

# Douglas Fir Tussock Moth Update- 2015



*Presented by:*

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Forest Entomologist

Colorado State Forest Service

[www.csfs.colostate.edu](http://www.csfs.colostate.edu)



# Historical perspective

Outbreaks have been documented since 1930's

The first large-scale, wildland forest outbreak since the 30's occurred 1993-1996

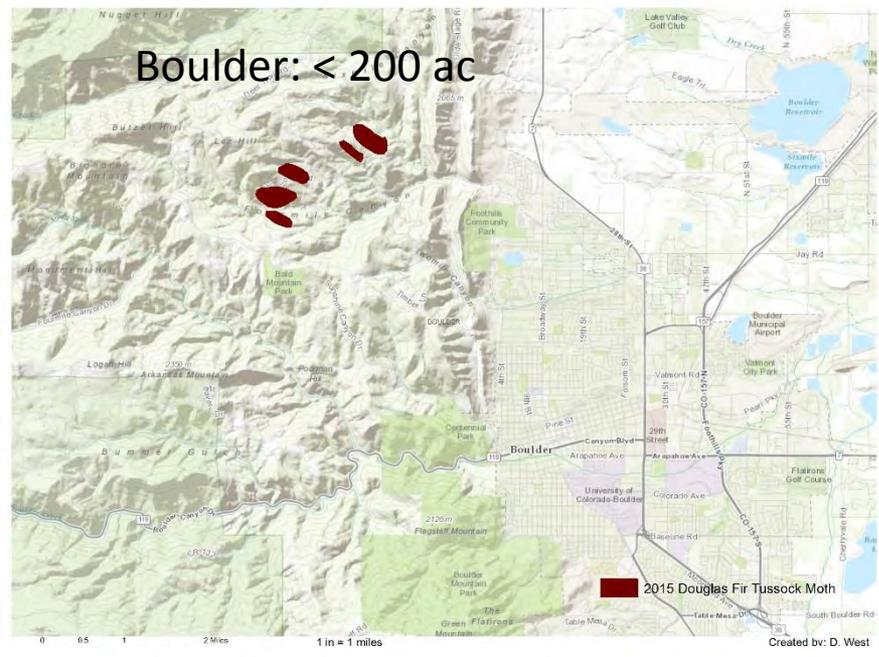
- South Platte River drainage on the Pike NF  
30-40% mortality of approx. 18,000 acres

The most recent epidemic occurred from 2004-08

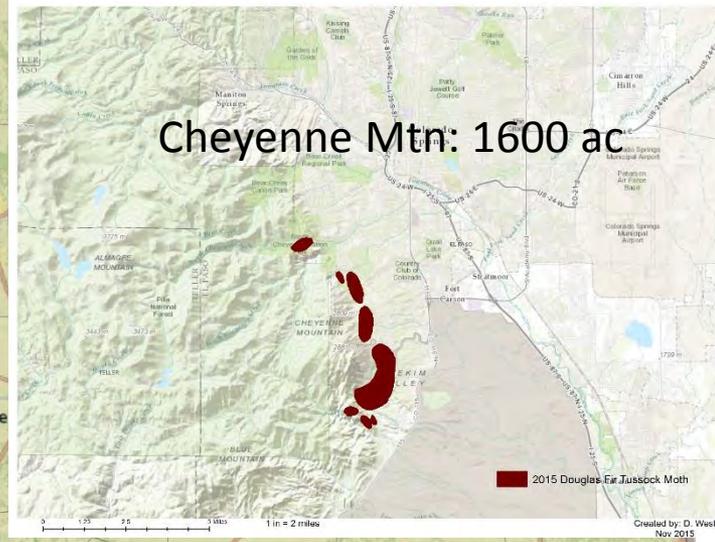
- Along the Rampart Range  
Pocket mortality – not widespread across  
entire drainages

