWPP and FAC initiative.*
 - 2.3 *Explain how fire modeling technology can be used to support a CWPP and FAC initiative.*
 - 2.4 *Articulate how to integrate a wildland fire preplan into a CWPP.*
 - 2.5 *Discuss strategies that other communities are using to mitigate wildland fire and develop FACs.*
-

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UNIT 2: TECHNICAL TOOLS TO SUPPORT FIRE-ADAPTED COMMUNITIES

Slide 2-1

ENABLING OBJECTIVES

- Give examples of how national codes and standards can be integrated into a Community Wildfire Protection Plan (CWPP) to support a fire-adapted community (FAC).
- Describe the technical tools that can be used to support a CWPP and FAC initiative.

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ENABLING OBJECTIVES (cont'd)

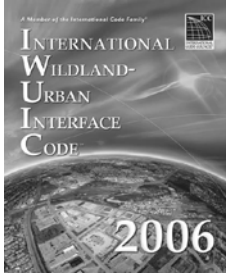
- Explain how fire modeling technology can be used to support a CWPP and FAC initiative.
- Articulate how to integrate a wildland fire preplan into a CWPP.
- Discuss strategies that other communities are using to mitigate wildland fire and develop FACs.

Slide 2-3

I. TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY

What is a code?



Slide 2-4

A. Codes and standards.

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY (cont'd)

- Codes.
 - Systematically arranged and comprehensive collection of laws.
 - Use the word “shall” as opposed to “should.”
 - Becomes law when formally adopted by the appropriate authority.
 - One of many tools to support an FAC.

Slide 2-5

1. Codes.

- a. A code is a systematically arranged and comprehensive collection of laws. It generally defines **what** needs to be accomplished.
- b. Codes contain mandatory requirements and typically use the word “shall” as opposed to “should.”
- c. Codes become law when formally adopted by the appropriate authority.
- d. Codes are a tool, but not the **only** tool, to support a fire-adapted community (FAC).

TECHNICAL TOOLS TO SUPPORT A
FIRE-ADAPTED COMMUNITY (cont'd)

What is a standard?



Slide 2-6

TECHNICAL TOOLS TO SUPPORT A
FIRE-ADAPTED COMMUNITY (cont'd)

- Standards.
 - Description of a method or process for accomplishing a task.
 - Written in a format suitable for reference by another code or can be adopted on their own.
 - Detail how something is to be done.

Slide 2-7

2. Standards.

- a. A standard is a description of a method or process for accomplishing a task. It generally describes **how** something technical will be accomplished.
- b. Standards are written in a format that is generally suitable for reference by another code or can be adopted on their own.
- c. Standards detail how something is to be done in order to comply with an applicable code.
- d. An industry may have a standard specific to their practices.
- e. Standards use a peer-reviewed and adopted process.

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY (cont'd)

- Authority having jurisdiction (AHJ).
 - Agency, entity or individual that has the vested authority to enact, interpret or enforce codes and standards.
 - Examples of AHJs include:
 - Cities.
 - Counties.
 - States.
 - Fire chiefs, building officials, state fire marshals, etc.

Slide 2-8

3. Authority having jurisdiction (AHJ).

- a. The AHJ is the agency, entity or individual that has the vested authority to enact, interpret or enforce codes and standards.
- b. Examples of AHJs include:
 - Cities.
 - Counties.
 - States.
 - Fire chiefs, building officials, state fire marshals, etc., can act as an AHJ for the jurisdiction they represent.

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY (cont'd)

- Most codes and standards in use today come from nationally developed model codes and adopted standards.
- National Fire Protection Association (NFPA) standards carry no legal authority **unless** adopted by state or local jurisdiction.

Slide 2-9

4. Most codes and standards in use today come from nationally developed model codes and adopted standards.

- a. Codes and standards are compiled by technical or practical experts.
 - b. They are a blend of research, testing results, experience and problem-solving in a peer-based development process.
- B. Wildland urban interface (WUI)-specific codes and standards.
1. National Fire Protection Association (NFPA).
- Consensus standards carry no legal authority **unless** adopted as a state or local code.
2. NFPA 1141 through 1144 (listed in “Your Role in Fire-Adapted Communities”) address both rural area and WUI-specific fire protection issues and, as standards, can be adopted along with local codes.

**WILDLAND URBAN INTERFACE
SPECIFIC CODES AND STANDARDS**

- NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas.*
- NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.*

Slide 2-10

- a. NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas.*
 - This standard describes the overall fire protection, roadways, water sources, fire suppression planning, and land use issues associated with general development.
 - While NFPA 1141 is not specific to the WUI, it represents a good starting point if the local jurisdiction does not have other adopted codes with similar provisions.
- b. NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting.*

- This standard defines water flow and delivery requirements, engineering standards, and alternative systems for providing adequate water in rural and suburban environments.

WILDLAND URBAN INTERFACE SPECIFIC
CODES AND STANDARDS (cont'd)

- NFPA 1143, *Standard for Wildland Fire Management.*
- NFPA 1144, *Standard for Reducing Structure Ignition Hazards from Wildland Fire.*

Slide 2-11

c. NFPA 1143, *Standard for Wildland Fire Management.*

- This standard provides minimum requirements to fire protection organizations on the management of wildland fire, including prevention, mitigation, preparation and suppression.

d. NFPA 1144, *Standard for Reducing Structure Ignition Hazards from Wildland Fire.*

- This standard provides a methodology for assessing wildland fire ignition hazards around existing structures, residential developments and subdivisions.
- It also assesses improved property or planned property improvement that will be located in a WUI area, and it provides minimum requirements for new construction to reduce the potential of structure ignition from wildland fires.

WILDLAND URBAN INTERFACE SPECIFIC CODES AND STANDARDS (cont'd)

- International Code Council (ICC) — WUI code.
 - Part of a “family” of national model codes.
 - “Stand-alone” code that addresses WUI issues specifically.
 - Consistent with the building, fire, electrical and other codes that ICC publishes.

Slide 2-12

3. International Code Council (ICC) — WUI code.

- a. This particular code is part of a “family” of national model codes adopted by federal, state and local entities.
- b. The ICC WUI code is a “stand-alone” code that addresses WUI issues specifically.
- c. In addition, it is consistent with the building, fire, electrical and other codes that ICC publishes.
- d. The provisions of this code apply to the construction, alteration, movement, repair, maintenance and use of any building, structure or premises within the WUI areas located within the AHJ.

WILDLAND URBAN INTERFACE SPECIFIC CODES AND STANDARDS (cont'd)

- Insurance Services Office standards.
 - Uses a grading classification system to measure fire protection.
 - Assigns a score of 1 to 10 to communities.
 - The Insurance Services Office offers other WUI products like “Fireline.”

Slide 2-13

4. Insurance Services Office standards.

- a. The Insurance Services Office uses a grading classification system to measure fire protection resources.
- b. Commonly termed the Property Protection Classification (PPC) system, this rating assigns a score of 1 to 10 to a community through a review process conducted every 10 years or so.
 - Class 1 represents superior fire protection; Class 10 represents fire protection that does not meet the Insurance Services Office's minimum criteria.
 - The PPC is considered a uniform way of measuring the capacity of fire protection.
 - PPC often has split scores (e.g., 3/8) for suburban/rural departments that protect both municipal (hydrant-equipped) and rural (nonhydrant-equipped) service areas.
 - This grading process changed in 2013 and now scores a fire department's fire prevention, training, public education and other mitigation efforts, as well as response criteria.
- c. The Insurance Services Office also offers other WUI products, like "Fireline," which specifically assess the wildland fire risk to an address by using remote sensing to evaluate the fuels, slope and road access.
 - This is currently available in seven Western states (<http://www.iso.com/Products/LOCATION/LOCATION-Wildfire-Services.html>).

5. State and local examples of building codes.

WILDLAND URBAN INTERFACE SPECIFIC CODES AND STANDARDS (cont'd)

- State building codes.



Waldo Canyon Fire Rebuild Provisions
HILLSIDE IGNITION-RESISTANT
CONSTRUCTION



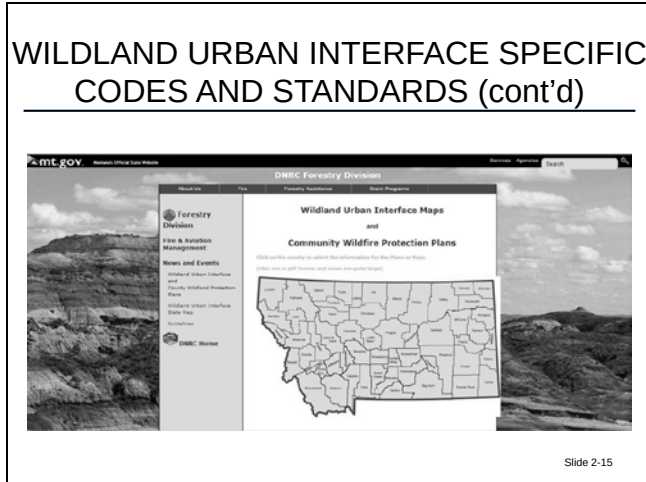
SCOPE: As a result of the Waldo Canyon Fire and the disastrous outcomes that were experienced, the Colorado Springs Fire Department, in partnership with the Colorado Springs Housing and Building Association, have collaborated to address some critical issues that were determined to be deficient with regard to wildfire mitigation and associated fire code requirements. As such, this document consequently modifies code language to more fully and accurately protect those residents who are rebuilding or building new homes in the Waldo Canyon Fire Burn Area.

The following requirements shall be enforced for all homes reconstructed due to the Waldo Canyon Fire for ignition-resistant construction and fuels management:

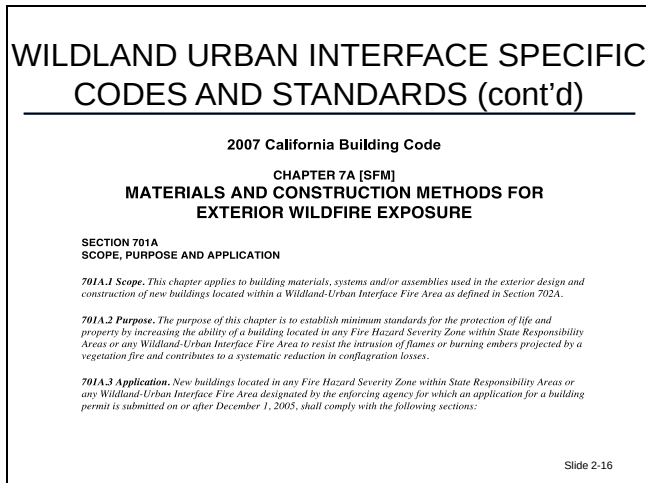
1. A Class A roof covering (including solid wood materials) shall be installed on all residential structures and structures Class B roof covering shall be installed on nonresidential structures, unless otherwise permitted.
2. Exterior cladding, siding and soffits shall be constructed of ignition-resistant materials, approved by CSFD. Approved materials include, but are not limited to: fiber cement board, stucco, masonry block, masonry veneer, stone, and other materials. Natural wood shingle siding, horizontal vinyl, and similar combustible materials are not allowed.
Exception: Natural wood or plastic products used for decks, vinyl board materials and trim accents, such as crown, false rafters, false trusses, shutters and decorative window material are allowed when painted or as approved.
3. For any portion of the attached structure with porches or overhangs, the area below the structure shall have all horizontal under-floor areas enclosed with ignition-resistant materials such as those allowed in Item 2 above.
Exception: Heavy timber or dimensional log construction is allowed.
4. Exterior doors shall be noncombustible or solid core not less than 1 3/4 inches thick. Windows within doors and above doors shall be tempered safety glass or multi-layered glass panels.

Slide 2-14

- a. Colorado Springs, Colorado — Waldo Canyon Fire Rebuild Provisions: Hillside Ignition-Resistant Construction (Appendix A, [http://www.springsgov.com/SIB/files/Waldo_Canyon_Fire_Rebuild_Provisions_Agreement_Letter\[1\]\(4\).pdf](http://www.springsgov.com/SIB/files/Waldo_Canyon_Fire_Rebuild_Provisions_Agreement_Letter[1](4).pdf)).



- b. State of Montana — “Guidelines for Development Within the Wildland-Urban Interface.”



- c. State of California — California State Building Code, Chapter 7A and California Fire Code, Chapter 47 (Appendix B).

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY

- Overview of the code adoption process.
 - Public policy often created after disaster.
 - National code organizations exist to help develop/accredit codes, standards and recommended practices.
 - Updated through review and development.

Slide 2-17

C. Overview of the code adoption process.

1. Historically, public policy has emerged in response to a disaster.
2. As fires occurred and investigators identified deficiencies, codes and public policy were altered to prevent similar future conditions.
3. National code organizations exist to help develop/accredit codes, standards and recommended practices.
4. Codes, standards and recommended practices are kept up to date through a review and development process.

TECHNICAL TOOLS TO SUPPORT A FIRE-ADAPTED COMMUNITY (cont'd)

- Jurisdiction will decide to adopt or modify a code and use a “model” as a starting point.
- Two major organizations are ICC and NFPA.
- Documents often work in tandem.

Slide 2-18

5. Generally, a jurisdiction will decide to adopt or modify a code and will use a “model” as a starting point.

6. This model can be one of the national models; a model from another entity, such as an organization or local entity; or an example in use from another community.
7. The two major codes and standards organizations in the United States are ICC and NFPA.
8. In many cases, ICC and NFPA documents work in tandem to support one another.
9. Compliance with a code or standard is often at the direction of the AHJ.
10. Sometimes, an AHJ will adopt only sections of a code or standard.
11. Often, a code or standard is adopted after a major incident. Without public outcry, implementation of more stringent codes would not take place.

**TECHNICAL TOOLS TO SUPPORT A
FIRE-ADAPTED COMMUNITY (cont'd)**

- A percentage of the public often resists new codes and standards based on a belief that they infringe on personal liberties.



Slide 2-19

12. On the contrary, even after large incidents occur and changes are implemented, a percentage of the public often resists new codes and standards based on a belief that they infringe on personal liberties.

**TECHNICAL TOOLS TO SUPPORT A
FIRE-ADAPTED COMMUNITY (cont'd)**

- WUI code adoption considerations.
 - Codes and standards are a very effective means of reducing risk to the built environment.
 - Often controversial because of the power of law behind it.

Slide 2-20

D. WUI code adoption considerations.

1. Proposing the use of a code (public policy) will likely be one of the mitigation strategies selected for inclusion into a Community Wildfire Protection Plan (CWPP).
2. Codes and standards are a very effective means of reducing risk to the built environment.
3. The adoption of public policy is often one of the most controversial strategies because it has the power of law behind it in terms of enforceability.
4. Codes and standards usually apply to construction requirements for new buildings, but they can also specify requirements for the following:
 - a. Retrofits to existing construction (roof replacements).
 - b. Defensible space requirements.
 - c. Rebuilding after significant fire loss.

WILDLAND URBAN INTERFACE CODE ADOPTION PROCESS

- Select a base code.
- Identify the appropriate code official.
- Determine adoption process.
- Decide if you will be amending an existing code or proposing a new one.

Slide 2-21

E. WUI code adoption process.

1. Select an appropriate base code to use as your base document.
 - a. This can be one or more NFPA standards, the ICC WUI code, or any other applicable code from another jurisdiction.
 - b. Model codes and standards are good base documents because an AHJ is permitted to use them in their entirety.
 - c. The AHJ can cut, change, modify or add any sections desired if the overarching code authority allows it.
 - d. Some states limit local authority by statute.
 - “Mini/Maxi” states adopt codes at a state level and require that any action taken locally stays within both the minimum and maximum provisions of the state code.
 - This strategy is employed to ensure some consistency of code from one jurisdiction to the next and to create some predictability to cost of construction for the building industry.
2. When considering a base code, it is critical to identify who the appropriate code official shall be.
3. Determine whether this is a state, county, city or fire district adoption process.
4. Decide if you will be amending an existing code or proposing an entirely new one.

**WILDLAND URBAN INTERFACE
CODE ADOPTION PROCESS (cont'd)**

- Determine scope of base document.
- Working relationship with code official.
- Create plan for adoption process.
- Be prepared for community controversy.

Slide 2-22

5. Determine if the base document will be comprehensive in scope or apply only to a certain set of WUI requirements.
6. Examples include:
 - a. Building code for construction requirements.
 - b. Conservation or environmental departments for fuels, vegetation or hillside ordinances.
 - c. Planning departments for development standards, such as water, roads and parcel requirements.
7. Develop a good working relationship with that code official, and create a plan for the appropriate adoption process in your community.
8. Be prepared for community controversy.
 - a. Research facts.
 - b. Know what the effect of the code will be in terms of improving loss statistics.
 - c. Collaborate with national colleagues that have already had experience with the process you are considering.
 - d. Many jurisdictions are attempting WUI codes and can learn from one another.

WILDLAND URBAN INTERFACE CODE ADOPTION PROCESS (cont'd)

- Significant findings.
 - Most communities adopted first set of WUI regulations in response to a major wildland fire.
 - Public often skeptical but usually accepts or supports the WUI standards if a strong public education effort is made.

Slide 2-23

F. Significant findings:

1. Most interviewed communities adopted their first set of WUI regulations in response to a major wildland fire.
2. A small minority of communities adopted WUI regulations proactively based on historical trends and concerns about imminent wildland fire danger or due to state requirements or incentives.
3. The public was often skeptical of proposed WUI regulations but usually came to accept or support the WUI standards if a strong public education effort (such as Firewise community initiatives) was made to address concerns and correct misinformation in a transparent and open manner.
4. Some communities adopted portions of an NFPA standard or ICC model WUI code (or both).
5. No community adopted a model WUI-related code in full.
6. However, the communities that adopted some portion of an NFPA standard or ICC code usually did not apply the standards directly from these codes; they relied primarily on their local standards that overlapped with the professional codes.
7. A related approach taken by many communities was to use model codes for some level of guidance in crafting their own regulations, but they did not adopt the model code in any formal way.
8. Most communities are generally happy with the technical aspects of their WUI standards because they are based on proven science and techniques for reducing wildland fire risk.

WILDLAND URBAN INTERFACE CODE ADOPTION PROCESS (cont'd)

- Most common WUI enforcement problem is continuing maintenance of defensible space.
- Lack of funding to conduct public education and vegetative clearing.
- Existing development presents a greater wildland fire risk than new development.

Slide 2-24

9. By far, the most common WUI enforcement problem was the lack of continuing maintenance of defensible space, due either to lack of political will or financial resources.
10. In addition, the lack of funding to conduct public education and vegetative clearing was cited as a significant deficiency.
11. Communities interviewed agreed that existing development presents a greater wildland fire risk than new development because there is usually more of it in high-hazard areas, and it is often served by substandard infrastructure (streets, water supply, etc.), while new development is typically constructed in accordance with the latest WUI standards.
12. Public education and nonregulatory programs that provide direct assistance to homeowners (e.g., debris pickup) are vital for the overall effectiveness of WUI regulations.

WILDLAND URBAN INTERFACE CODE ADOPTION PROCESS (cont'd)

- WUI regulations usually administered and enforced by fire or building department.
- Flexibility in the administration is critical for maintaining support.

Slide 2-25

13. WUI regulations are usually administered and enforced by the fire or building department.
 - a. Rarely is the planning department given primary enforcement responsibility.
 - b. However, the fire marshal and fire department personnel may not receive appropriate training to perform enforcement duties.
 - c. Shifting enforcement duty to staff specifically trained to do code enforcement sometimes results in better compliance.
 - d. Regardless of which department employs the WUI specialist (e.g., fire, building or code enforcement) having one or more people with clear responsibility for and expertise in WUI implementation is a significant aid to effective and consistent enforcement of WUI regulations.
14. Flexibility in the administration of WUI regulations is critical for maintaining community and political support for wildland fire regulations.

One-size-fits-all solutions that are unable to respond to the unique wildland fire and development circumstances in the community are seldom effective and often create political opposition.

OVERVIEW OF WILDLAND URBAN
INTERFACE LAND USE PLANNING AND
POLICIES

- Land use planning is the set of policies, requirements, guidelines and statutes that determine how land is subdivided, built upon, managed and maintained.
- One of the most effective tools to affect WUI fire safety.

Slide 2-26

G. Overview of WUI land use planning and policies.

1. Land use planning is the set of policies, requirements, guidelines and statutes that determine how land is subdivided, built upon, managed and maintained.

- a. Its use is widely varied throughout the country in terms of requirements, terminology, processes and adherence.
- b. Most WUI communities today face risk because the land use policy did not account for the WUI threat.
- c. Many of today's WUI risk experts see land use as the last major policy initiative to improve upon around the country.
- d. However, it could be considered for use as a cornerstone of long-term mitigation for growing communities.
- e. In a "built-out" community where new construction and land development is limited, focus will likely be on mitigating, retrofitting and protecting existing buildings and infrastructure.

**OVERVIEW OF WILDLAND URBAN
INTERFACE LAND USE PLANNING AND
POLICIES (cont'd)**

- Types and terminology.
 - Land use designations and zoning.
 - Density.
 - Master or general plans.
 - Specific or project plans.
 - Best practices.
 - Building permits.

Slide 2-27

2. Types and terminology.

- a. Land use designations and zoning.
 - Most private land is classified into use categories called zoning or designations.
 - These can include examples like open space, industrial, residential or agricultural.
- b. Density.
 - Along with designations, there are usually guidelines for density of homes per area for land (i.e., one per acre for suburban/rural or seven per acre for compact housing).

- Density influences the eventual fire risk and community mitigation options.
 - It will determine the designation of an interface or intermix community, or it will determine if the area will be fully developed but still have ember exposure threats.
- c. Master or general plans.
- Most communities have some sort of broad guidance plan that is adopted on a periodic basis.
 - The plan describes the assumptions of growth, development needs, community values, environmental considerations, housing and economic needs, and community safety.
 - Research the contents of your community's plan and provide input on how to best influence the WUI issues as the community develops.
- d. Specific or project plans.
- These plans deal primarily with a specific project like a large facility or subdivision.
 - Developers of single-home construction are generally not required to develop this kind of document.
 - Project plans describe the building features, access, water systems, environmental issues, project phases, etc.
 - Your fire prevention bureau may already be very involved with these.
- e. Best practices.
- These are often found as recommendations that jurisdictions ask or require of developers.
 - Best practices allow for more fluid changes to methods and techniques than codes or statutes.
 - Sometimes jurisdictions call these guidelines or recommendations.

f. Building permits.

- Most, but not all, jurisdictions require a building permit to help ensure the construction of safe buildings.
- Permits are usually issued and enforced by the building official.
- Review of permits can help verify if adopted WUI requirements are being implemented.

3. WUI land use practices.

a. The following are recommendations for WUI land use practices.

- b. Source: NFPA Research Foundation publication “Addressing Community Wildfire Risk: A Review and Assessment of Regulatory and Planning Tools” from 2011 (<http://www.nfpa.org/~media/Files/Research/Research%20Foundation/rfwiregulatoryassessment.pdf>).

**OVERVIEW OF WILDLAND URBAN
INTERFACE LAND USE PLANNING AND
POLICIES (cont'd)**

- WUI land use practices.
 - Identify the high and extreme fire risk areas as types of sensitive lands where plats may not locate buildable lots.



Slide 2-28

- Add mapped high and extreme fire risk areas as types of sensitive lands where plats may not locate buildable lots.
- If the area has already been platted in those areas, add a requirement that “building envelopes” be defined to minimize those risks before building permits are issued.
- Plats are units of area on a map or the process of dividing land into ordered segments.

OVERVIEW OF WILDLAND URBAN
INTERFACE LAND USE PLANNING AND
POLICIES (cont'd)

- Carefully consider approval of risky businesses, sensitive populations, and large assembly uses.



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- Ensure that risky businesses (e.g., lumber yards, gas stations), sensitive populations (e.g., hospitals), and large assembly uses (e.g., churches) are either not permitted in those zone districts that include high or extreme fire risk areas or are addressed with special conditions of approval.

OVERVIEW OF WILDLAND URBAN
INTERFACE LAND USE PLANNING AND
POLICIES (cont'd)

- Ensure that landscaping and tree protection requirements are consistent with defensible space/vegetation management requirements.



Slide 2-30

- Ensure that landscaping standards and tree protection requirements are consistent with defensible space/vegetation management requirements for fire risk-reduction, at least in high or extreme fire risks areas.

OVERVIEW OF WILDLAND URBAN INTERFACE LAND USE PLANNING AND POLICIES (cont'd)

- Consider adding incentives to those willing to incorporate defensible space and structure controls.



Slide 2-31

- Consider adding incentives, such as waiver of application/processing fees, to those willing to incorporate defensible space and structure controls into their applications and to sign development agreements to maintain those features over time.

OVERVIEW OF WILDLAND URBAN INTERFACE LAND USE PLANNING AND POLICIES (cont'd)

- Require or encourage subdivisions to be designed to maximize the use of natural features.



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- Require or encourage subdivisions in the WUI to be designed to maximize the use of natural (e.g., water, wetlands, open meadows) and man-made (e.g., ball fields, golf courses, utility and road easements) features as buffers for wildland fire protection.

H. National Cohesive Wildland Fire Management Strategy or Cohesive Strategy.

**NATIONAL COHESIVE WILDLAND
FIRE MANAGEMENT STRATEGY**

What are some of the
key components of the
Cohesive Strategy?



Slide 2-33

1. The Cohesive Strategy is a national policy initiative that unifies the varying perspectives, approaches, policies and funding sources for all levels of government across the country.
2. This replaces the 10-year fire plan that has been the policy guidance document for federal and state agencies since 2000.
3. Developed and written with many partners, including:
 - a. Department of the Interior.
 - b. U.S. Department of Agriculture (USDA).
 - c. U.S. Forest Service (USFS).
 - d. National Park Service.
 - e. U.S. Fish and Wildlife Service.
 - f. Bureau of Land Management.
 - g. Bureau of Indian Affairs.
 - h. U.S. Geological Service.
 - i. Department of Homeland Security (DHS).
 - j. Governor, Western states representative.
 - k. Counties representative.

- l. President, Intertribal Timber Council.
 - m. National League of Cities.
 - n. Designated representative for the National Association of State Foresters (NASF).
 - o. Designated representative for the International Association of Fire Chiefs (IAFC).
4. Overview of the strategy.

NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY (cont'd)

- Addressing wildland fire is not simply a fire management, fire operations or WUI problem.



Slide 2-34

- a. Addressing wildland fire is not simply a fire management, fire operations or WUI problem; it is a larger, more complex land management and societal issue.

NATIONAL COHESIVE WILDLAND FIRE MANAGEMENT STRATEGY (cont'd)

- The vision for the next century:
 - Safely and effectively extinguish fire when needed.
 - Use fire where allowable to manage natural resources.
 - As a nation, live with wildland fire.

Slide 2-35

- b. The vision for the next century:
- Safely and effectively extinguish fire when needed.
 - Use fire where allowable to manage our natural resources.
 - As a nation, live with wildland fire.

**NATIONAL COHESIVE WILDLAND FIRE
MANAGEMENT STRATEGY (cont'd)**

- Three primary factors representing the greatest challenges for making a positive difference are:
 - Restoring/Maintaining resilient landscapes.
 - Creating FACs.
 - Responding to wildland fires.

Slide 2-36

5. The three primary factors identified as presenting the greatest challenges (and the greatest opportunities) for making a positive difference in addressing the wildland fire problems to achieve this vision are:

- a. Restoring and maintaining resilient landscapes.
- The strategy must recognize the current lack of ecosystem health and the variability of this issue from geographic area to geographic area.
 - Because landscape conditions and needs vary depending on local climate and fuel conditions, among other elements, the strategy will address landscapes on a regional and subregional scale.
- b. Creating FACs.
- The strategy will offer options and opportunities to engage communities and work with them to become more resistant to wildland fire threats.
- c. Responding to wildland fires.

- This element will consider the full spectrum of fire management activities and will recognize the differences in missions among local, state, tribal and federal agencies.
 - The strategy will offer collaboratively developed methodologies to move forward.
6. The Cohesive Strategy is defined by three phases.
- a. Phase 1: National Cohesive Wildland Fire Management Strategy.
 - b. Phase 2: Development of Regional Strategies and Assessments.
 - c. Phase 3: National Trade-Off Analysis and Execution.
- I. National risk assessments by regions.
- 1. The Cohesive Strategy requires that a uniform approach to risk assessment be developed across the country. The three regions are:
 - a. Southeastern U.S.
 - b. Western U.S.
 - c. Northeastern U.S.
 - 2. Each of these risk assessment projects encompasses multiple states and numerous conditions or features that impact wildland fire.
 - 3. They have extensive Geographic Information System (GIS) libraries of data, intended for use in wildland fire planning at every level, that will continue to grow over the years ahead.
 - 4. However, quantifying risk from wildland fire at a federal, state, local, and then personal, level will always have some degree of subjectivity in it. Remember from Module 1 that risk, in the end, has a strong component of personal values.
 - 5. FACs are not a process of looking up a risk rating on an online map and then assigning mitigations to it.
 - 6. FACs are human communities consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire. They are collaborative, sustained and varied.

ACTIVITY 2.1

Using Building and Planning Codes

Purpose

To provide practice problem-solving for WUI code adoption and enforcement.

Directions

1. Work in your small table groups to complete this activity.
2. As a group, select a code or ordinance that could be used to support a WUI fire mitigation strategy.
3. List on an easel pad the potential obstacles, objections and controversies that could arise if the code or ordinance were proposed for adoption.
4. Complete this portion of the activity within 15 minutes.
5. Exchange your code/ordinance and associated obstacles, objections and controversies with another table group as directed by the instructor.
6. List on an easel pad potential solutions to the obstacles, objections and controversies identified by the other table group.
7. Complete this portion of the activity within 15 minutes.
8. The instructor will review each group's issues and solutions with the class.
9. The entire activity should be completed within 45 minutes.

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II. OVERVIEW OF GEOSPATIAL TOOLS

OVERVIEW OF GEOSPATIAL TOOLS

- These tools include (but are not limited to):
 - Geographic Information System (GIS).
 - Public Web maps.
 - Interactive Web maps.
 - Remote sensing tools.
 - GPS and geolocation services.
 - Fire behavior models.
 - Wildland fire decision support systems.
 - Common operational pictures/platforms.

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A. Types of geospatial tools.

1. Historically, paper maps were used to “visualize” a WUI area.
2. Based on the concept that “visual” information is critical to understanding wildland fire issues, a rapidly growing set of tools is available to our industry.
3. These tools include (but are not limited to):
 - a. GIS.
 - b. Public Web maps.
 - c. Interactive Web maps.
 - d. Remote sensing tools.
 - e. GPS and geolocation services.
 - f. Fire behavior models.
 - g. Wildland fire decision support systems.
 - h. Common Operational Pictures/Platforms (COPS).

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

What are the benefits of geospatial tools?



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B. Benefits of geospatial tools.

1. CWPPs increasingly rely on technical tools to depict the spatial quality of information about landscapes, wildland fire events, history and place.
2. Wildland fire is very much an event that happens across a landscape; therefore, wildland fire agencies were early adopters of geospatial needs.
3. Careful gathering of data, plans and information **prior** to a wildland fire event (such as the development of a CWPP) will also provide priceless information **during** the wildland fire event.
4. This is one of the places where prevention/planning interfaces with operations.
5. This can create a paradigm shift in the fire service, the public and our communities.
6. Map-based data is exceedingly powerful at conveying information.
7. Fire departments across the country are rapidly adopting GIS technology to better understand and communicate risks, deployments, prevention and mitigation, levels of service, public education, safety, and more effective response.
8. Example:
 - a. Consider a community meeting where fire officials are describing the wildland fire hazard to an audience.
 - b. Officials are speaking, handing out brochures and raising awareness.

- c. Contrast that with the same community where officials are able to project an aerial view of the community, then overlay that with the fire history of that community and show each person **his or her home** within a designated wildland fire risk area.
- d. The result is that citizens understand the message when they see it in a relevant way, and they can apply it to themselves visually.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- GIS.
 - A computer system capable of capturing, storing, analyzing and displaying geographically referenced information.
 - Combines the analytical capacity of a database with the visual benefits of a map.

Slide 2-40

C. GIS.

1. GIS has been in existence for approximately 40 years.
2. GIS is a computer system capable of capturing, storing, analyzing and displaying geographically referenced information (i.e., data identified according to location).
3. Practitioners also define GIS as including the procedures, operating personnel and spatial data that go into the system.
4. GIS combines the analytical capacity of a database with the visual benefits of a map.
5. Leveraging the geography inherent within data uncovers important patterns and provides powerful insights that can result in better decisions, increased efficiency and improved outcomes throughout the organization.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- GIS providers.
 - Environmental Systems Research Institute (ESRI).
 - OpenStreetMap or Google Maps.
 - WUI officials commonly use ESRI software or Google Maps/Earth.

Slide 2-41

6. GIS providers.

- a. The largest provider of GIS in the wildland fire community is the Environmental Systems Research Institute (ESRI), a computer software company that specializes in GIS.
- b. ESRI provides an overwhelmingly large number of software systems for local, state and federal government agencies.
- c. Other types of GIS include open-source systems, such as OpenStreetMap or Google Maps to show locations.
- d. However, WUI risk officials most commonly use either ESRI software or Google Maps/Earth to provide map visuals.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- How GIS works.
 - GIS is layer-centric.
 - Creates a map by stacking different layers on top of one another.
 - Creates accurate information picture and an analytical framework for an area of interest.
 - Any digital map is a collection of layers.

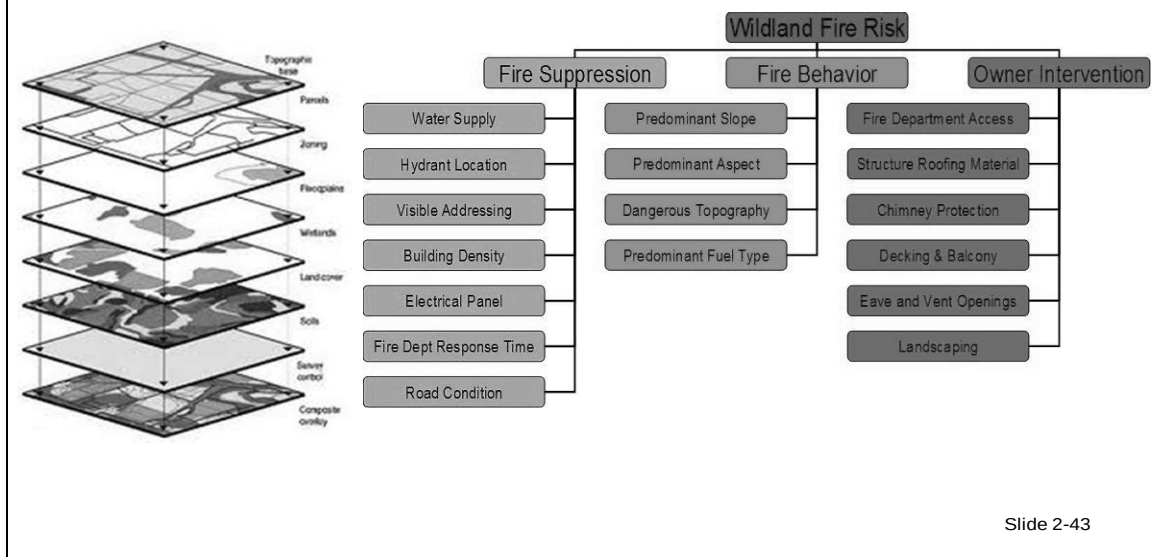
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7. How GIS works.

- a. GIS is layer-centric.

- GIS provides the ability to take a layer-centric approach to managing, creating, analyzing and visualizing data.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)



- GIS creates a map by stacking layers of different information — aerial imagery, streets and highways, fire districts, and station locations — on top of one another like acetate map sheets (map overlays).
- This creates an accurate information picture and analytical framework for an area of interest.
- Any digital map is actually a collection of these layers.

- The first layers on a map are almost always things like political boundaries; large natural features like water and mountains; and common infrastructure features, including roads.
- These collections of data are called base maps; they are frequently referred to by descriptive names, like street maps or topographic maps.
- GIS technicians often design and compile with the capabilities to build upon them.
- Base maps are the foundation for other layers containing information about features, such as fire stations, hydrants or hazardous material locations.
- GIS provides the fire service with a visual or map-centric approach to bringing information together for situational awareness or other specific needs.
- It can supply a map view of real-time data on an emergency vehicle's mobile data unit, on a hand-held mobile device, or in the command center.
- This enables users to make quick assessments and act with the best available information.
- It also provides a complete map-based analysis framework that enables users to ask complex questions of the data.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- GIS is geography-centric.
 - Ability to manage physical features that are geographically referenced.
 - Unique ability to index and sort disparate data.
 - Combines geocentric layering with power of a traditional **database**.

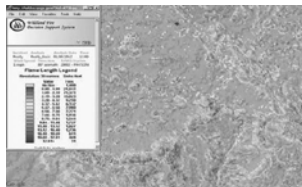
Slide 2-44

b. GIS is geography-centric.

- GIS has the ability to manage physical features that are geographically referenced, such as those that have a physical address or a latitude-longitude grid reference.
- This ability to store the data's physical geography gives GIS the unique ability to index and sort otherwise disparate data.
- GIS combines geocentric layering with the power of a traditional **database**.
- Fire personnel can use GIS to query an unlimited number of characteristics (or attributes) in the data.
- With GIS, the layers of data all stay attached to the original data maintained in, and accessed from, the database.
- Much like the columns of data in a spreadsheet, GIS allows people to add any attribute to any feature.
- For example, the way to track defensible inspection dates is simply to include a field, or an attribute, called "inspection date" in the database. Combined with the first two principles (layering and geographic referencing), this ability to query unlimited attributes provides a powerful construct for modeling or accessing very detailed data.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Who is using GIS in your department?
- What are you using GIS for?



Slide 2-45

D. Public Web maps.

Part of today's growing capability of geospatial services is the availability of publically shared geospatial information.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Public access flat maps (Google, Bing, Apple, et al.).



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1. Planimetric (flat) maps (Google, Bing, Apple, et al.).
 - a. Show only the horizontal position of features on the Earth's surface that reveal geographic objects, natural and cultural physical features, and entities without topographic properties.
 - b. Most large information providers have entered the "geo" business of making information location-relevant.
 - c. It is no longer acceptable to simply list addresses or provide Web pages for key events, businesses or projects; consumers expect to receive some type of map that "shows them where to go."

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Public access 3-D maps.



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2. Three-dimensional maps (Google, Bing, Apple, et al.).

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Interactive Web maps.
 - Transitioned from static, view-only tools to interactive tools.
 - User can manipulate map to see customized features, save information or share maps.

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E. Interactive Web maps.

1. Web maps have transitioned from static, view-only tools to interactive tools.
2. Interactive means the user can manipulate the map to see customized features, save personal information, or share his or her map with others.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)



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OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Mapping data sources.
 - Federal land/fire agencies.
 - State land/fire agencies.
 - Soil management agencies.
 - Conservation agencies.
 - Also, check out www.fire.org.

Slide 2-50

3. Allied agencies and FAC partners are a good starting point for map data.
 - a. Federal land/fire agencies.
 - b. State land/fire agencies.
 - c. Soil management agencies.
 - d. Conservation agencies.
 - e. Also, check out www.fire.org.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Remote sensing tools.
 - Acquisition of information about an object without making physical contact with the object.
 - Use of aerial sensor technologies to detect and classify objects on Earth by means of propagated signals.

Slide 2-51

F. Remote sensing tools.

1. Definition:

- a. Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object.

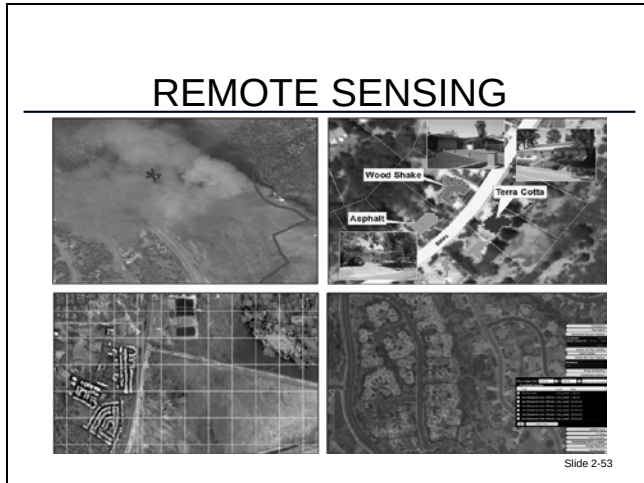
- b. In modern usage, the term generally refers to the use of aerial sensor technologies to detect and classify objects on Earth (both on the surface and in the atmosphere and oceans) by means of propagated signals (e.g., electromagnetic radiation emitted from aircraft or satellites).
- c. In WUI planning and mitigation efforts, we look for ways to gather information about our communities in a cost-effective manner.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

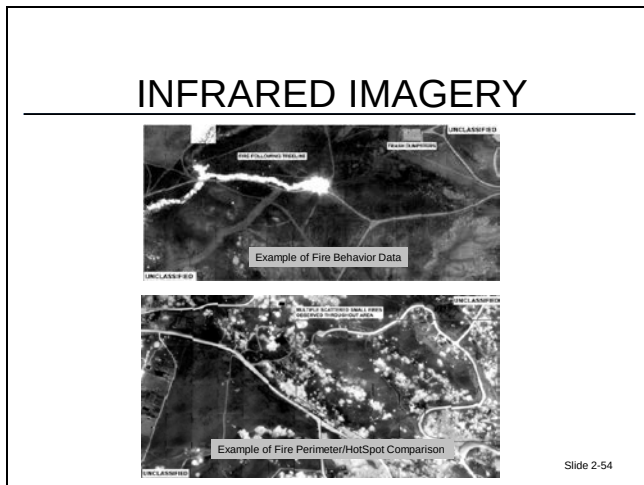
- At small scales, easiest to go and directly observe the local community or risks.
- At larger scales, using remote sensing can be fastest and cheapest way to collect and refresh data.