# Douglas-Fir Tussock Moth Defoliation - 2015

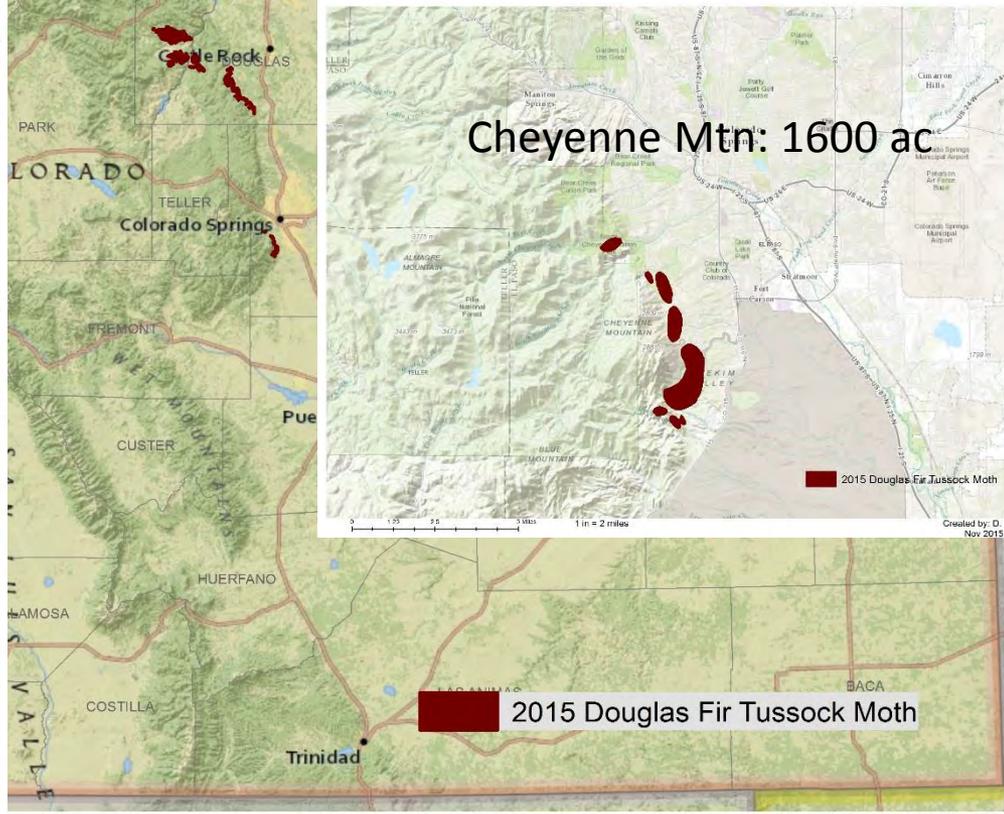
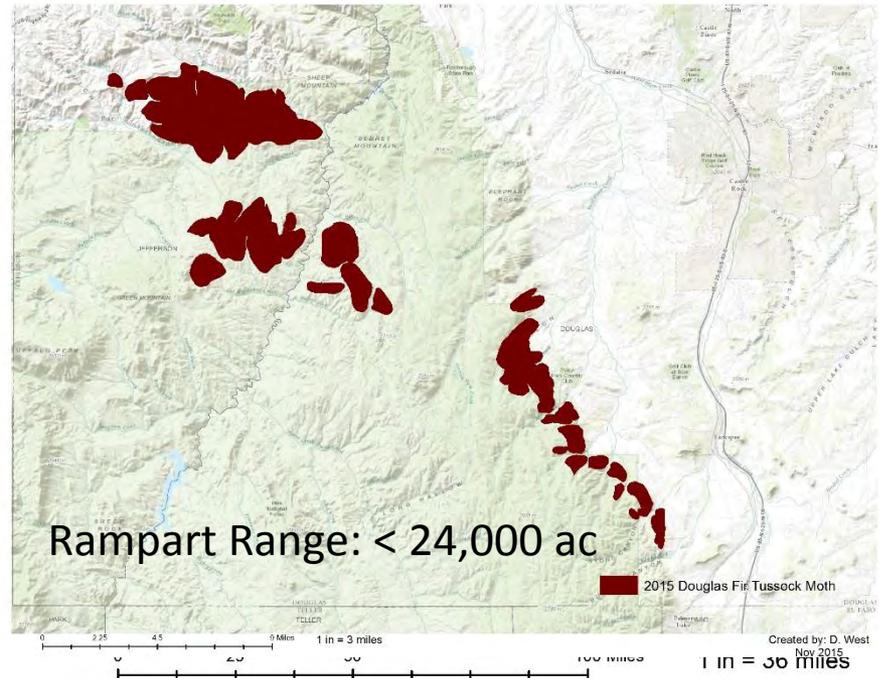
Boulder: < 200 ac