Slide 2-52

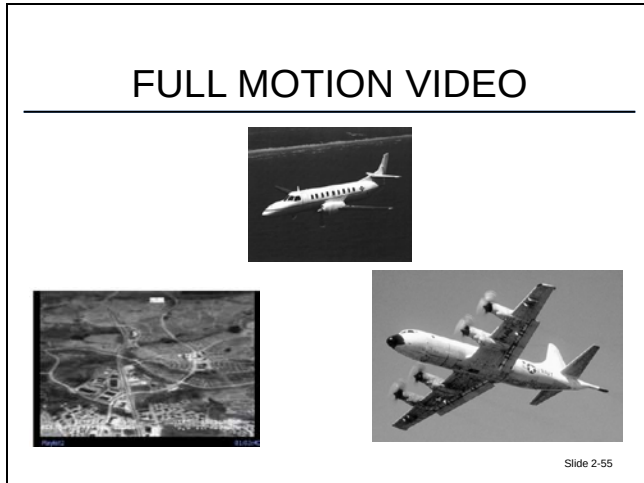
- d. At small scales, it is often easiest to go and directly observe the local community or certain risks.
- e. At larger scales, using remote sensing can be the fastest and cheapest way to collect and refresh data on a regular basis.
- f. Example: most frequently used is vegetation data gathered over large areas and then converted into fuel types for fire behavior inputs.
- g. Increasingly, our industry is using remote sensing products to assist us with every phase of wildland fire management, from community planning to response to post-incident damage assessment, recovery, and public information.



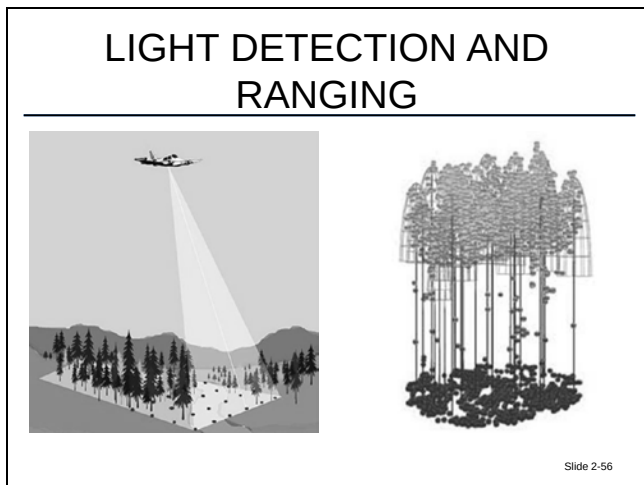
2. Types of remote sensing.



- a. Infrared (IR) — IR light is electromagnetic radiation with longer wavelengths than those of visible light. It is usually thought of as “heat signatures” since it displays energy being given off by a subject. In wildland fire applications, it is most commonly used for:
- Fire perimeter mapping.
 - Ignition detection.

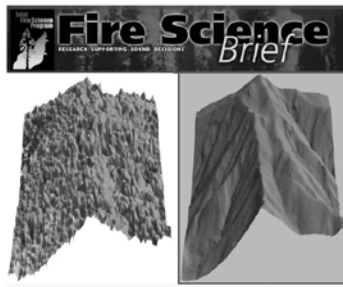


- b. Full Motion Video (FMV) — Standard video technology that captures the image and displays it in a continuous stream. It is used for:
- Video capture, often aerially, to provide an overview perspective or allow zooming in to specific features.
 - Fire detection with remote video camera systems.



- c. Light Detection and Ranging (LiDAR) — LiDAR is an optical remote sensing technology that can measure the distance to, or other properties of, a target by illuminating the target with light, often using pulses from a laser. In wildland fire or mapping applications, it is used for:
- Providing detailed height, shape or volume measurements used in conjunction with aerial topographical photos.

LIGHT DETECTION AND RANGING (cont'd)



This project found that a combination of direct measurement remote sensing technologies (DTM) for canopy model (pfr) and LiDAR for terrain model (pfr) provides useful landscape scale data measurements.

Frequencies, Lasers, and Wavelengths: A Quest for Affordable, Landscape Scale Remote Sensing

Slide 2-57

- Examples are:
 - Tree canopy.
 - Vegetation spacing.
 - Utility/Power lines.
 - Building height and footprints.

HYPERSPECTRAL IMAGERY

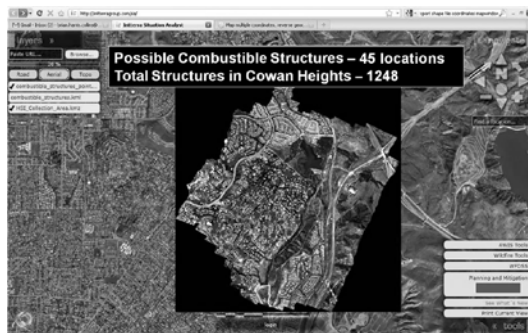


Slide 2-58

- d. Multispectral imaging (MSI) and hyperspectral imaging (HSI) — these techniques capture image data at specific frequencies across the electromagnetic spectrum.

- Spectral imaging allows for very specific information to be collected and analyzed, such as the species of vegetation, ground surface information, types of building material — anything that has a horizontal component to it can be detected by MSI/HSI and matched against a library of materials.
- The technology was originally developed for space-based imaging but is now used for many applications, including those in wildland fire management.
- Examples are:
 - Mapping vegetation by species.
 - Roof types.
 - Post-fire soil conditions.
 - Vegetation health.
 - Invasive species detection.

POSSIBLE COMBUSTIBLE STRUCTURES

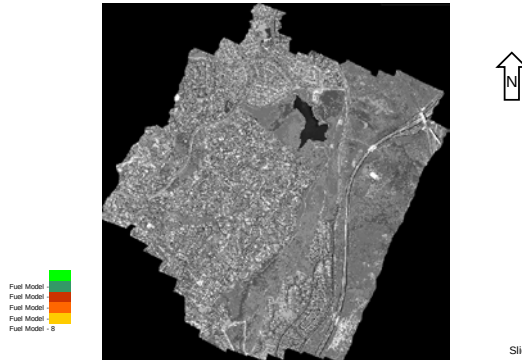


HIGH-RISK VEGETATION



Slide 2-60

FUEL MODEL OVERLAY



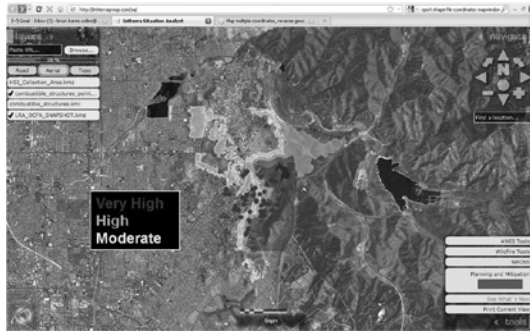
Slide 2-61

EXAMPLE — COMBUSTIBLE STRUCTURE



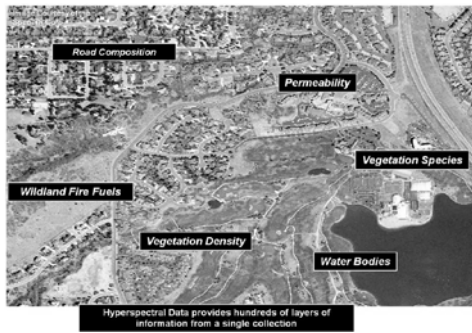
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COMBUSTIBLE STRUCTURES — LOCAL RESPONSIBILITY HAZARD AREAS



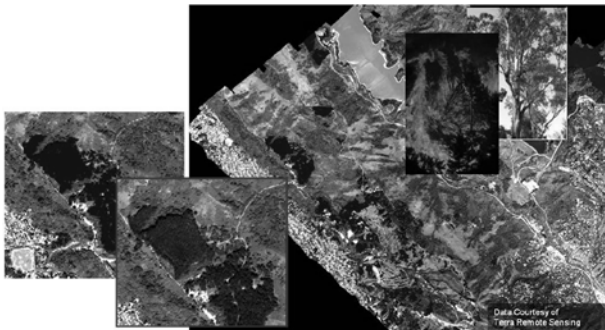
Slide 2-63

HYPERSPECTRAL IMAGERY (cont'd)



Slide 2-64

HYPERSPECTRAL DATA — HIGH-PROFILE VEGETATION



Slide 2-65

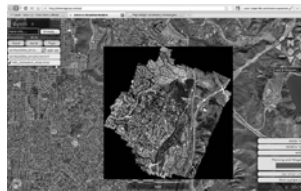
WILDLAND FIRE FUELS — HYPERSPPECTRAL IMAGING



Slide 2-66

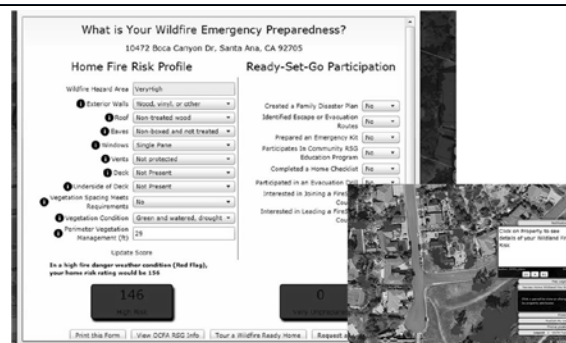
OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

How can geospatial tools be used to support WUI fire risk mitigation strategies?



Slide 2-67

INTEGRATING IMAGERY INTO PLANNING



Slide 2-68

GPS AND GEOLOCATION INTEROPERABILITY



OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- GPS and geolocation services.
 - Anticipate an overwhelming demand for location-based information as events occur.
 - The “where” of your actions is increasingly being requested, scrutinized, used, shared and evaluated.

Slide 2-70

G. GPS and geolocation services.

1. GPS is becoming a standard tool of everyday life — most notably in our smartphones and tablet tools.
2. Tracking resources, people and certain events is possible with this technology.
3. What it means to an FAC.
 - a. Anticipate an overwhelming demand for location-based information as events occur.
 - b. People know the technology can provide this type of pinpoint information, so the “where” of your actions is increasingly being requested, scrutinized, used, shared and evaluated.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Trace and record the geospatial points or boundaries of places, landmarks, fuel projects, fires, evacuation zones or routes for inclusion in your CWPP.

Slide 2-71

- c. With GPS devices, you can trace and record the geospatial points or boundaries of places, landmarks, fuel projects, fires, evacuation zones or routes for inclusion in your CWPP.
- d. Automatic vehicle location is becoming more widespread as we track ground assets. This can extend to crews, individuals and aircraft.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

- Fire behavior models.
 - Use of mathematical fire models to predict fire behavior and fire effects.
 - Predictions can be successfully applied to a range of fire management activities.

Slide 2-72

H. Fire behavior models.

1. Use of mathematical fire models to predict fire behavior and fire effects plays an important supporting role in wildland fire management.

OVERVIEW OF GEOSPATIAL TOOLS (cont'd)

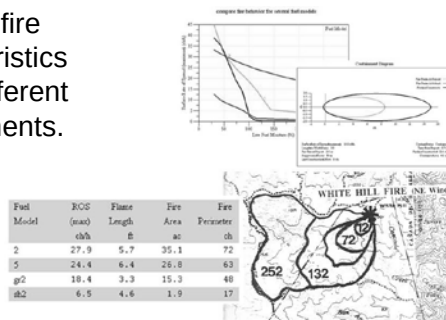
- What does fire behavior modeling do?
 - Analyze fire behavior under varying circumstances.
 - Three different models are used:
 - Behave.
 - FARSITE.
 - FlamMap.
 - Each shows different information.

Slide 2-73

2. When used in conjunction with personal fire experience and a basic understanding of the fire models, predictions can be successfully applied to a range of fire management activities, including wildland fire behavior prediction, prescribed fire planning, and fuel hazard assessment.

BEHAVE

- Displays fire characteristics under different environments.

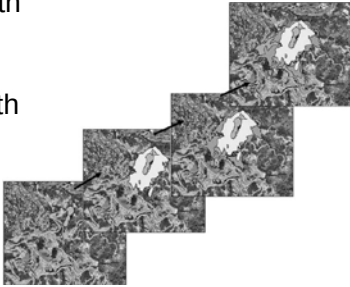


Slide 2-74

3. Behave fire model.
 - a. The Behave fire behavior prediction and fuel modeling system was among the early computer systems developed for wildland fire management.
 - b. The system has been updated and expanded and is now called the BehavePlus fire modeling system to reflect its expanded scope.
 - c. BehavePlus provides a means of modeling fire behavior (such as rate of spread and spotting distance), fire effects (such as scorch height and tree mortality), and the fire environment (such as fuel moisture and wind adjustment factor).

FARSITE

- Shows fire growth over time and space.
- Compares growth with and without mitigations.
- Helps response planning.



Slide 2-75

4. FARSITE fire model.

- a. FARSITE is a fire growth simulation modeling system. It uses spatial information on topography and fuels along with weather and wind files. It incorporates existing models for surface fire, crown fire, spotting, post-frontal combustion and fire acceleration into a two-dimensional fire growth model.
- b. FARSITE is widely used by USFS, the National Park Service, and other federal and state land management agencies to simulate the spread of wildland fires and fire use for resource benefit across the landscape. It is designed for users familiar with fuels, weather, topography, wildland fire situations, and the associated terminology.
- c. Because of its complexity, only users with the proper fire behavior training and experience should use FARSITE where the outputs are to be used for making fire and land management decisions.

WUI Heights Wildland Fire Potential

FARSITE Fire Behavior Modeling

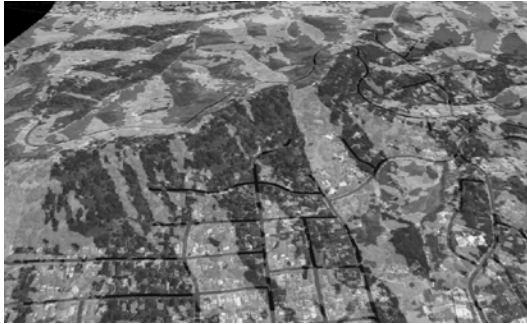
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FARSITE FIRE BEHAVIOR MODELING



Slide 2-77

FARSITE FIRE BEHAVIOR MODELING (cont'd)



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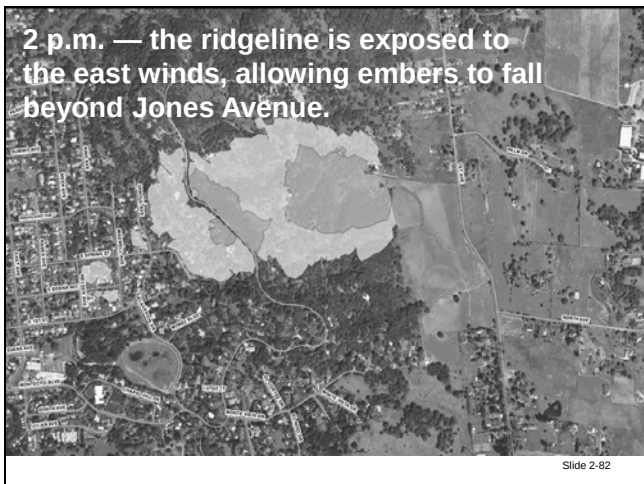
FARSITE FIRE BEHAVIOR MODELING (cont'd)

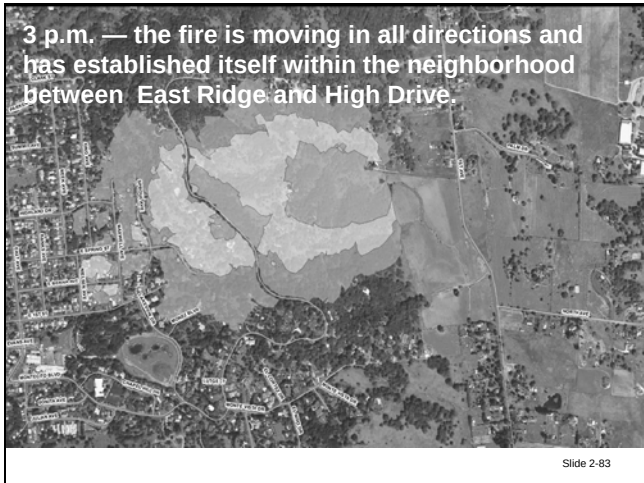
- This simulation was built using an east-northeast wind consistent with frequent “red flag” winds.
- Although these winds are only occasional, they do tend to be the common factor in large, damaging fires.

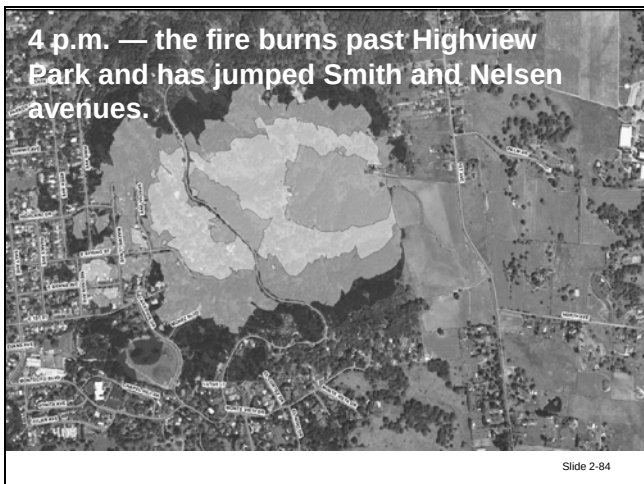
Slide 2-79

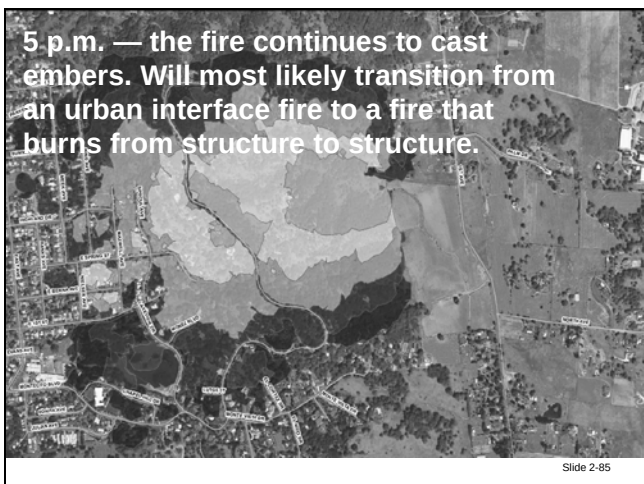






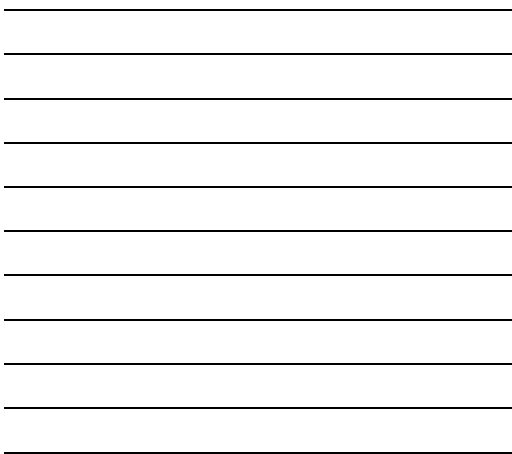






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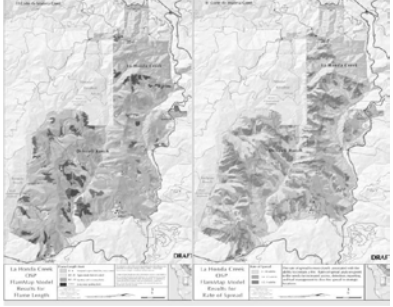
- [illegible]



5. FlamMap fire model.
 - a. FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.) over an entire FARSITE landscape for constant weather and fuel moisture conditions.
 - b. The FlamMap software creates maps of potential fire behavior characteristics (e.g., spread rate, flame length, crown fire activity) and environmental conditions (dead fuel moistures, midflame wind speeds, and solar irradiance) over an entire FARSITE landscape. These maps can be viewed in FlamMap or exported for use in a GIS, image or word processor.
 - c. FlamMap is not a replacement for FARSITE or a complete fire growth simulation model. There is no temporal component in FlamMap. It uses spatial information on topography and fuels to calculate fire behavior characteristics for a single set of environmental conditions.

FLAMMAP (cont'd)

- Spatial distribution of fire behavior.
- Can display effects of fuel management.



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- d. FlamMap is widely used by USFS, the National Park Service, and other federal and state land management agencies in support of fire management activities. It is designed for use by users familiar with fuels, weather, topography, wildland fire situations, and the associated terminology. Because of its complexity, only users with the proper fire behavior training and experience should use FlamMap where the outputs are to be used for making fire and land management decisions.

COMPARISON OF THREE MODELS

- BehavePlus.
 - One site only.
 - Good outputs on tree mortality, probability of ignition.

All are public domain (free)!

Slide 2-90

COMPARISON OF THREE MODELS (cont'd)

- FARSITE.
 - Spatial (provides growth over space).
 - Ignition-site dependent.
 - Many layers of outputs.

All are public domain (free)!

Slide 2-91

COMPARISON OF THREE MODELS (cont'd)

- FlamMap.
 - Spatial (provides context).
 - Same inputs/outputs as FARSITE.

All are public domain (free)!

Slide 2-92

OTHER FIRE BEHAVIOR MODELING TOOLS

- Interagency Fuels Treatment Decision Support System (IFTDSS).
 - Free Web-based modeling and decision-making tool.
 - User-defined, map-based outputs.
 - Outputs combine Behave, FlamNav and GIS.
 - Account required (open to any user).

Slide 2-93

6. Interagency Fuels Treatment Decision Support System (IFTDSS).

- a. Web-based program that can produce hazard analysis, risk assessment, fuels treatments, potential losses (property damage), and mitigation project-related outputs using user-provided data inputs.
- b. Outputs combine Behave, FlamNav and GIS.
- c. User-defined, map-based outputs.
- d. Useful decision-making tool.
- e. Free access — account setup required (<http://iftdss.sonomatech.com>).

III. WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING

WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING

- Wildland fire preplans.
 - Planning and gathering information for use during response.
 - Developing or linking the CWPP to wildland fire preplans is one way of improving outcomes.

Slide 2-94

A. Wildland fire preplans.

1. Planning and gathering information for use during response improves one's ability to respond in a safe and effective manner. This is the preplanning process.
2. Developing or linking the CWPP to wildland fire preplans is one way of improving outcomes for responders and the community at large.

**WILDLAND FIRE PREPLANS AND
LARGE FIRE PLANNING (cont'd)**

- What are wildland fire preplans?
- How many of you have them?



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**WILDLAND FIRE PREPLANS AND
LARGE FIRE PLANNING (cont'd)**

- Wildland fire preplans.
 - Systematic process for evaluating a target and identifying critical conditions, hazards, objectives and resources that are present during a wildland fire event.



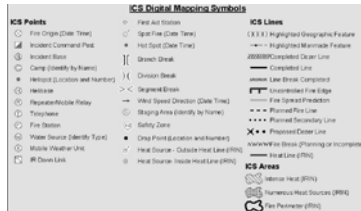
Slide 2-96

3. It is a systematic process for evaluating a target (community, neighborhood, street, open space area, or park) and identifying critical conditions, hazards, objectives and resources that are present during a wildland fire event.
4. It can also be called a preattack plan, wildland fire plan, or other titles.
5. Just like a structural firefighting preplan, it can be as general (or as detailed) as your department chooses to make it.

6. Currently, the Fire Incident Mapping Tools (FIMT) symbology is being standardized to include wildland fire preplanning symbols.

WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING (cont'd)

- Use the standard Incident Command System (ICS) incident symbols when building a WUI preplan.



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7. Use the standard Incident Command System (ICS) incident symbols when building a WUI preplan.

WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING (cont'd)

- Who should be involved with helping to develop a wildland fire preplan?
- How would you engage stakeholders in the process?



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WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING (cont'd)

- What are items that should be included in a wildland fire preplan?
- How often should the plan be reviewed and updated?



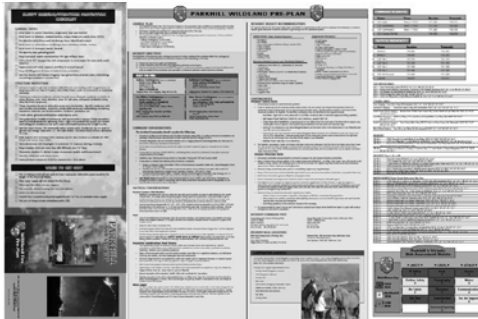
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8. Items to include might be:

- a. Life safety information.
 - Evacuation plans.
 - Public assembly points.
 - Emergency notification procedures.
 - Safety zones.
- b. Evacuation communications.
 - Mass notification systems.
 - Public information communication during emergency events.
- c. Incident locations.
 - Staging Areas.
 - Incident Command Posts (ICPs).
 - Water supply sources.
 - Shelters.
 - Helibase/Helisports.
 - Traffic control points.

- d. Incident planning.
 - Safety briefing information.
 - Unified Command or Cooperator key items.
 - Control objectives.
 - Structure protection triage guidelines.
 - Fire protection responsibilities among agencies.
 - Specific safety plans or hazards.
 - Communications plans, such as radio or cell dead spots.
 - Restricted operations areas.
 - Military.
 - Sensitive resources.
 - Retardant avoidance areas.
 - Resource needs.
 - Preset orders.
 - Special resources needs.

WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING (cont'd)



WILDLAND FIRE PREPLANS AND LARGE FIRE PLANNING (cont'd)

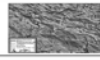
CAL FIRE / San Luis Obispo County Fire, the County Office of Emergency Service and the San Luis Obispo County Communities Fire Safe Council have contributed funding to these projects to create Pre-Planned Evacuations brochures for the public that confirm for the residents the proper evacuation route.

West Atascadero Evacuation Route Plan (2013)

DRAFT

West Atascadero Evacuation Plan (PDF, .swg) 2013

(Funding provided by SLOCCFSC)

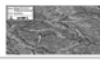


Parkhill Evacuation Route Plan (2013)

DRAFT

Parkhill Evacuation Plan (PDF, .swg)

(Funding provided by SLOCCFSC)

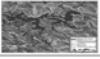


Lake Nacimiento Evacuation Route Plan (2012)

DRAFT

Lake Nacimiento Evacuation Plan (PDF, .swg)

(Funding provided by SLOCCFSC)



Avila Evacuation Route Plan (2012)

DRAFT

Avila Evacuation Plan (PDF, .swg)

(Funding provided by SLOCCFSC)



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ACTIVITY 2.2

Use of Wildland Fire Preplans

Purpose

To articulate the value of connecting the CWPP to wildland fire preplans needed for firefighting response.

Directions

1. Work within your table group to complete this activity.
2. Review the wildland fire preplan items discussed in the previous section of lecture.
3. Within your table group, consider and respond to the following questions relating to the use of wildland preplans:
 - a. Where and how would you incorporate prefire plan information into a CWPP?
 - b. Who would use the information?
 - c. Would you share the plan with the community? If so, how?
4. Record your group's responses on the easel pad.
5. Complete this portion of the activity within 15 minutes.
6. The instructor will solicit responses to each of the above questions.
7. The entire activity should be completed within 30 minutes.

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IV. SUMMARY



SUMMARY

- Variety of technical tools available to support a CWPP and FAC initiative.
- CWPPs increasingly rely on technical tools.
- Developing or linking the CWPP to wildland fire preplans can improve response outcomes.

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APPENDIX A

WALDO CANYON FIRE REBUILD PROVISIONS: HILLSIDE IGNITION-RESISTANT CONSTRUCTION

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Waldo Canyon Fire Rebuild Provisions HILLSIDE IGNITION-RESISTANT CONSTRUCTION



SCOPE: As a result of the Waldo Canyon Fire and the disastrous outcomes that were experienced, the Colorado Springs Fire Department, in partnership with the Colorado Springs Housing and Building Association, have collaborated to address some critical issues that were determined to be deficient with regard to wildfire mitigation and associated fire code requirements. As such, this document cooperatively modifies code language to more safely and reasonably protect those residents who are rebuilding or building new homes in the Waldo Canyon Fire Burn Area.

The following requirements shall be enforced for all homes reconstructed due to the Waldo Canyon Fire for ignition-resistant construction and fuels management:

1. A Class A roof covering (excluding solid wood materials) shall be installed on all Residential Occupancies and a minimum Class B roof covering shall be installed on remaining occupancies, unless otherwise permitted.
2. Exterior cladding, eaves and soffits shall be constructed of ignition-resistant materials approved by CSFD. Approved materials include, but are not limited to: fiber-cement board, stucco, masonry/brick, manufactured stone, and similar materials. Natural wood/cedar siding, hardboard, vinyl, and similar combustible materials are not allowed.

Exception: Natural wood or plastic products used for fascia, trim board materials and trim accents, such as corbels, false rafter tails, faux trusses, shutters and decorative vents material are allowed when painted or as approved.

3. For any portion of the attached structure with projections or overhangs, the area below the structure shall have all horizontal under-floor areas enclosed with ignition resistive materials such as those allowed in item 2 above.

Exception: Heavy timber or dimensional log construction is allowed.

4. Exterior doors shall be noncombustible or solid core not less than 1 3/4-inches thick. Windows within doors and glazed doors shall be tempered safety glass or multi-layered glazed panels. Exception: Decorative single pane glazing in front entry doors is allowed.
5. Exterior windows shall be a minimum double pane. Tempered panes are preferable but not required.
6. All attic vents shall be screened with wire mesh or hardware cloth having openings no larger than 1/8-inch unless an alternative design or product is allowed by the Fire Code Official. Soffit vents are allowed. Gable vents may be allowed but only as approved by the Fire Code Official.

7. Gutters and downspouts that are of non-combustible construction shall be installed such that the leading edge of the roof is finished with a metal drip edge so that no wood sheathing is exposed. The drip edge shall extend into the gutter. Vinyl gutters may be allowed, but must have a non-combustible landing area below the roof line, that is a minimum 5 foot distance from the side of the structure or foundation. NOTE: gutter caps are highly encouraged as a home-owner maintenance item to prevent combustible debris from collecting in the trough.
8. Decks and other habitable spaces shall be of ignition resistant or non-combustible decking materials, such as composite or metal decking. Wood is not permitted to be used for the decking surface, but can be used for all large structural components and railings.
9. The base of exterior walls, posts or columns shall be protected on the bottom side with provisions such as fire resistant foam or wire mesh having openings no larger than 1/8-inch to protect them from ember intrusion and still allow for weeping and moisture control.
10. Chimneys serving fireplaces, as well as other heating appliances in which solid or liquid fuels used shall have an approved spark arrestor or cap.

Note: Alternative materials or construction methods not specifically addressed above may be considered on a case-by-case basis if found to have comparable ignition-resistant properties.

Fuels Management: All lots within the Waldo Canyon Burn Area shall be subject to the following fuels management requirements:

Safety zone: Brush patches or clusters may be left in the safety zone, but shall be separated by clear areas of ten feet (10') or more of noncombustible materials or grass mowed to not more than four inches (4") in height.

Clearance to Main Structure: No brush or trees shall be allowed within fifteen feet (15') of the main structure. Conifers or other similarly combustible plants shall not be planted under soffit vents.

Exception: When approved by the Fire Official, small brush patches or trees, not exceeding one hundred (100) square feet in size and no more than fifteen (15) linear feet in any direction, may be allowed to encroach into this zone. Vegetation must be maintained in accordance with the Colorado Springs Fire Department Wildfire Mitigation recommendations.

Pruning of Dead Limbs: Large trees shall not have overlapping limbs and shall be pruned of dead limbs to a height of ten feet (10') above the ground. Tree clusters may be allowed if sufficient clear area is provided and approved.

Clearance of Tree Branches to Structures or Appurtenances: Tree branches shall not extend over or under the roof or eaves, and shall not be within fifteen feet (15') of a deck or similar combustible projection, wood burning appliance or chimney.

Construction Permit Review Requirements: All requirements must be reviewed and approved by the Colorado Springs Fire Department Construction Services prior to permit issuance and prior to final inspection. Construction work may be approved based upon signature of this document by the builder or homeowner's representative prior to initial construction in addition to verification and approval at final inspection. By signing below, the builder or homeowner's representative agrees to the use of the materials, construction methods, and fuels managements provisions included in this document. A final fire department inspection to verify compliance will be required prior to issuance of the Certificate of Occupancy.

Address of Permit: _____

Name (printed): _____

Signature: _____

Date: _____

Colorado Springs Fire Department, Waldo Canyon Rebuild July 31, 2012

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APPENDIX B

2007 CALIFORNIA FIRE AND BUILDING CODES

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CHAPTER 7A [SFM]

MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE

SECTION 701A SCOPE, PURPOSE AND APPLICATION

701A.1 Scope. *This chapter applies to building materials, systems and/or assemblies used in the exterior design and construction of new buildings located within a Wildland-Urban Interface Fire Area as defined in Section 702A.*

701A.2 Purpose. *The purpose of this chapter is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flames or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.*

701A.3 Application. *New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after December 1, 2005, shall comply with the following sections:*

1. 704A.1—Roofing

2. 704A.2—Attic Ventilation

701A.3.1 Alternates for materials, design, tests, and methods of construction. *The enforcing agency is permitted to modify the provisions of this chapter for site-specific conditions in accordance with Appendix Chapter 1, Section 104.10. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted in accordance with the California Fire Code, Chapter 47.*

701A.3.2 New buildings located in any fire hazard severity zone. *New buildings located in any Fire Hazard Severity Zone shall comply with one of the following:*

1. State Responsibility Areas. *New building located in any Fire Hazard Severity Zone within State Responsibility Areas, for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.*

2. Local Agency Very-High Fire Hazard Severity Zone. *New buildings located in any Local Agency Very-High Fire Hazard Severity Zone for which an application for a building permit is submitted on or after July 1, 2008, shall comply with all sections of this chapter.*

3. Wildland-Urban Interface Fire Area designated by the enforcing agency. *New buildings located in any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.*

701A.3.2.1 Inspection and certification. *Building permit applications and final completion approvals for buildings within the scope and application of this chapter shall comply with the following:*

701A.3.2.2 *The local building official shall, prior to construction, provide the owner or applicant a certification that the building as proposed to be built complies with all applicable state and local building standards, including those for materials and construction methods for wildfire exposure as described in this chapter.*

701A.3.2.3 *The local building official shall, upon completion of construction, provide the owner or applicant with a copy of the final inspection report that demonstrates the building was constructed in compliance with all applicable state and local building standards, including those for materials and construction methods for wildlife exposure as described in this chapter.*

701A.3.2.4 *Prior to building permit final approval the property shall be in compliance with the vegetation clearance requirements prescribed in California Public Resources Code 4291 California Government Code Section 51182.*

SECTION 702A DEFINITIONS

For the purposes of this chapter, certain terms are defined below:

CDF DIRECTOR *means the Director of the California Department of Forestry and Fire Protection.*

FIRE PROTECTION PLAN *is a document prepared for a specific project or development proposed for a Wildland Urban Interface Fire Area. It describes ways to minimize and mitigate potential for loss from wildfire exposure.*

The Fire Protection Plan shall be in accordance with this chapter and the California Fire Code, Chapter 47. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted. Only locally adopted ordinances that have been filed with the California Building Standards Commission or the Department of Housing and Community Development in accordance with Section 101.8 shall apply.

FIRE HAZARD SEVERITY ZONES *are geographical areas designated pursuant to California Public Resources Codes Sections 4201 through 4204 and classified as Very High, High, or Moderate in State Responsibility Areas or as Local Agency Very High Fire Hazard Severity Zones designated pursuant to California Government Code, Sections 51175 through 51189. See California Fire Code Article 86.*

MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE

The California Code of Regulations, Title 14, Section 1280, entitles the maps of these geographical areas as “Maps of the Fire Hazard Severity Zones in the State Responsibility Area of California.”

IGNITION-RESISTANT MATERIAL *is any product which, when tested in accordance with ASTM E 84 for a period of 30 minutes, shall have a flame spread of not over 25 and show no evidence of progressive combustion. In addition, the flame front shall not progress more than 101/2 feet (3200 mm) beyond the centerline of the burner at any time during the test.*

Materials shall pass the accelerated weathering test and be identified as exterior type, in accordance with ASTM D 2898 and ASTM D 3201. All materials shall bear identification showing the fire performance rating thereof. That identification shall be issued by ICC-ES or a testing facility recognized by the State Fire Marshal having a service for inspection of materials at the factory.

Fire-Retardant-Treated Wood or noncombustible materials as defined in Section 202 shall satisfy the intent of this section.

The enforcing agency may use other definitions of ignition-resistant material that reflect wildfire exposure to building materials and/or their materials, performance in resisting ignition.

LOCAL AGENCY VERY HIGH FIRE HAZARD SEVER- ITY ZONE *means an area designated by a local agency upon the recommendation of the CDF Director pursuant to Government Code Sections 51177(c), 51178 and 5118 that is not a state responsibility area and where a local agency, city, county, city and county, or district is responsible for fire protection.*

STATE RESPONSIBILITY AREA means lands that are classified by the Board of Forestry pursuant to Public Resources Code Section 4125 where the financial responsibility of preventing and suppressing forest fires is primarily the responsibility of the state.

WILDFIRE is any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property, or resources as defined in Public Resources Code Sections 4103 and 4104.

WILDFIRE EXPOSURE is one or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.

WILDLAND-URBAN INTERFACE FIRE AREA is a geographical area identified by the state as a “Fire Hazard Severity Zone” in accordance with the Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires.

SECTION 703A STANDARDS OF QUALITY

703A.1 General. Material, systems, and methods of construction used shall be in accordance with this Chapter.

703A.2 Qualification by testing. Material and material assemblies tested in accordance with the requirements of Section 703A shall be accepted for use when the results and conditions

of those tests are met. Testing shall be performed by a testing agency approved by the State Fire Marshal or identified by an ICC-ES report.

703A.3 Standards of quality. The State Fire Marshal standards listed below and as referenced in this chapter are located in the California Referenced Standards Code, Part 12 and Chapter 35 of this code.

SFM 12-7A-1, Exterior Wall Siding and Sheathing. **SFM 12-7A-2,** Exterior Window.

SFM 12-7A-3, Under Eave.

SFM 12-7A-4, Decking.

SECTION 704A MATERIALS, SYSTEMS AND METHODS OF CONSTRUCTION

704A.1 Roofing.

704A.1.1 General. Roofs shall comply with the requirements of Chapter 7A and Chapter 15. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.

704A.1.2 Roof coverings. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be fire stopped with approved materials or have one layer of 72 pound (32.4 kg) mineral-surfaced non-perforated cap sheet complying with ASTM D3909 installed over the combustible decking.

704A.1.3 Roof valleys. When provided, valley flashings shall be not less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of 72 pound (32.4 kg) mineral-surfaced non-perforated cap sheet complying with ASTM D3909 running the full length of the valley.

704A.1.4 Reserved.

704A.1.5 Roof gutters. Roof gutters shall be provided with the means to prevent the accumulation of leaves and debris in the gutter.

704A.2 Attic ventilation.

704A.2.1 General. When required by Chapter 15, roof and attic vents shall resist the intrusion of flame and embers into the attic area of the structure, or shall be protected by corrosion-resistant, noncombustible wire mesh with openings a minimum of 1/8-inch (3.2 mm) and shall not exceed 1/4-inch (6 mm) or its equivalent.

704A.2.2 Eave or cornice vents. Vents shall not be installed in eaves and cornices.

Exception: Eave and cornice vents may be used provided they resist the intrusion of flame and burning embers into the attic area of the structure.

704A.2.3 Eave protection. Eaves and soffits shall meet the requirements of SFM 12-7A-3 or shall be protected by ignition-resistant materials or noncombustible construction on the exposed underside.

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704A.3 Exterior walls.

704A.3.1 General. Exterior walls shall be approved noncombustible or ignition-resistant material, heavy timber, or log wall construction or shall provide protection from the intrusion of flames and embers in accordance with standard SFM 12-7A-1.

704A.3.1.1 Exterior wall coverings. Exterior wall coverings shall extend from the top of the foundation to the roof, and terminate at 2-inch (50.8 mm) nominal solid wood blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.

704A.3.2 Exterior wall openings. Exterior wall openings shall be in accordance with this section.