Cheyenne Mtn: 1600 ac



Rampart Range: < 24,000 ac



2015 Douglas Fir Tussock Moth

Created by: D. West  
Nov 2015

# Current outbreak (See Map)

## Cheyenne Mountain

Initiated in 2014 – approx. **530** acres

2015 – approx. **1600** acres

Pacific Northwest Research Station has detected NPV presence, which indicates that a collapse of that population is imminent

## Rampart Range

2014 – Larvae observed, no significant defoliation

2015 – **24,000** acres of defoliation

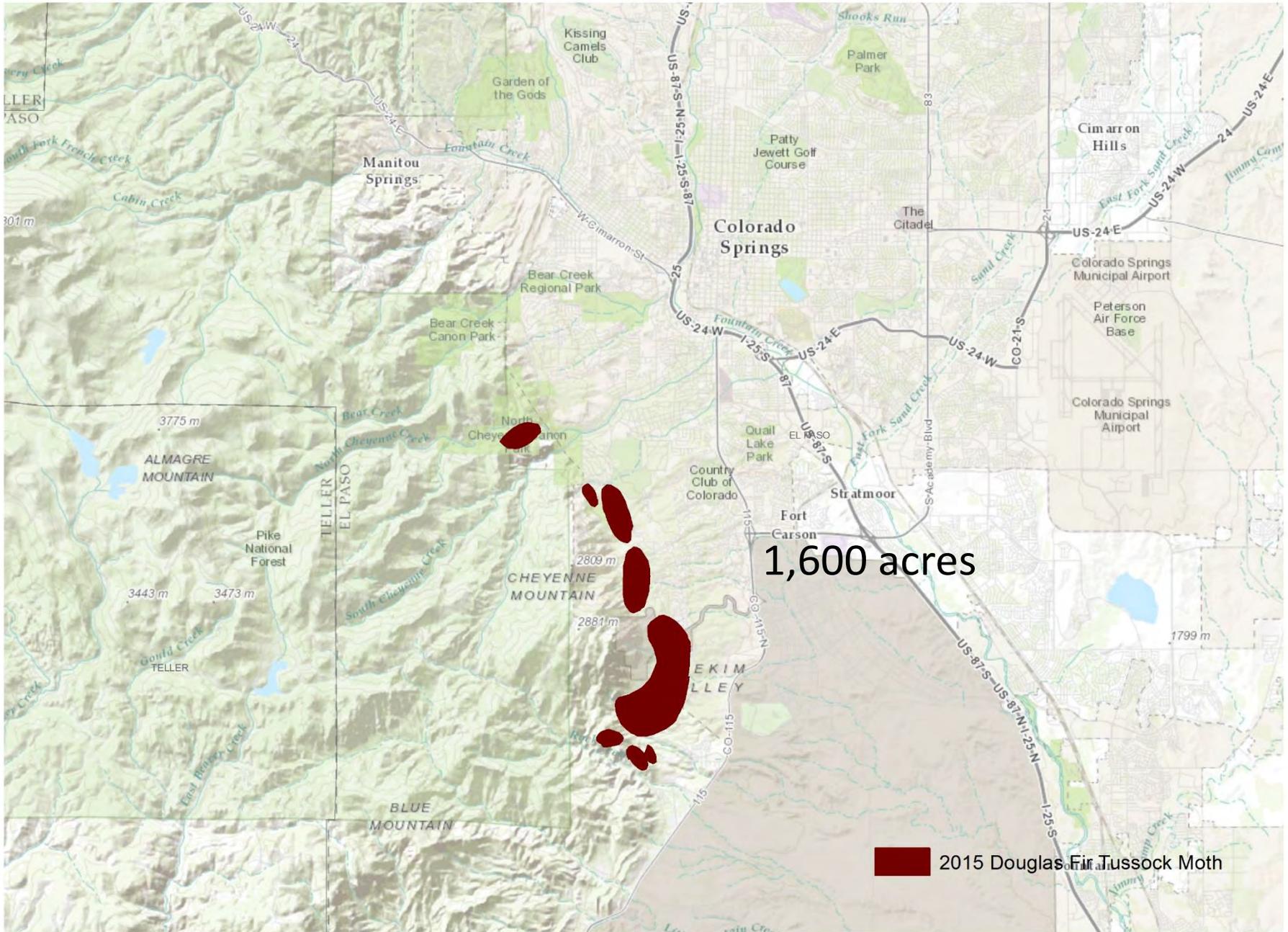
Indian Creek, Devil's Head and Topaz Point