704A.3.2.1 Exterior wall vents. Unless otherwise prohibited by other provisions of this code, vent openings in exterior walls shall resist the intrusion of flame and embers into the structure or vents shall be screened with a corrosion-resistant, noncombustible wire mesh with 1/4-inch (6 mm) openings or its equivalent.

704A.3.2.2 Exterior glazing and window walls. Exterior windows, window walls, glazed doors, and glazed openings within exterior doors shall be insulating-glass units with a minimum of one tempered pane, or glass block units, or have a fire-resistance rating of not less than 20 minutes, when tested according to NFPA 257, or in accordance with Section 715, or conform to the performance requirements of SFM 12-7A-2.

704A.3.2.3 Exterior door assemblies. Exterior door assemblies shall conform to the performance requirements of standard SFM 12-7A-1 or shall be of approved noncombustible construction, or solid core wood having stiles and rails not less than 1-1/8 inches thick with interior field panel thickness no less than 1-1/4 inches thick, or shall have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 252, or in accordance with Section 715.

Exception: Noncombustible or exterior fire-retardant treated wood vehicle access doors are not required to comply with this chapter.

704A.4 Decking, floors and under floor protection. 704A.4.1 Decking.

704A.4.1.1 Decking surfaces. *Decking, surfaces, stair treads, risers, and landings of decks, porches, and balconies where any portion of such surface is within 10 feet (3048 mm) of the primary structure shall comply with one of the following methods:*

1. *Shall be constructed of ignition-resistant materials and pass the performance requirements of SFM 12-7A-4, Parts A and B.*
2. *Shall be constructed with heavy timber, exterior fire-retardant-treated wood or approved noncombustible materials.*
3. *Shall pass the performance requirements of SFM 12-7A-4, Part A, 12-7A-4.7.5.1 only with a net peak heat release rate of 25kW/sq. ft. for a 40-minute observation period and:*
 1. *Decking surface material shall pass the accelerated weathering test and be identified as exterior type, in accordance with ASTM D 2898 and ASTM D 3201 and;*
 2. *The exterior wall covering to which it the deck is attached and within 10 (3048 mm) feet of the deck shall be constructed of approved noncombustible or ignition resistant material.*

Exception: *Walls are not required to comply with this subsection if the decking surface material conforms to ASTM E-84 Class B flame spread.*

The use of paints, coatings, stains, or other surface treatments are not an approved method of protection as required in this chapter.

704A.4.2 Under-floor and appendages protection.

704A.4.2.1 Underside of appendages and floor projections. *The underside of cantilevered and overhanging appendages and floor projections shall maintain the ignition-resistant integrity of exterior walls, or the projection shall be enclosed to the grade.*

704A.4.2.2 Unenclosed under-floor protection. *Buildings shall have all under-floor areas enclosed to the grade with exterior walls in accordance with Section 704A.3.*

Exception: *The complete enclosure of under floor areas may be omitted where the underside of all exposed floors, exposed structural columns, beams and supporting walls are protected as required with exterior ignition-resistant material construction or be heavy timber.*

704A.5 Ancillary buildings and structures.

704A.5.1 Ancillary buildings and structures. *When required by the enforcing agency, ancillary buildings and structures and detached accessory structures shall comply with the provisions of this chapter.*

CHAPTER 47

REQUIREMENTS FOR WILDLAND-URBAN INTERFACE FIRE AREAS

SECTION 4701 GENERAL

4701.1 Scope. *The mitigation of conditions where a wildfire burning in vegetative fuels may readily transmit fire to buildings and threaten to destroy life, overwhelm fire suppression capabilities, or result in large property losses shall comply with this chapter.*

4701.2 Purpose. *The purpose of this code is to provide minimum standards to increase the ability of a building to resist the intrusion of flame or burning embers being projected by a vegetation fire and contributes to a systematic reduction in conflagration losses through the use of performance and prescriptive requirements.*

SECTION 4702 DEFINITIONS

4702.1 General. *For the purpose of this chapter, certain terms are defined as follows:*

CDF DIRECTOR means the Director of the California Department of Forestry and Fire Protection.

FIRE PROTECTION PLAN is a document prepared for a specific project or development proposed for a Wildland- Urban Interface Fire Area. It describes ways to minimize and mitigate potential for loss from wildfire exposure.

The Fire Protection Plan shall be in accordance with this chapter. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted. Only locally adopted ordinances that have been filed with the California Building Standards Commission in accordance with Section 101.14 or the Department of Housing and Community Development in accordance with Section 101.15 shall apply.

FIRE HAZARD SEVERITY ZONES are geographical areas designated pursuant to California Public Resources Codes Sections 4201 through 4204 and classified as Very High, High, or Moderate in State Responsibility Areas or as Local Agency Very High Fire Hazard Severity Zones designated pursuant to California Government Code Sections 51175 through 51189.

The California Code of Regulations, Title 14, Section 1280 entitles the maps of these geographical areas as “Maps of the Fire Hazard Severity Zones in the State Responsibility Area of California.”

LOCAL AGENCY VERY HIGH FIRE HAZARD SEVERITY ZONE means an area designated by a local agency upon the recommendation of the CDF Director pursuant to Government Code Sections 51177(c), 51178 and 51189 that is not a state responsibility area and where a local agency, city, county, city and county, or district is responsible for fire protection.

STATE RESPONSIBILITY AREA means lands that are classified by the Board of Forestry pursuant to Public Resources

Code Section 4125 where the financial responsibility of preventing and suppressing forest fires is primarily the responsibility of the state.

WILDFIRE is any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property, or resources as defined in Public Resources Code Sections 4103 and 4104.

WILDFIRE EXPOSURE is one or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.

WILDLAND-URBAN INTERFACE FIRE AREA is a geo- graphical area identified by the state as a “Fire Hazard Severity Zone” in accordance with the Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at a significant risk from wildfires. See Article 86B for the applicable referenced sections of the Government Code and the Public Resources Code.

SECTION 4703 PLANS [RESERVED]

SECTION 4704 FIRE HAZARD SEVERITY ZONES

4704.1 General. Lands in the state are classified by the CDF Director in accordance with the severity of wildfire hazard expected to prevail in those areas and the responsibility for fire protection, so that measures may be identified which will reduce the potential for losses to life, property, and resources from wildfire.

4704.2 Classifications. The CDF Director classifies lands into fire hazard severity zones in accordance with California Public Resources Code Sections 4201 through 4204 for State Responsibility Areas and in accordance with Government Code Sections 51175 through 51189 for areas where a local agency is responsible for fire protection.

SECTION 4705 WILDLAND-URBAN INTERFACE FIRE AREA

4705.1 General. Construction methods and requirements to mitigate wildfire exposure shall be applied within geographical areas where a wildfire burning in vegetative fuels may readily transmit fire to buildings and threaten to destroy life, overwhelm fire suppression capabilities, or result in large property losses.

4705.2 Construction methods and requirements within established limits. Within the limits established by law, construction methods intended to mitigate wildfire exposure shall comply with the California Building Code Chapter 7A, and this chapter.

REQUIREMENTS FOR WILDLAND-URBAN INTERFACE FIRE AREAS

4705.3 Establishment of limits. The establishment of limits for the Wildland-Urban Interface Fire Area's required construction methods shall be designated pursuant to the California Public Resources Code for State Responsibility areas or by a local agency following a finding supported by substantial evidence in the record that the requirements of this section are necessary for effective fire protection within the area.

SECTION 4706 VEGETATION MANAGEMENT [RESERVED]

SECTION 4707 DEFENSIBLE SPACE [RESERVED]

SECTION 4708 MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE

4708.1 Scope, purpose and application.

4708.1.1 Scope. This chapter applies to building materials, systems and or assemblies used in the exterior design and construction of new buildings located within a Wildland- Urban Interface Fire Area as defined in this chapter.

4708.1.2 Purpose. The purpose of this chapter is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility

Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

4708.1.3 Application. *New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after December 1, 2005, shall comply with the following Sections:*

1. 4710.1 Roofing

2. 4710.2 Attic Ventilation

4708.2 Alternates for materials, design, tests, and methods of construction. *The enforcing agency is permitted to modify the provisions of this chapter for site-specific conditions in accordance with the California Building Code Appendix Chapter 1, Section 104.10. When required by the enforcing agency for the purposes of granting modifications, a fire protection plan shall be submitted in accordance with the Chapter 47.*

SECTION 4709 STANDARDS OF QUALITY [RESERVED]

SECTION 4710 MATERIALS, SYSTEMS AND METHODS OF CONSTRUCTION

4710.1 Roofing.

4710.1.1 General. *Roofs shall comply with the requirements of this chapter and the California Building Code, Chapter 15. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.*

4710.1.2 Roof coverings. *Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be fire-stopped with approved materials or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.*

4710.1.3 Roof valleys. *When provided, valley flashings shall be not less 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of No. 72 ASTM cap sheet running the full length of the valley.*

4710.1.4 Roof gutters. *Roof gutters shall be provided with the means to prevent the accumulation of leaves and debris in the gutter.*

4710.2 Attic ventilation.

4710.2.1 General. *When required by the California Building Code, Chapter 15, roof and attic vents shall resist the intrusion of flame and embers into the attic area of the structure, or shall be protected by corrosion-resistant, noncombustible wire mesh with 1/4-inch (6 mm) openings or its equivalent.*

4710.2.2 Eave or cornice vents. *Vents shall not be installed in eaves and cornices.*

Exception: *Eave and cornice vents may be used provided they resist the intrusion of flame and burning embers into the attic area of the structure.*

APPENDIX

LAKESHORE CASE STUDY

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Lakeshore Case Study

General Community Information

Lakeshore, population 20,840, is a community spanning 15 square miles nestled in a mountain basin at 4,100 feet elevation on the eastern slopes of a mountain range. The mountain range runs parallel to the Scenic River. The Scenic River runs directly alongside the community of Lakeshore. Drake National Forest is across the Scenic River from Lakeshore and the Maddox State Forest extends into three of Lakeshore's neighborhoods (Hillside, Vista and Woodside). Both forests are located in Lincoln County.

Lakeshore was founded in 1867 and incorporated in 1905. It is the largest community and seat of Lincoln County. Neighboring cities include Cameron, located approximately 75 miles to the west, and Oakdale located 135 miles to the north.

Steeped in history, the Lakeshore area offers an array of natural and cultural wonders and is unsurpassed for beauty and diversity of activities. Lakeshore offers a variety of outdoor recreation, such as cross-country skiing, golfing, fishing, hunting and canoeing. It is known for its splendid bird watching and is the home of one of the highest concentrations of bald eagles. The city also offers a variety of arts and culture with numerous antique shops and museums, along with plays and musicals. Visitors can ride the downtown Trolley or follow the Old Town Historic Walking Tour.

Timber harvesting was extensive in Lincoln County for the first few decades of the 20th century. With the arrival of the Southern Pacific Railroad Transportation Company in 1909, Lakeshore grew rapidly from a few hundred residents to several thousand. Dozens of lumber mills cut fir and pine timber, and the industry flourished until the late 1980s when the Northern Spotted Owl and other endangered species became driving forces for change in local forest policy.

Climate

The Lakeshore area enjoys an average of 300 days of sunshine each year. Lakeshore has chilly winters and hot summers. The city's climate is often described as Warm Summer Mediterranean or Warm Summer Continental Mediterranean.

Typical of the region, Lakeshore has a dry summer season. The greatest amount of precipitation occurs during the winter in the form of snow. Although not arid or semi-arid, total precipitation is still low at 13.41 inches per year due to the city being in the rain shadow of the mountains to the west. The all-time record high is 105°F on July 27, 1911, and the all-time record low is -24 °F on January 15, 1888. The freeze-free season averages around 120 days, with the first freeze in a typical year occurring in mid-late September, and the last freeze occurring in late May. On average, 21 days per year reach 90°F or higher, and two days per year reach temperatures of 0°F or lower.

Geography and Topography

Lakeshore is a high desert landscape surrounded by mountains. The city encompasses a geographical area of 20.66 square miles, and ranges from 4,100-5,530 feet above sea level. *The topographic influence of the Scenic River creates a wind corridor in the Lakeshore area that can play a significant role in wildland fire behavior in and around Lakeshore.*

Transportation

Three state highways provide access to the City from the west, northwest, north, east, southeast, and southwest. Amtrak provides daily passenger rail service, and other railroad companies provide cargo rail service to the area.

Basin Transit Service, a special district with an elected Board of Directors, provides fixed route public transit service throughout the local area.

The Lakeshore Regional Airport serves local private and business aircraft, as well as commercial passengers with two scheduled daily morning departures and evening arrivals. The airport is located just south of the Madison Park area.

Education

The Lakeshore City School District, governed by an elected six-member Board of Directors, serves 3,000 K-12 students with five elementary schools (K-5), one middle school (6-8), and two high schools.

The Lincoln Community College and the State Institute of Technology provide local secondary education.

Industry

Many of Lakeshore's industries manufacture building commodities such as plywood, siding, roofing materials, etc. Other key industries include health care (Sky View Regional Medical Center) and customer and technical support services.

Recreation

The Lakeshore region is widely recognized as a destination for summer and winter recreation activities including boating and water sports, fishing, camping, golfing, skiing, rafting, hiking, hunting, and touring wineries. The Scenic River is one of the state's premier Steelhead salmon fisheries, and the area boasts numerous parks, campgrounds, wineries, and golf courses. Recreational tourism is a significant element of the City's economy.

Lakeshore Community Demographics (People and Housing)

Current Population		20,840
Population Density		484.4 persons per square mile
Race and Ethnicity Composition		83.4% White 11.8% Hispanic or Latino 5.0% from two or more races 4.5% from other races 4.3% Native American 1.6% Asian 1.0% African American 0.1% Pacific Islander
Housing Profile		Total # of Residential Properties: 8,542 70% owner occupied 30% renter occupied (greatest concentration is in the Center City area)
Age and Gender Profiles		The median age of Lakeshore residents is 33.6 years. 25% of residents are under age 18. 15% are age 18 to 24. 25% are age 25 to 44. 25% are age 45 to 64. 10% are 65 years of age or older. The gender makeup of the city is 49.3% male and 50.7% female.

Household Profiles		30% of households include children under the age of 18. Nearly 40% of households include married couples. 13% of households are led by a female with no husband present. 6% of householders are led by a male householder with no spouse present. 11% of households are occupied by at least one person who is 65 years of age or older. The average household size is 2.35 persons.
Household Income Profiles		The median household income is \$28,498.00. The median family income is \$37,021.00. Per capita income for the City is \$16,710.00. 22% of the population and 16% of families are challenged by poverty. This includes 27% of children under age 18 and 9.5% of people age 65 or older.

Planning and Growth

Between 1980 and 2006, Lakeshore’s population grew steadily. During the 1980s and 1990s, several new residential developments were built and many new businesses came to the area. However, since 2006 the population has remained consistent at 20,840. This slowed growth has been attributed to the recession that impacted the nation between 2006 and 2012.

Residential Development

Center City: This area of Lakeshore is located alongside the Scenic River and directly across from the Drake National Forest. Approximately **half** of Lakeshore’s residents live in the highly developed Center City area.

The west area of Center City includes several upscale restaurants, quaint specialty retail stores and a theater.

Downtown housing stock includes a mix of building styles that date to the early 1900s. There are a variety of brick (non-sprinklered) retail buildings and also an eclectic composition of wood-frame houses that sport older wood-shake roofing. Many of the older residential properties are registered as historical properties with the Lakeshore Historical Society. These homes are primarily owner-occupied and are of significant value. A significant number of residents over age 65 reside in the Center City area.

The area northwest of Highway 22 is an upscale development located in a hilly area comprised of owner-occupied lightweight construction non-sprinklered townhouses.

While Lakeshore has a relatively high percentage of owner-occupied housing, the southeastern section of the Center City area is where the greatest concentration of rental properties is located. Residents living in this section of Lakeshore have the lowest annual income per capita. Many of the landlords reside in other states and some of the housing is falling into various states of disrepair.

Public water and sewer service is present in the entire Center City area. The main water service lines are 12 inches in diameter. Electric service is provided through aboveground overhead lines.

There is an active merchant's association and neighborhood association in the core Center City area. The groups collaborate regularly to advance the agenda of keeping Center City safe, economically sustainable and steeped in historical significance.

The rest of Lakeshore (with exception of one neighborhood) is comprised of homes located near the brush and wooded areas that surround and ascend from the Center City area. Each neighborhood of Lakeshore has distinct character and carries its own designation.

Hillside:

Hillside is a highly developed neighborhood constructed in the 1960s overlooking the Center City area. While housing density is high, the majority of Hillside residents own their homes. Lot sizes range from a quarter to one acre. Housing stock includes mostly wood-frame dwellings that have been covered in recent years with vinyl siding. Nonfire-rated shingles are the primary roof coverings. Most properties include frame outbuildings for storage purposes.

Public water (with 12-inch main service lines and fire hydrants), overhead electric and underground sewer service are present in Hillside. Foliage that surrounds and is present throughout the Hillside neighborhood includes western juniper, bitterbrush, manzanita and sagebrush. Hillside has an active neighborhood association that strives to make the small but densely populated area a safe and active place to raise a family. The association's primary focus is on creating family-related activities.

Madison Park:

Madison Park was constructed in the 1970s –1980s and is comprised of both residential and commercial properties. Most of the residential housing stock is comprised of brick two-story homes with nonfire-rated shingled roofing. The commercial properties are either single-story retail businesses or office buildings. Building construction of these structures is a mix of steel, frame and brick. The roofs of nearly all commercial buildings are constructed of composite type shingles or poured rubber/asphalt material.

Full public utility service (including fire hydrants) is provided in this neighborhood. Most commercial and office buildings have fire sprinklers. Foliage in Madison Park is primarily deciduous trees that were planted for landscaping purposes when the neighborhood was built. Madison Park has neither a business association nor neighborhood group.

Geographically, Madison Park is the largest “neighborhood” but has the smallest number of residents. The south and east quadrants of Madison Park are zoned for business and commercial development. Community leaders are hopeful that growth will resume in the near future.

Vista:

Vista was developed in the 1990s. It is a residential neighborhood with land parcels that average between one and two acres. Housing stock is a mixture of single-family and condominium-type structures. Building construction varies with single-family homes being primarily wood or stucco-sided structures and condominiums wood-frame with simulated wooden vinyl siding. Some of the single-family homes have wood-shake roofs. Vista is home to the second largest number of residents over age 65.

Like Hillside, the Vista neighborhood is surrounded by and includes a combination western juniper, bitterbrush, manzanita, sagebrush and deciduous foliage. Some of this foliage is so thick among the neighborhood that many homes are not visible from street view. The northern section of Vista that includes a piece of the Maddox State Forest is zoned residential and slated for expansive development when growth resumes. This area incorporates and is surrounded by beautiful ponderosa pine trees.

While there is public utility service (including fire hydrants) to the area, water pressure is sometimes low due to the size of water mains, elevation to the neighborhood and lack of a pressure boosting pumping station. The road infrastructure in Vista is comprised of narrow streets and constricted gravel driveways bordered by trees. Vista has a very active (but small) neighborhood association. Organizers would love to expand the number of members so future projects could be considered that would further enhance the area. The continuing issue regarding lack of residential water pressure is something of great concern to the current group.

Woodside:

Woodside is the newest neighborhood in Lakeshore. Development began on this area in the late 1990s and continues sporadically. This is a residential neighborhood with land parcels averaging five to 30 acres.

While it is the smallest neighborhood in terms of homes and residents, Woodside sports the largest and most luxurious homes in the Lakeshore area. Most homes are at least 4,000 square feet or larger. Nearly all homes

are wood-frame log style construction. Roofs are comprised of either wood-shake or tile.

Like the neighborhoods of Hillside and Vista, Woodside includes a very dense mixture of western juniper, bitterbrush, manzanita, sagebrush and deciduous foliage. In addition, large stands of ponderosa pines surround and are located within Woodside.

Woodside has public utility service in the form of electricity provided by Lakeshore Power. The extension of public water, sewer and gas services were refused by an ad hoc group of Woodside homeowners.

Access to the homes in Woodside is somewhat limited as most properties have narrow gravel-covered tree-lined driveways. None of the properties are easily visible from the main thoroughfares due to the heavy forest type conditions. All access roads into and through Woodside are narrow. The residents of Woodside do not have a community association and prefer to be left alone.

Note — the Maddox State Forest extends into the neighborhoods of Hillside, Vista and Woodside. Center City is directly across the Scenic River from the Drake National Forest.

*Every neighborhood in Lakeshore includes quantities of homes that have attached wooden decks.

Utility Service

Electric:

Lakeshore Power provides service to the entire community. All areas of the city have overhead power lines that supply customers.

While the company is very responsive to customer needs, it does have a problem with frequent power outages due to overhead foliage coming in contact with high voltage lines located north and west of the city. The company attributes this condition to a lack of tree trimming service which became a victim of budget cuts in 2008.

Water and Sewer:

Public water (including fire hydrants) and sewer service is provided to all parts of Lakeshore with exception of the Woodside neighborhood. This neighborhood opposed extension of services due to costs associated with connection.

Water service to the Vista neighborhood has been problematic due to the size of service lines, elevation and lack of a pumping station in the area.

Lakeshore does not have a rural hydrant system or ancillary tanks for fire suppression activities. There are no agreements with state or federal officials to use any of the water sources in the forests for fire suppression purposes.

Natural Gas: Public access to natural gas service is available in the Center City, Hillside and Madison Park areas. Many of the homes in the Vista and Woodside neighborhoods use propane as a major utility. It is not uncommon for homes in the Vista area to have (at a minimum) 500 gallon aboveground propane tanks in their backyard. Most homes in Woodside have 1,000 gallon tanks. Some are above ground, others are buried.

Note — Lakeshore does not have an Adequate Public Facilities Ordinance that requires extension of public utilities to new developments. It also does not have an ordinance that requires specific types of address signage so emergency, utility and mail service staff can easily identify a home.

Economy and Finances

Lakeshore's largest employer is the Sky View Regional Medical Center. It is closely followed by the Lakeshore School District. Other major employers include JELD-WEN, an international building products manufacturer; the Collins Products plywood and siding plant; the American Forest Products plywood manufacturing plant; Corp Customer and Technical Care; Lincoln County School District; State Institute of Technology; and Home Depot. Most of Lakeshore's commerce-related property is located in either Madison Park or Center City.

Recreation is a significant element of the local economy with the Lakeshore region widely recognized as a destination for summer and winter recreation activities.

Lakeshore's current General Fund budget is \$21.6 million. The budget is supported by property taxes, sales tax, and city fees. In addition to the General Fund, the City has a Parks Fund that is derived from property taxes, water assessment fees, and hotel/motel taxes. The fund helps maintain over 600 acres of parks within the City. Lakeshore also has an Airport Fund supported by property taxes and airport rental activities to fund airport operations.

Even though the nationwide recession slowed the growth of Lakeshore, the City has a \$4.1 million surplus from last year's budget, and currently has an \$18.9 million reserve. However, this reserve is dedicated to future liabilities such as employee health care and retirement, as well as capital renewal and replacement. The current budget includes a \$4 million appropriation for unanticipated emergencies.

Police, code enforcement, and municipal court operations take up 59% of the annual General Fund budget.

Government & Politics

The City is governed by a Council-Manager form of government. The city council, which is nonpartisan, has five members, each elected from one of the five wards. Elected officials serve four-year terms which are staggered so that either two or three seats are up for election every two years.

The mayor's position is nonpartisan. He or she serves a term of four years and presides over all city council meetings. The mayor appoints committees, can veto any ordinance not passed with the affirmative vote of at least four council members, and casts tie-breaking votes.

The city manager is considered the administrative head of the city. He or she is appointed by the council and serves an indefinite term at the council's pleasure. The current Mayor was re-elected to his fifth term last year, and the incumbent Council members representing Districts 1, 2 and 3 were also re-elected to new terms. The current City Council works well together with little significant political discord. The current City Manager has served Lakeshore for nearly 20 years.

Lincoln County is governed by an elected three-member Board of Commissioners. Each full-time partisan term is for four (4) years and the official is paid a salary established by the Budget Committee. The Board oversees all county activities with the exception of the Sheriff and the District Attorney. A board chairman is appointed by the entire board, and the position is rotated among the three members. The Board of Commissioners encourages and supports new industry to enhance the local economy, and promotes the transfer of local forest resource management from federal agencies to state and local agencies.

Municipal Services

Lakeshore has 185 employees who are divided amongst the following departments:

- Police
- Public Works
- Parks and Recreation
- Economic and Community Development
- Code Enforcement
- Airport Services

Fire protection services within the corporate limit of Lakeshore and immediate surrounding areas are provided by Lincoln County Fire District #1, an independent rural fire district governed by an elected, five-member Board of Directors. The District serves Lakeshore and all adjacent rural areas with 70 full-time employees. The District is led by a veteran chief. A deputy chief oversees

three firefighting battalions and each of those is supervised by a shift commander. A fire marshal and two deputies handle investigations, commercial building inspections and public education.

The Operations Division staffs five fire stations and responds to approximately 5,250 incidents annually. A station is located in each of the five Lakeshore neighborhoods. Each station has a Type-1 engine. The stations in Center City, Hillside, Vista and Madison Park have an ambulance. Hillside, Vista and Woodside houses each have a Type-3 wildland engine. A 100-foot ladder tower and heavy rescue unit are housed in Center City. All Type-1 engines, the ladder tower and heavy rescue unit are staffed by three firefighters. Each ambulance is staffed by two paramedics. The department also has three command vehicles and three utility pickup trucks. The District is funded by an assessment on real property, and the District's current budget is approximately 10 million dollars.

Other local and regional fire protection services include:

- Lincoln County Fire District #4 serves the rural area west of Lakeshore with 28 volunteer personnel from one station. Fire District #4 responds to approximately 450 incidents annually with two Type-1 engines, one Type-3 engine, one 4,000-gallon water tender, one BLS ambulance, one light rescue unit, and one command vehicle.
- The State Department of Forestry staffs two wildland engines and one 20-person hand crew in the Lakeshore area during the summer wildland fire season. In addition, a state-funded firefighting helicopter and air tanker operate out of a large regional airport approximately 75 miles west of Lakeshore.
- The U.S. Forest Service and Bureau of Land Management jointly fund and staff two wildland engines and one 20-person Hot Shot Crew in the Lakeshore area during the summer wildland fire season. Additional federal wildland fire suppression resources are available throughout the state, with the two closest located 75 miles west and 130 miles north of Lakeshore.

In sum, the Lincoln County fire districts and all of their mutual-aid partners (including federal and state authorities) are very proud of their well-staffed, trained, equipped and efficient organizations. Each places great emphasis on suppressing wildland fire in a rapid and effective manner. All of the agencies are very well respected by the community decision-makers and citizens of the Lakeshore area.

Vegetative Fuels and the WUI

Ponderosa pine is currently found throughout the greater Lakeshore area. Historically, ponderosa pine forests contained more understory grasses and less shrubs than are present today. Less stand management, less logging activity and highly effective wildland fire suppression have significantly altered the ponderosa pine forest type. Removal of the larger pines has dramatically decreased open park-like forests, replacing them with more evenly spaced and smaller "black-bark" forests. Similar to other species of conifer forest types, the suppression of fire has greatly increased the number and density of trees, creating ladder fuels and putting the stands at risk of

attack from insects and diseases. These factors have contributed to more intense fires in ponderosa pine forests in recent years.

Western juniper occurs mainly in the northern and eastern sections of the Greater Lakeshore WUI. The fire history of western juniper is characterized by fire that occurs approximately every 30 years and is generally limited by the availability of fuels. Western juniper trees have thin bark and fires kill them easily. Western juniper appears to be expanding its range over the previous century.

Bitterbrush occurs throughout the greater Lakeshore area on all aspects and elevations and is frequently found with mixed shrubs such as manzanita and sage. Bitterbrush is fire dependent, but not fire resistant. It regenerates mostly from seed after a fire and often sprouts from caches of seeds made by rodents. Bitterbrush will sprout after burning regardless of the severity of the burn and matures relatively quickly. Consequently, the Greater Lakeshore WUI area is rich with patches of bitterbrush that burn well on their own and provide fire-ready ladder fuels for taller tree stands.

Manzanita is a shrub that occurs throughout the greater Lakeshore area. It is usually interspersed with other shrub species such as bitterbrush. Manzanita generates both through sprouts and seeds that are stimulated by fire. Fires in manzanita are conducive to rapid and extensive fire spread due to both physical and chemical characteristics. The shrub has volatile materials in the leaves, low moisture content in the foliage, and persistence of dead branches and stems. Manzanita is particularly susceptible to fire where it is the primary understory component.

Sagebrush is found on the eastern portions of the Greater Lakeshore WUI and commonly grows in association with juniper and bitterbrush. Most fires kill sagebrush plants. In many communities, changes in fire occurrence along with fire suppression and livestock grazing have contributed to the current condition of sagebrush. Prior to the introduction of annuals, insufficient fuels may have limited fire spread in big sagebrush communities. Introduction of annuals, especially cheat grass, has increased fuel loads so that fire carries easily. Burning in sage communities commonly sets the stage for repeated fires. Fire frequency can be as little as 5 years, not sufficient time for the establishment and reproduction of big sagebrush. In these cases, annuals such as cheat grass commonly take over the site.

The result of the fuel hazards and forest types in the greater Lakeshore area is an overgrowth of trees and forest floor fuels with an abundance of dead or dying vegetation that contribute to a substantially elevated risk of wildland fires that are difficult to control. These overly dense conditions lead to fire behavior that produces flame lengths exceeding eight feet with crowning and torching that can result in stand replacement severity fires.

Not only have large stand replacement fires not occurred, but also the more frequent low intensity fires have not been allowed to burn either. This practice of fire exclusion along with insufficient vegetation/fuels reduction has resulted in the buildup of excessive live and dead fuels.

Wildland Fire History

Lakeshore is a true wildland urban interface (WUI) community with many of its residences located on forested or vegetation-heavy sites. Lakeshore lies within a ponderosa pine and mixed conifer forested area. Natural vegetation in the area transitions from forest to a mix of annual grasses, shrubs and juniper.

The Lakeshore region has a significant history of natural and human-caused fires. The forest and shrub vegetation of the area evolved with fire's influence prior to human settlement. Surrounded by a forest type dominated by ponderosa pine and associated species, Lakeshore is in a historically fire dependent ecosystem. Historic fires thinned younger stems and tended to generate a more open forest condition than exists today.

Since human settlement, the vegetation has increased in density. Timber harvest removed many of the older, larger and more valuable trees prior to subdivision development. The remaining forested areas that were subdivided into residential lots are often represented by clumps of dense, smaller trees competing for nutrients, water and sunlight. This competition has led to high mortality levels in many locations. Tree mortality has resulted in a buildup of dead fuels in tree clumps prone to crown fire behavior. Such fire behavior exceeds the fire suppression capabilities of local and regional ground-based suppression resources.

Numerous wildland fires have occurred within and adjacent to the Lakeshore area in the past 10 years. Last year, the 250-acre Maddox fire scorched the outermost corners of the Vista and Woodside neighborhoods. While six homes were destroyed, residents and community leaders credited the fast and efficient response of the Lincoln County fire district and its mutual-aid partners with saving both neighborhoods. Over the past decade, 465 wildland fires have burned a total of 3,330 acres within a six-mile radius of Lakeshore. Lightning has caused one-third of the fires. Both the Drake National Forest and Maddox State Forest have experienced moderate wildland fire events with wind-propelled flaming embers reaching all neighborhoods within Lakeshore. Last year there were several incidents where embers from relatively small fires in the Drake National Forest ignited combustible roofing material on homes in the Center City area. These incidents sparked interest from both the merchants association and historical society. In addition, vegetation is growing back quickly under the tree canopies where the Maddox fire occurred.

Wildland Fire Mitigation Program

Sixty percent of the forested landscape around Lakeshore is public land administered by the U.S. Forest Service, U.S. Bureau of Land Management, National Park Service, U.S. Fish & Wildlife Service, and the State Department of Forestry. The other 40 percent is comprised of private timbered holdings.

Currently the community WUI Mitigation Program consists of an annual public education campaign held during wildland fire awareness week each year in May. The fire marshal's office is responsible for public education and coordinates the annual campaign's public messaging

using federal and/or free materials. This is the only public education program related to WUI fire issues.

A state requirement for 30 feet of defensible space around buildings has existed for years. The “D-Space” requirement is not systematically enforced by any agency. Occasionally the state and local fire jurisdiction will spar with one another and proclaim the other is responsible for inspections, but neither budget staff for doing so. The state forestry agency has provided and managed a few grant-funded community fuels modification efforts through a federal grant in the past five years. Community interest and support for this program has been very minimal.

Public and Community Leader Opinion of Wildland Fire Threat

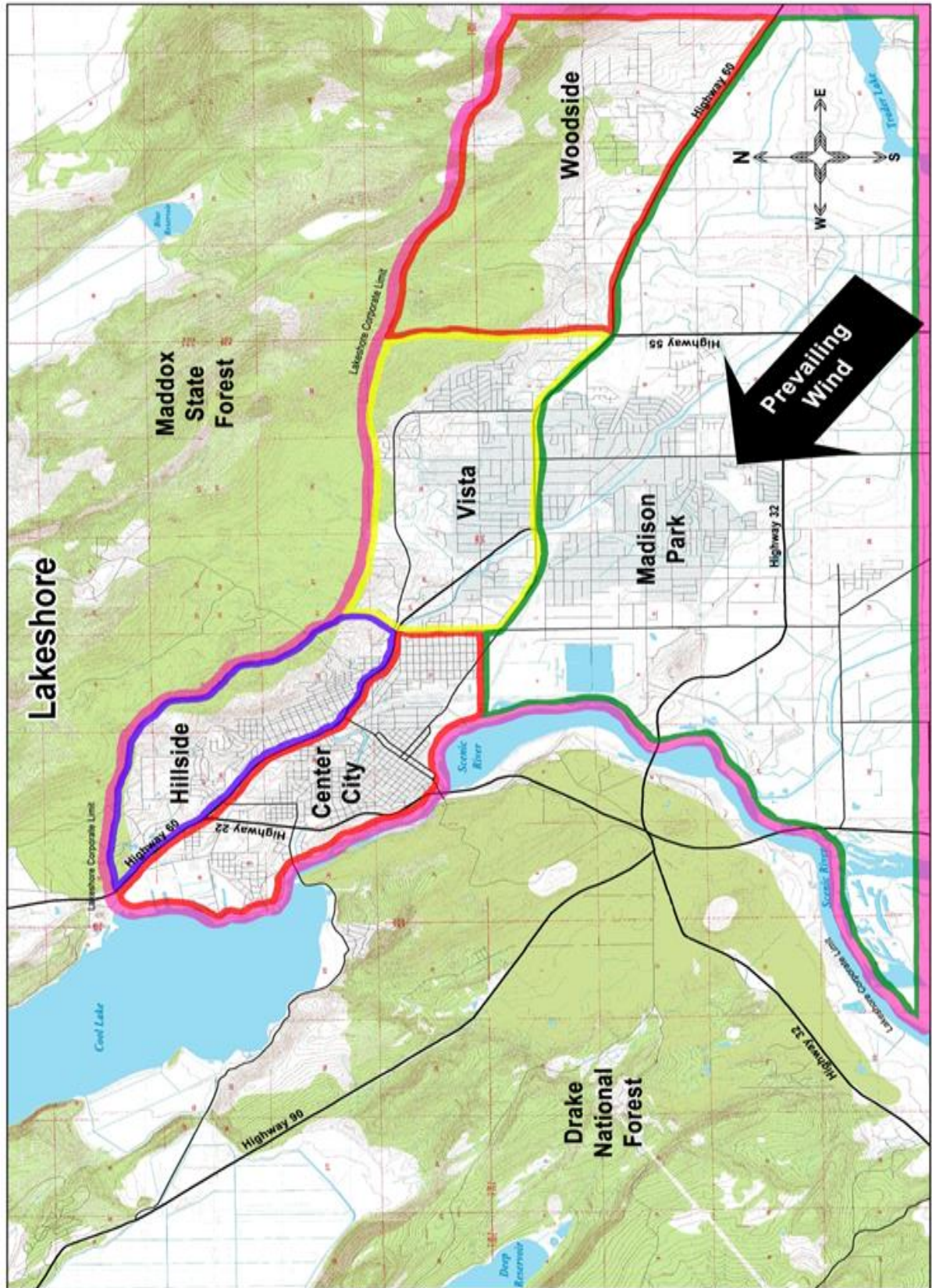
Because no incident has devastated or significantly impacted the economy/quality of life of Lakeshore, general apathy exists among the public at large and decision-makers regarding the risk of wildland fire in the Lakeshore WUI. No business, neighborhood or historical groups have spoken about the issue. At present, it is a nonissue.

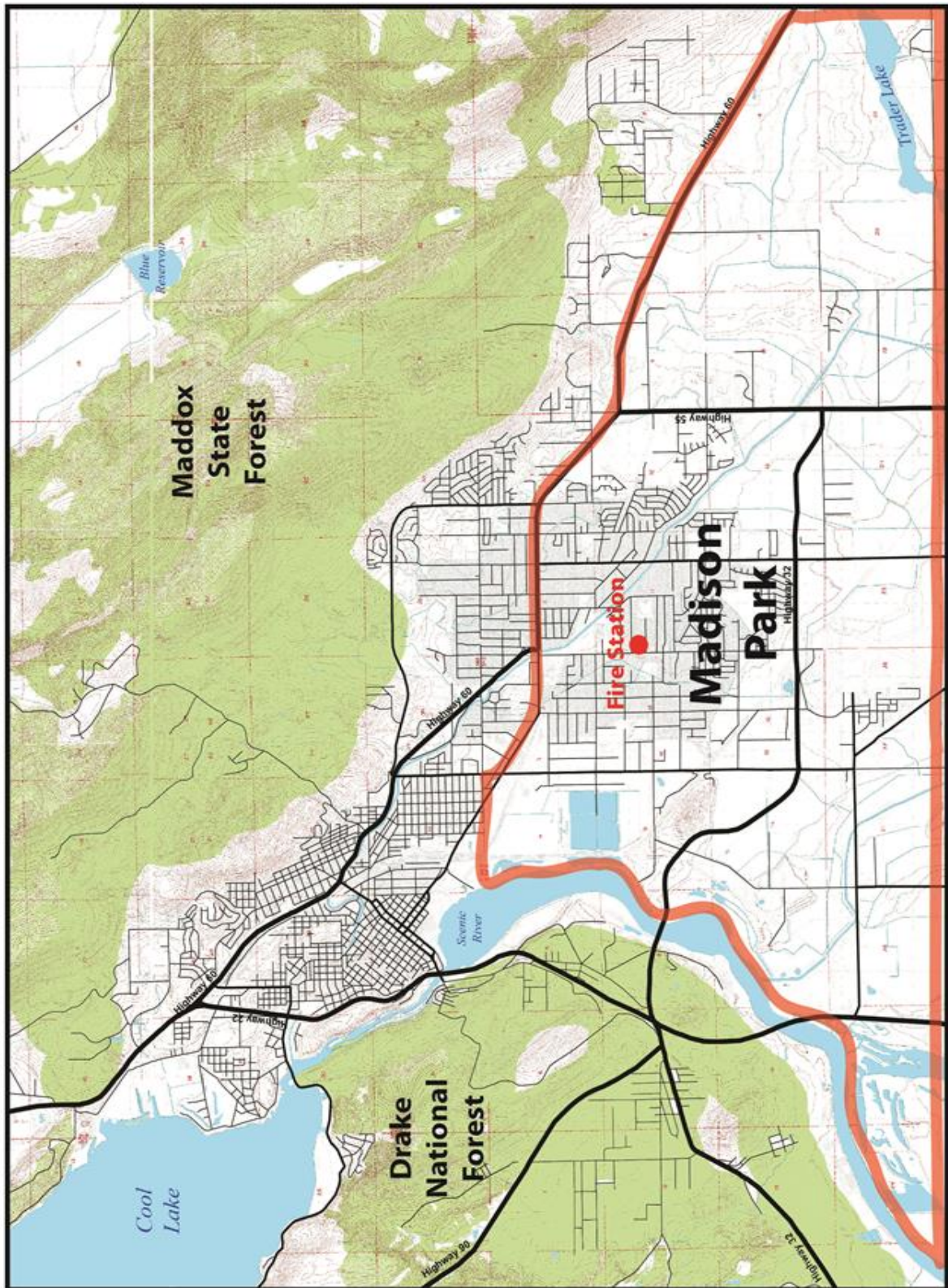
The overarching priority of community decision-makers is to increase Lakeshore’s tax base by promoting residential growth in the north Center City area and around the Vista and Woodside neighborhoods. Decision-makers are also very busy attempting to entice more businesses to locate in the Madison Park area.

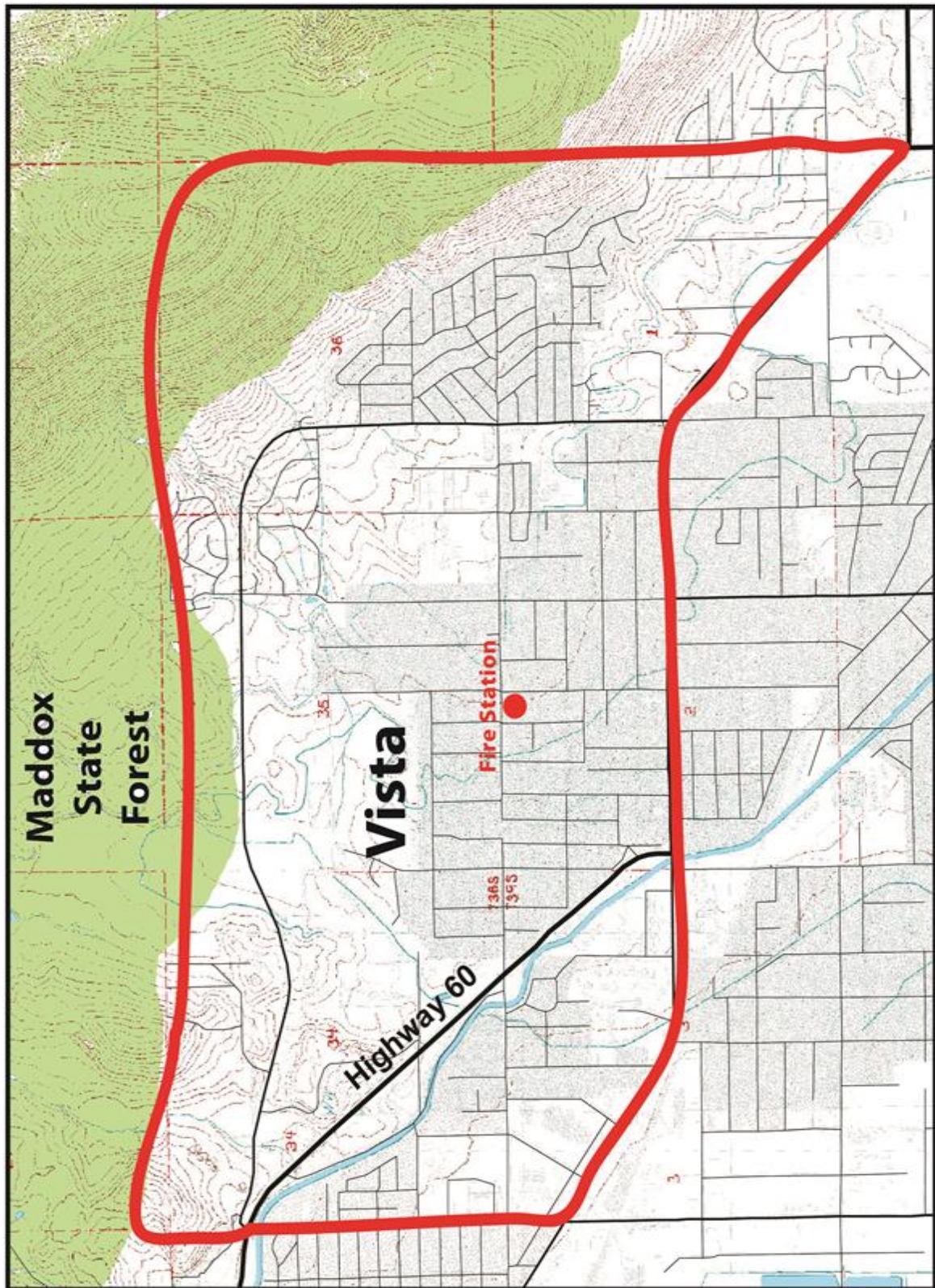
There has been no dialogue between Lakeshore community leaders and representatives from the local, state or federal fire service about preparing for or mitigating the effects of a major WUI incident. Lakeshore has never developed a Community Wildland Fire Protection Plan.

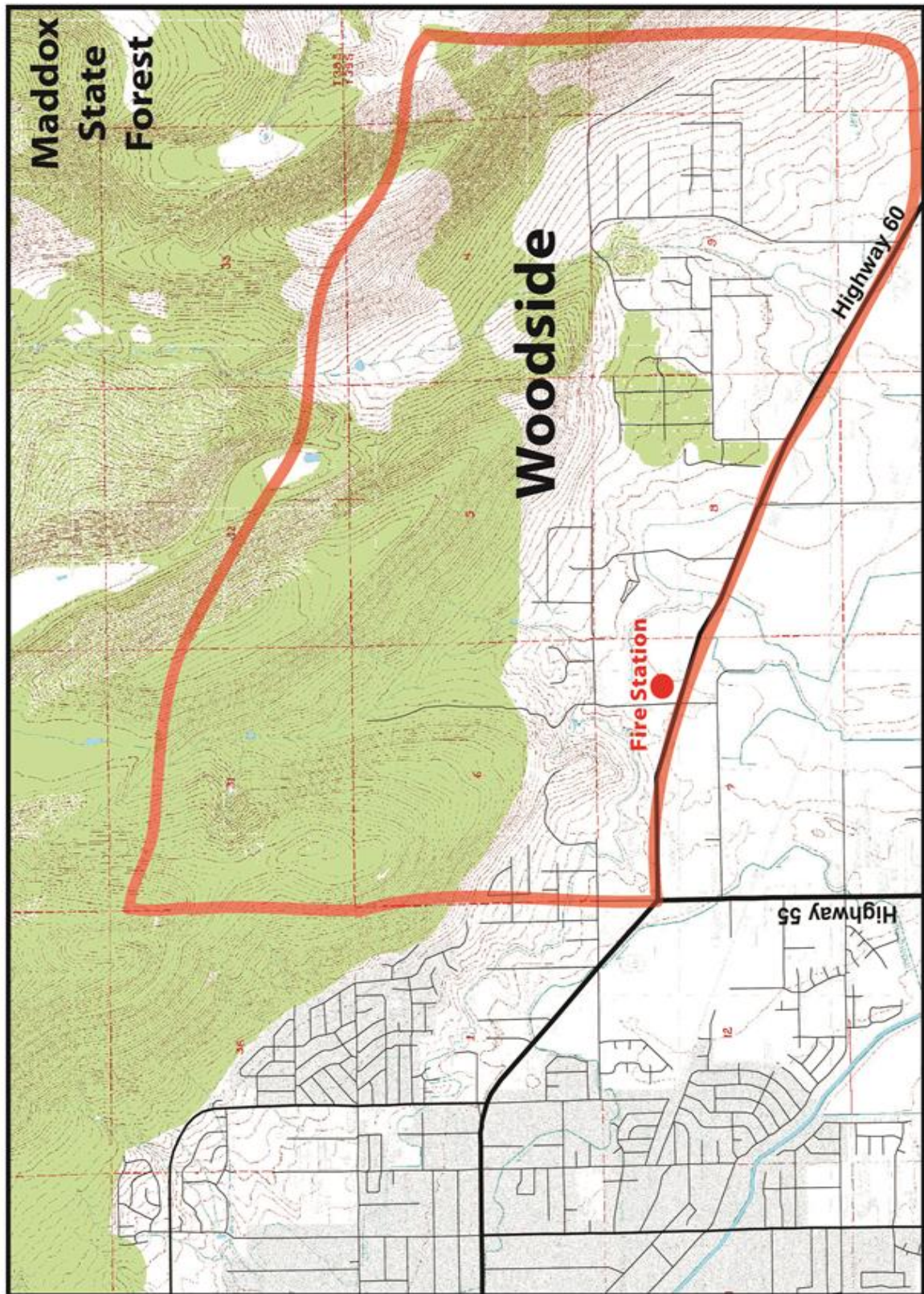
Critical Infrastructure

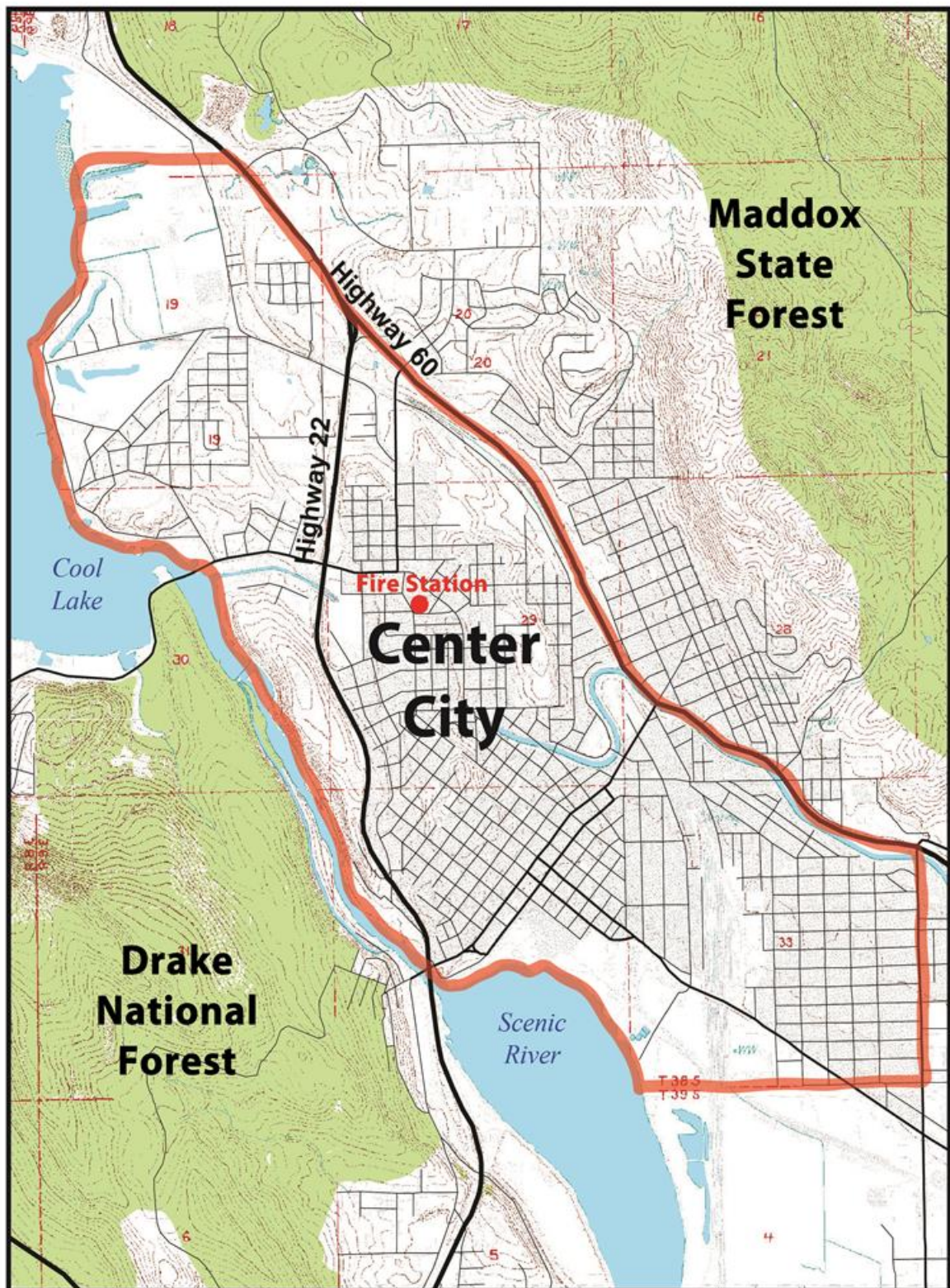
Waste Water Treatment Plant and pumping stations.
Potable water storage tanks (22) and 32 pumping stations.
Potable water distribution system and fire hydrants (1,000).
Electrical power distribution stations.
Natural gas distribution system.
City administrative buildings.
City administrative buildings.
Police facility.
Fire stations.
Sky View Medical Center.
Airport tower, runways and taxiways.
Amtrak railway.
Elementary schools.
Middle school.
High schools.
Lincoln Community College.
State Institute of Technology.
State highways.

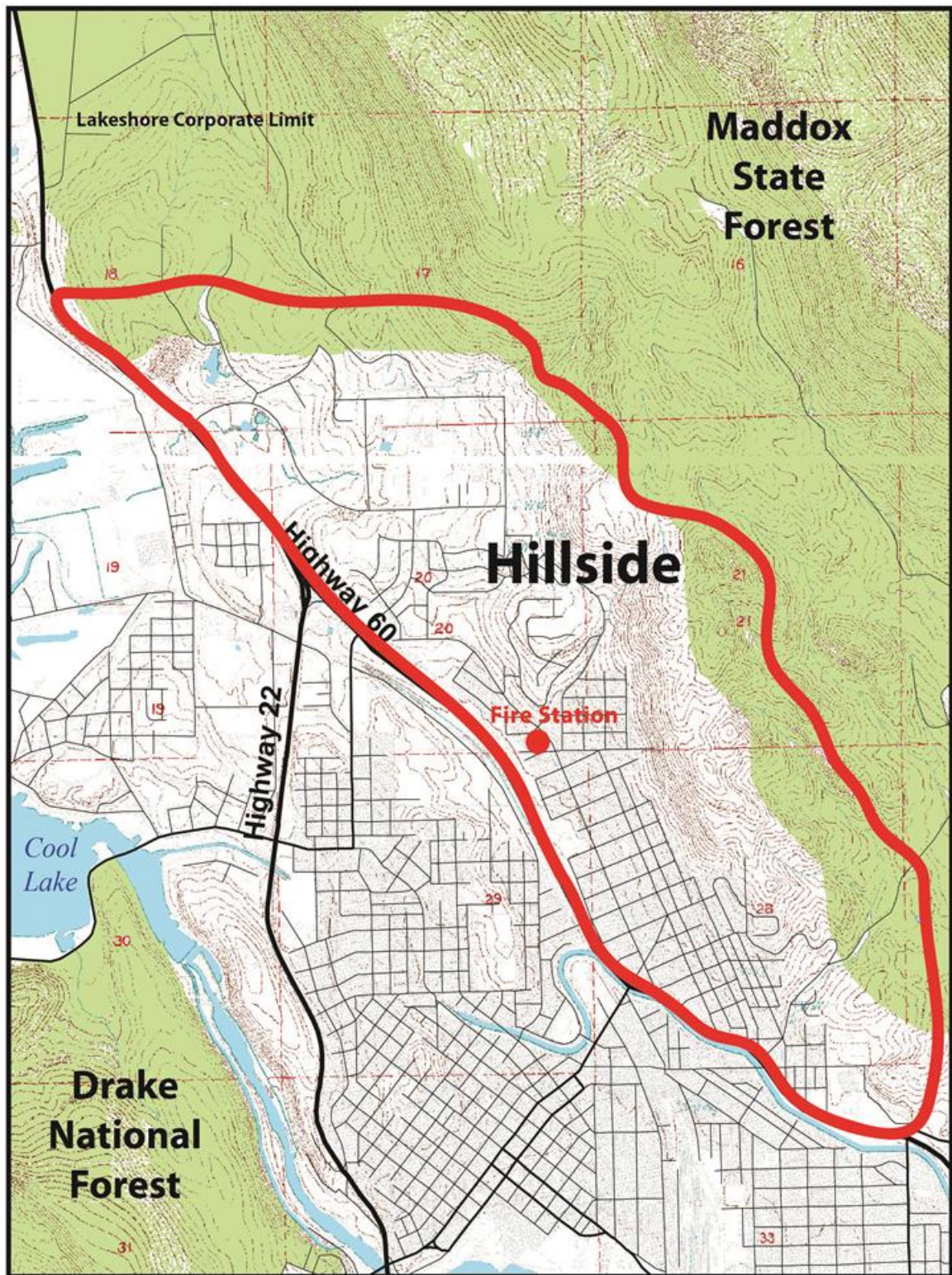












GLOSSARY/ACRONYMS

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GLOSSARY

This glossary is specific to creating fire-adapted communities (FACs) in a wildland urban interface (WUI). Terms identified with an asterisk (*) are taken directly from the Glossary of Wildland Fire Terminology from the National Wildfire Coordinating Group (NWCG). While some of these terms may not appear in all of the two-day WUI: FAC courses, they are pertinent to have as a reference. Terms taken directly from the WUI: FAC courses are followed by an indicator of the course and unit where they first appear. For example, “CI-U2” means Course I-Unit 2.

*Acceptable Fire Risk	The potential fire loss a community is willing to accept rather than provide resources to reduce such losses.
Action Plans	Plans that identify, in sequence, the specific detailed steps necessary to achieve a desired objective. (CI-U4)
Aerial Fuels	Large trees with flammable canopies. (CI-U1)
*After Action Review	A professional discussion of an event, focused on performance standards, that enables Agency Administrators and firefighters to discover for themselves what happened, why it happened, and how to sustain strengths and improve on weaknesses.
Attribute	A variable that can influence a hazard. (CI-U3)
Authority Having Jurisdiction (AHJ)	The agency, entity or individual that has the vested authority to enact, interpret or enforce codes and standards. (CII-U2)
*BEHAVE	A system of interactive computer programs for modeling fuel and fire behavior; comprised of two systems: BURN and FUEL.
Built Environment	The attributes (objects or features) constructed and maintained by people. (CII-U1)
Census Tracts	Defined geographical areas within a city, town, county or village. Each tract carries a numerical identification. (CI-U3)
Coalition	A formal relationship between people or organizations that is formed to accomplish a specific goal or support a cause, initiative or project. (CI-U2)
Code	A systematically arranged and comprehensive collection of laws. A code defines what needs to be accomplished. Codes contain mandatory requirements and typically use the word “shall” as opposed to “should.” (CII-U2)

Collaboration	People or groups working together with others to create a joint effort. (CI-U2)
Common Operational Pictures/Platforms (COPS)	A single identical display of relevant (operational) information (position of own resources and the fire; status of important infrastructure such as Incident Command Post (ICP), staging areas, roads, etc.) shared by more than one command. (CII-U2)
Community Risk Assessment	A fact-based objective study of local risks. (CI-U3)
Community Risk Reduction	A defined process for identifying, assessing, and prioritizing risks and mitigations across the community. (CI-U3)
*Community Wildfire Protection Plan (CWPP)	A plan developed in the collaborative framework established by the Wildland Fire Leadership Council and agreed to by state, tribal, local government, local fire departments, other stakeholders and federal land management agencies managing land in the vicinity of the planning area. A Community Wildfire Protection Plan (CWPP) identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure and recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP may address issues such as wildfire response, hazard mitigation, community preparedness, structure protection, or all of the above. A CWPP is a community-based wildland fire planning tool that includes: (CI-U1) • An assessment of local wildland fire risks. • A set of strategies to reduce or mitigate identified risks. • A long-term plan for implementing the strategies.
Contingency Planning	Involves developing plans for unexpected scenarios or, at a minimum, identifying methods to track alternative events so that a strategic plan can be re-examined and necessary changes initiated when it becomes clear that action is necessary.
Coercive Power	Power gained through the authority to punish (demote, fine, censure, terminate employment, etc.); it is the opposite of reward power. (CI-U2)

Consensus	A general agreement of a group as a whole, not just a majority. It is a conclusion or agreement that all members of the group are willing to support. (CI-U2)
Critical Success Indicator (CSI)	A benchmark measure or critical intermediate step necessary to complete a project that, if not met, should trigger a re-evaluation of the overall strategy. (CIII-U1)
*Crown Fire	A fire that advances from top to top of trees or shrubs, more or less independent of a surface fire. Crown fires are sometimes classed as “running” or “dependent” to distinguish the degree of independence from the surface fire.
*Dead Fuels	Fuels with no living tissue in which moisture content is governed almost entirely by absorption or evaporation of atmospheric moisture (relative humidity and precipitation).
*Debris Burning Fire	In fire suppression terminology, a fire spreading from any fire originally ignited to clear land or burn rubbish, garbage, crop stubble, or meadows (excluding incendiary fires). In prescribed fire terminology, a fire used to dispose of scattered, piled, or windrowed dead woody fuel, generally in the absence of a merchantable overstory. Its purpose is to reduce unsightly fuel concentrations or consume unwanted natural fuels to facilitate subsequent resource management or land use actions on the area.
Defensible Space	The area around a structure or infrastructure that has been modified to facilitate effective defensive fire suppression strategies and tactics.
Development Densities	The pattern of buildings constructed in the WUI. (CII-U1)
Expert Power	Power vested in a person with specialized knowledge, skills and abilities (KSAs). (Fire marshals and fire investigators have expert power due to their specialized knowledge and skills.) (CI-U2)
Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009	One of two federal laws that provide a legal basis for CWPPs and community wildland fire planning in general. (CIII-U1)
*Fire-Adapted Community (FAC)	A human community consisting of informed and prepared citizens collaboratively planning and taking action to safely co-exist with wildland fire. (CI-U1)

*FIREMODEL	Computer program which, with specified information (fuel, weather, topography), predicts an hourly rate of spread from a point of origin.
Fire Behavior Model	A mathematical model to predict fire behavior and fire effects. When used in conjunction with personal fire experience and a basic understanding of fire models, predictions can be successfully applied to a range of fire management activities including wildland fire behavior prediction, prescribed fire planning, and fuel hazard assessment. (CII-U2)
Formal Political Structure	Includes elected and appointed officials tasked with establishing and managing public policy. (CI-U2)
*Fuelbreak	A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.
Fuel Breaks	Intended to modify fire behavior and spread by altering fuel beds in a linear alignment, typically situated along ridge tops and may include retained trees (shaded fuel breaks). (CII-U1)
*Fuelbreak System	A series of modified strips or blocks tied together to form continuous strategically located fuel breaks around land units.
*Fuel Group	An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics. General fuel groups are grass, brush, timber, and slash.
*Fuel Loading	The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.
*Fuel Management	Act or practice of controlling flammability and reducing resistance to control wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives.
*Fuel Reduction	Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.
*Fuel Treatment	Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning). Synonym: Fuel Modification.

Fuel Types	Are defined as an identifiable association of fuel elements of distinctive species, form, size, arrangement or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions. (CI-U1)
Full Motion Video (FMV)	Standard video technology that captures the image and displays it in a continuous stream. (CII-U2)
Gap Analysis	A step in planning whereby gaps, if any, between the group's current state or performance and its desired future state are identified. (CIII-U1)
General Land Use Plans	How communities often describe their overall housing, zoning, transportation, safety and economic development goals in terms of broad land use plans. (CII-U1)
*Global Positioning System (GPS)	A system of navigational satellites operated by the U.S. Department of Defense and available for civilian use. The system can track objects anywhere in the world with an accuracy of approximately 40 feet.
Geographic Information Systems (GIS)	A computer system capable of capturing, storing, analyzing and displaying geographically referenced information (i.e., data identified according to location). GIS combines the analytical capacity of a database with the visual benefits of a map. (CII-U2)
*Ground Fuel	All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, and sawdust that normally support a glowing combustion without flame.
Hazard	An object, process or condition that can cause harm. (CI-U3)
Healthy Forests Restoration Act (HFRA, 2003)	One of two federal laws that provide a legal basis for CWPPs and community wildland fire planning in general. (CIII-U1)
*Home Assessment	Evaluation of a dwelling and its immediate surroundings to determine its potential to escape damage by an approaching wildland fire. Includes the fuels and vegetation in the yard and adjacent to the structure, roof environment, decking and siding materials, prevailing winds, topography, fire history, etc., with the intent of mitigating fire hazards and risks.
Ignition-Resistant Construction	The use of specific construction materials and/or construction methods to reduce a building's vulnerability to ignition from an external source.

Integrated Action Plan	A step in planning that involves the finalization of strategic direction and development of specific, detailed operational plans to achieve the objectives identified in the strategic business modeling step, including projected time frames.
International Code Council (ICC) — WUI Code	This particular code is part of a “family” of national model codes adopted by federal, state and local entities. The ICC WUI Code is a “stand-alone” code that addresses WUI issues specifically. (CII-U2)
Influence	The ability to affect someone or something without direct or apparent effort. (CI-U2)
Informed Consent	Permission granted with knowledge of the possible consequences (e.g., a medical patient, knowledgeable of the risks and benefits, giving permission for surgery). (CIII-U1)
Infrared (IR)	A type of remote sensing tool. IR light is electromagnetic radiation with longer wavelengths than those of visible light. It is usually thought of as “heat signatures” since it displays energy being given off by a subject. (CII-U2)
Interactive Web Map	Maps that can be manipulated by the user to see customized features, save personal information, or share the maps with others. (CII-U2)
Insurance Services Office Standards	A process that uses a grading classification system to measure fire department effectiveness. Commonly termed the “Property Protection Classification” system (or PPC), this rating assigns a score of 1-10 to fire departments through a review process conducted every 10 years or so. (CII-U2)
*Ladder Fuels	Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.
Ladder Fuels	Brush, small trees and dead lower branches of larger trees. (CI-U1)
LANDFIRE	(Also known as Landscape Fire and Resource Management Planning Tools.) An interagency vegetation, fire and fuel characteristics mapping program sponsored by the U.S. Department of the Interior and the U.S. Department of Agriculture, Forest Service. (CI-U3)

*Land Use Plan	A set of decisions that establish management direction for land within an administrative area; an assimilation of land-use-plan-level decisions developed through the planning process regardless of the scale at which the decisions were developed.
Land Use Planning	The set of policies, requirements, guidelines and statutes that determine how land is subdivided, built upon, managed and maintained. (CII-U2)
*Land/Resource Management Plan (L/RMP)	A document prepared with public participation and approved by an agency administrator that provides general guidance and direction for land and resource management activities for an administrative area. The L/RMP identifies the need for fire's role in a particular area and for a specific benefit. The objectives in the L/RMP provide the basis for the development of fire management objectives and the fire management program in the designated area.
Landscape Area Treatments	Actions intended to modify fire behavior by treating fuels over large areas in strategic locations or historic fire corridors; these treatments are typically conducted on large expanses of federal or private land (e.g., Strategically Placed Area Treatments). (CII-U1)
Legitimate Power	Power vested by virtue of a particular position of authority (fire chief, city manager, president, etc.). (CI-U2)
Light Detection and Ranging (LiDAR)	LiDAR is an optical remote sensing technology that can measure the distance to, or other properties of, a target by illuminating the target with light, often using pulses from a laser. (CII-U2)
Master Plan	A broad plan of guidance that is adopted by a community on a periodic basis. The plan describes the assumptions of growth, development needs, community values, environmental considerations, housing and economic needs, and community safety.
Misinformed Consent	Consent given without full knowledge of the potential consequences or other reasonable factors that may be relevant to giving consent. (CIII-U1)

*Mitigation	Those activities implemented prior to, during, or after an incident which are designed to reduce or eliminate risks to people or property that lessen the actual or potential effects or consequences of an incident. Mitigation measures can include efforts to educate governments, businesses, and the general public on measures they can take to reduce loss and injury and are often informed by lessons learned from prior incidents.
Mitigation Actions	On-the-ground actions that serve to increase the defensibility of the Maximum Manageable Area (MMA); check, direct or delay the spread of fire; and minimize threats to life, property and resources. Mitigation actions may include mechanical and physical nonfire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create “black lines” through controlled burnouts, and to limit fire spread and behavior.
Multispectral (MSI) and Hyperspectral (HSI)	These techniques capture image data at specific frequencies across the electromagnetic spectrum. Spectral imaging allows for very specific information to be collected and analyzed such as the species of vegetation, ground surface information, types of building material — anything that has a horizontal component to it can be detected by MSI/HSI and matched against a library of materials. (CII-U2)
*Mutual Aid	Assistance in firefighting or investigation by fire agencies, without regard for jurisdictional boundaries.
*Mutual-Aid Agreement	Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.
Mission Statement	A statement that clarifies future direction within the organization or group. It also provides a vehicle for communicating clarity to other stakeholders.
*National Association of State Foresters (NASF)	An organization consisting of the State Forester from each state and territory which promotes cooperation in forestry matters between the states and territories, the federal government and private forestry groups. It promotes legislation, programs and activities which will advance the practice of forestry and use of forest products.

National Cohesive Wildland Fire Management Strategy (Cohesive Strategy)	The Cohesive Strategy is a collaborative process with active involvement of all levels of government and nongovernmental organizations (NGOs), as well as the public, to seek national, all-lands solutions to wildland fire management issues. (CI-U1)
Natural Environment	Includes those features that are primarily composed of naturally growing or occurring physical landscapes. (CII-U1)
*National Fire Codes (NFC)	The collected technical fire protection standards prepared by various committees of the National Fire Protection Association (NFPA) and published annually in 15 volumes.
NFPA 1141, <i>Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas</i>	This standard describes the overall fire protection, roadways, water sources, fire suppression planning, and land use issues associated with general development. (CII-U2)
NFPA 1142, <i>Standard on Water Supplies for Suburban and Rural Fire Fighting</i>	This standard defines water flow and delivery requirements, engineering standards, and alternative systems for providing adequate water in rural and suburban environments. (CII-U2)
NFPA 1143, <i>Standard for Wildland Fire Management</i>	This standard provides minimum requirements to fire protection organizations on the management of wildland fire, including prevention, mitigation, preparation and suppression. (CII-U2)
NFPA 1144, <i>Standard for Reducing Structure Ignition Hazards from Wildland Fire</i>	This standard provides a methodology for assessing wildland fire ignition hazards around existing structures, residential developments, and subdivisions. It also assesses improved property or planned property improvement that will be located in a WUI area, and it provides minimum requirements for new construction to reduce the potential of structure ignition from wildland fires. (CII-U2)
*National Fire Danger Rating System (NFDRS)	A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.
National Fire Danger Rating System (NFDRS)	A system used by wildland fire management agencies to assess current fire danger at local and national levels. It consists of a variety of indices that portray current potential fire danger conditions.

*National Fire Protection Association (NFPA) Standards	Standards of the National Fire Protection Association are frequently adopted by insurance agencies such as the National Board of Fire Underwriters as a basis for their regulations and used as a guide for municipal, state, or provincial laws, ordinances, and regulations.
*National Interagency Fire Center (NIFC)	A facility located at Boise, Idaho, jointly operated by several federal agencies, dedicated to coordination, logistical support, and improved weather services in support of fire management operations throughout the United States.
*National Wildfire Coordinating Group (NWCG)	A group formed under the direction of the Secretaries of the Interior and Agriculture to improve the coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend appropriate action, or resolve issues and problems of substantive nature.
*Native Species	A species which is a part of the original fauna or flora of the area in question.
*Natural Barrier	Any area where lack of flammable material obstructs the spread of wildfires.
*Natural Fuels	Fuels resulting from natural processes and not directly generated or altered by land management practices.
Negotiation	The attempt to reach a mutually agreeable or desired result/outcome. (CI-U2)
Operational Planning	The identification of very short-term (e.g., days/week), noncomplex goals or objectives and the means to achieve them.
Organizational Culture	The collection of values and norms that are shared by people and groups in an organization and control the way they interact with each other and external stakeholders.
*Partners	All agencies and organizations that engage in joint decision-making with federal agencies in planning and conducting fire management projects and activities.
Partner	A person, group or organization that takes part in an undertaking with another person, group or organization to achieve a mutual benefit. (CI-U2)
Partnership	An informal relationship between people or organizations that is formed to accomplish a specific goal or support for a cause, initiative or project. (CI-U2)

Performance Audit	A step in planning whereby a detailed examination of the organization or group's current state or performance helps determine its capacity to realize the desired outcome or future state.
*Perennial Plant	A plant that lives for more than two growing seasons. For fire danger rating purposes, biennial plants are classed with perennial plants.
Politics	The art of building and using influence to achieve an individual or group public policy goal. (CI-U2)
Power	The ability to influence a person's behavior and get him or her to act in a certain manner. (CI-U2)
*Preparedness	Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination. It includes mental readiness to recognize changes in fire danger and act promptly when action is appropriate. There must also be a range of deliberate, critical tasks and activities necessary to build, sustain, and improve the capability to protect against, respond to, and recover from domestic incidents.
*Preparedness Level	Increments of planning and organization readiness commensurate with increasing fire danger.
*Preparedness Plan	A written plan providing for timely recognition of approaching critical fire situations, priority setting, the deployment of forces, and other actions to respond to those situations.
*Prescribed Burning	Application of prescribed fire.
*Prescribed Fire	Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and National Environmental Policy Act requirements (where applicable) must be met prior to ignition.
Prescribed or Controlled Burning	Intended to reduce fuel loads in key locations while considering vegetation type characteristics and disturbance regimes. (CII-U1)

*Prevention	Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards (fuels management). It includes actions to avoid an incident, to intervene for the purpose of stopping an incident from occurring, or to mitigate an incident's effect to protect life and property. It also includes measures designed to mitigate damage by reducing or eliminating risks to people or property, lessening the potential effects or consequences of an incident.
Project Plan	A plan that deals primarily with a specific project like a large facility or subdivision. (CII-U2)
Public Policy	The set of laws, regulations, standards, policies and procedures that direct the actions of public officials, staff and often the public at large. (CI-U2)
Public Web Maps	A part of today's geospatial services that includes publically shared spatial information. Examples include Flat and 3D maps. (CII-U2)
Quadrennial Fire Review (QFR) Report	A document designed to take a long-term look at the nation's wildland fire program, and with consideration given to the future, identify risks and conditions that could affect fire management over the next four years and beyond. (CI-U1)
Qualitative Data	What people tell you about incidents, personal experiences, impacts created by programs, risk perceptions, etc. (CI-U3)
Quantitative Data	Statistics that are collected and analyzed. (CI-U3)
Referent Power	Power gained through respect, loyalty and/or admiration. (For example, a fire chief may gain referent power from his or her subordinates through successes in the local political environment.) (CI-U2)
*Relative Greenness (RG)	An NDVI-derived image of vegetation greenness compared to how green it has been historically.
*Relative Humidity (RH)	The ratio of the amount of moisture in the air to the maximum amount of moisture that air would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure.
Relative Humidity (RH)	The amount of moisture in the air divided by the amount the air could hold if saturated at the same air temperature, expressed in a percentage. (CI-U1)

Remote Sensing Tools	Aerial sensor technologies to detect and classify objects on Earth (both on the surface, and in the atmosphere and oceans) by means of propagated signals (e.g., electromagnetic radiation emitted from aircraft or satellites). (CII-U2)
Response Environment	Relates to the preparedness and effectiveness of the community and first responder actions once a wildland fire has ignited. (CII-U1)
Reward Power	Power gained through the authority to give or reduce tangible rewards (promotions, raises, etc.). (CI-U2)
*Risk	The chance of fire starting as determined by the presence and activity of causative agents; 2) A chance of suffering, harm or loss; 3) A causative agent; and 4) A number related to the potential of fire brands to which a given area will be exposed during the rating day according to the National Fire Danger Rating System.
Risk Assessment	A subjective evaluation of hazard factors to determine the potential for damage or loss.
Risk Exposure	Measures the overall threat of the risk, combining the likelihood of actual loss (probability) with the magnitude of the potential loss (impact) into a single numeric value. (CI-U3)
Risk Impact	An estimate of the severity of adverse effects, the magnitude of a loss, or the potential opportunity cost should a risk be realized. (CI-U3)
Risk Perception	The “value” of a risk. (CI-U3)
Risk Probability	A measure of the likelihood that the consequences described in a risk statement will actually occur. (CI-U3)
Road-Side Fuel Treatments	Actions intended to reduce the likelihood of ignition sources along roadways and maintain access/egress capabilities. (CII-U1)
*Situation Awareness (SA)	An on-going process of gathering information by observation and by communication with others. This information is integrated to create an individual’s perception of a given situation. Synonym: Situational Awareness.

*Size Class of Fire	As to size of wildfire: • Class A — one-fourth acre or less. • Class B — more than one-fourth acre, but less than 10 acres. • Class C — 10 acres or more, but less than 100 acres. • Class D — 100 acres or more, but less than 300 acres. • Class E — 300 acres or more, but less than 1,000 acres. • Class F — 1,000 acres or more, but less than 5,000 acres. • Class G — 5,000 acres or more.
*Slash	Debris resulting from such natural events as wind, fire, or snow breakage; or such human activities as road construction, logging, pruning, thinning, or brush cutting. It includes logs, chunks, bark, branches, stumps, and broken understory trees or brush.
*Slash Disposal	Treatment of slash to reduce fire hazards or for other purposes (preferred to brush disposal).
*Slope Class	One of five categories used to describe the topography of a fire danger rating area.
SMART Objectives	An acronym that calls for objectives to be developed so they are Specific, Measurable, Attainable, Realistic and Time Bound. (CIII-U1)
Social Environment	Encompasses how people think, feel and act in a human manner. (CII-U1)
Social Marketing	The systematic application of marketing techniques to achieve specific behavioral goals for a social benefit. (CIII-U1)
Special Interest Group	A group of individuals with common interests and/or goals. (CI-U2)
Stakeholder	Someone with interests that may be affected (positively or negatively) by a public policy decision, or someone who desires or has the ability to exert influence on the decision, process or other people involved. (CI-U2)

Standard	A description of a method or process for accomplishing a task. It generally describes how something technical will be accomplished. Standards are written in a format that is generally suitable for reference by another code or can be adopted on its own. (CII-U2)
Strategic Business Modeling	Identifies the planning time frame (e.g., five, 10, 15 years). It is a planning step whereby desired outcome(s) (future state) and the broad objectives necessary to achieve them are defined in tangible, measurable terms. It also identifies how success will be measured.
Strategic Planning	The identification of longer-term (e.g., three plus years), complex goals and objectives and the means to achieve them. (CIII-U1)
Strategy	The general plan or direction to achieve a desired objective or end state.
*Surface Fuel	Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.
Surface Fuels	Annual grasses and weeds; forest litter (conifer needles/cones, twigs and branches). (CI-U1)
Survivable Space	The area around a structure or infrastructure that has been modified to prevent damage from a wildland fire without any suppression interventions.
Systematic Development of Informed Consent (SDIC)	A model that defines informed consent as “the grudging willingness of opponents to go along with a course of action they are actually opposed to.” (“I am still opposed to what you are proposing, but I’ll go along with it.”) (CIII-U1)
SWOT Analysis	Assessment of Strengths, Weaknesses, Opportunities, Threats.
Tactic	The detailed deployment and direction of resources to achieve an objective by means of a designated strategy.
Tactical Planning	The identification of longer-term (e.g., months to three years), more complex goals and objectives and the means to achieve them.
*Understory Burning	Prescribed burning under a forest canopy.

Uninformed Consent	Consent given without full knowledge of the possible consequences or other factors that may have been relevant to your consent. (For example, a physician fails to inform you of his or her financial interest in an experimental treatment that you have consented to.) (CIII-U1)
Vision Statement	A statement that expresses the desired future state of an organization or group. (CIII-U1)
*Wildland Fire	Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.
Wildland Fire Decision Support Systems	Tools that not only assemble data in a single place for information management but also anticipate the questions or problems that need solving. They guide the user throughout the decision-making process using algorithms (mathematical and data formulas) that can speed knowledge and understanding. (CII-U2)
Wildland Fire Preplan	A systematic process for evaluating a target (community, neighborhood, street, open space area, or park) and identifying critical conditions, hazards, objectives and resources that are present during a wildland fire event. (CII-U2)
*Wildland Urban Interface (WUI)	The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.
Wildland Urban Intermix	An area where homes (structures) and infrastructure are intermingled among wildland vegetative fuels.
WUI Risk Attribute Categories	Include the natural, built, social and response environments. (CI-U3)
Zoning	Categorizing land use. (CII-U1)

ACRONYMS

AAR	After-Action Report
APFO	Adequate Public Facilities Ordinance
AVL	Automatic Vehicle Locator
CAG	Core Advisory Group
CERTs	Community Emergency Response Teams
CONO	Council of Neighbors and Organizations
DHS	Department of Homeland Security
EIR	Environmental Impact Report
EMS	Emergency Medical Services
EPS-HDT	Economic Profile System — Human Dimensions Toolkit
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIMT	Fire Incident Mapping Tools
FLN	Fire Learning Network
HOA	homeowners' association
IAFC	International Association of Fire Chiefs
IBHS	Institute for Business and Home Safety
ICC	International Code Council
ICP	Incident Command Post
ICS	Incident Command System
IFTDSS	Interagency Fuel Treatment Decision Support System
IG	Instructor Guide

IRS	Internal Revenue Service
KSAs	knowledge, skills and abilities
LEPC	Local Emergency Planning Committee
LHMP	Local Hazard Mitigation Plan
NEPA	National Environmental Policy Act
NFA	National Fire Academy
NFIRS	National Fire Incident Reporting System
NGO	nongovernmental organization
NIMBY	not in my back yard
NIMTOO	not in my term of office
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Aerospace Defense Command
NORTHCOM	U.S. Northern Command
NPS	National Park Service
NVFC	National Volunteer Fire Council
PAI	Potentially Affected Interests
PPC	Property Protection Classification
PPE	personal protective equipment
PSAs	public service announcements
ROI	return on investment
SM	Student Manual
TBA	to be announced
TBD	to be determined

TNC	The Nature Conservancy
USAF	United States Air Force
USDA	U.S. Department of Agriculture
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
WFLC	Wildland Fire Leadership Council
WUI: FAC	“Wildland Urban Interface: Fire-Adapted Communities”
WUI: FAC — DCWPP	“Wildland Urban Interface: Fire-Adapted Communities — Developing a Community Wildfire Protection Plan, Course III”
WUI: FAC — IL	“Wildland Urban Interface: Fire-Adapted Communities — Introduction and Leadership, Course I”
WUI: FAC — SDFAC	“Wildland Urban Interface: Fire-Adapted Communities — Strategies for Developing a Fire-Adapted Community, Course II”

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