Perry Park ( ~5,970 acres) and Jarre Canyon (~2849 acres)

Buffalo Creek, Cathedral Spires, Foxtan

# 2015 Outbreak El Paso County Cheyenne Mtn Area

# Aerially Visible Defoliation 2015 – Colo. Springs Area



1,600 acres

 2015 Douglas Fir Tussock Moth



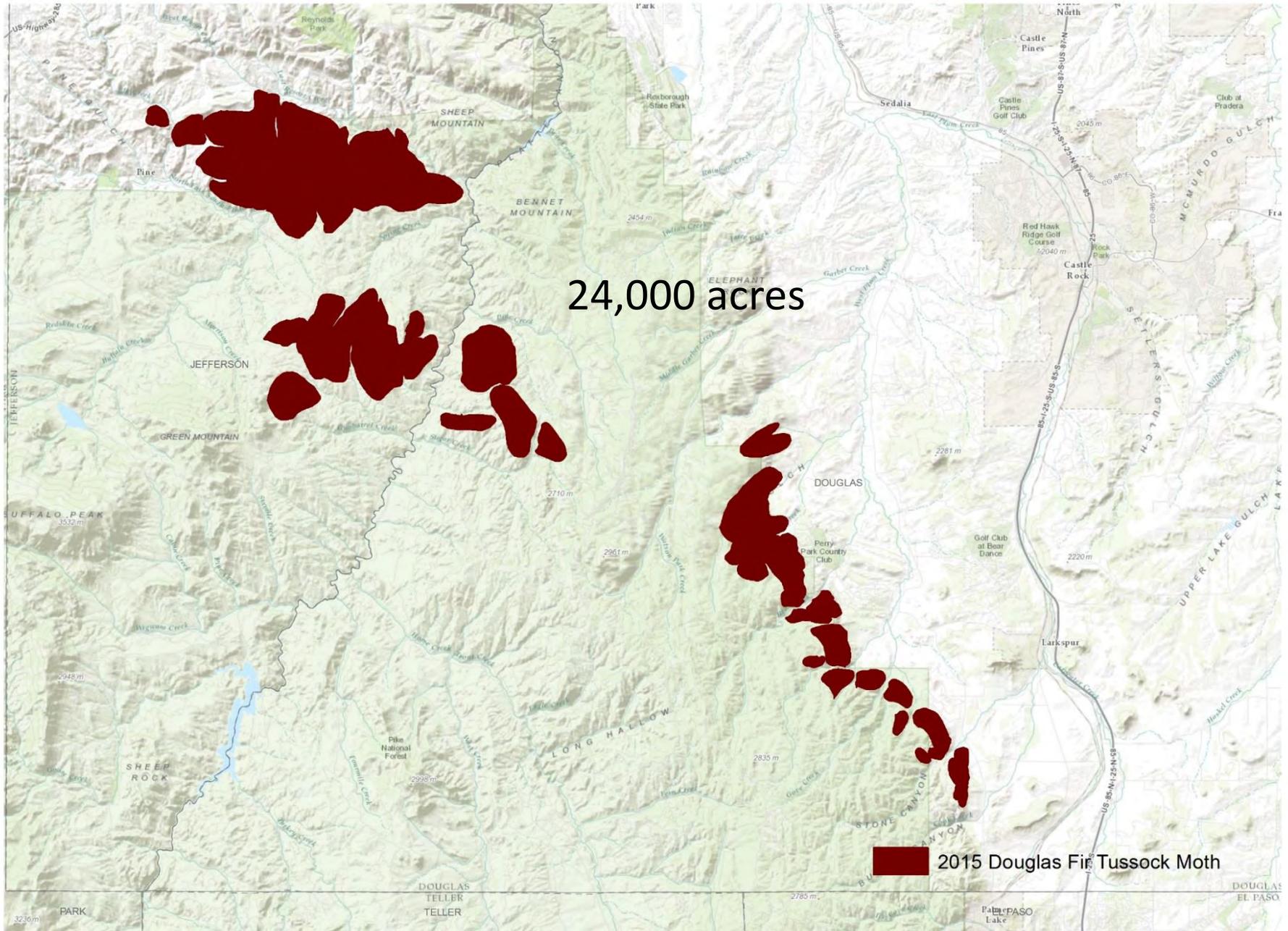
Cheyenne Mtn Area 2014



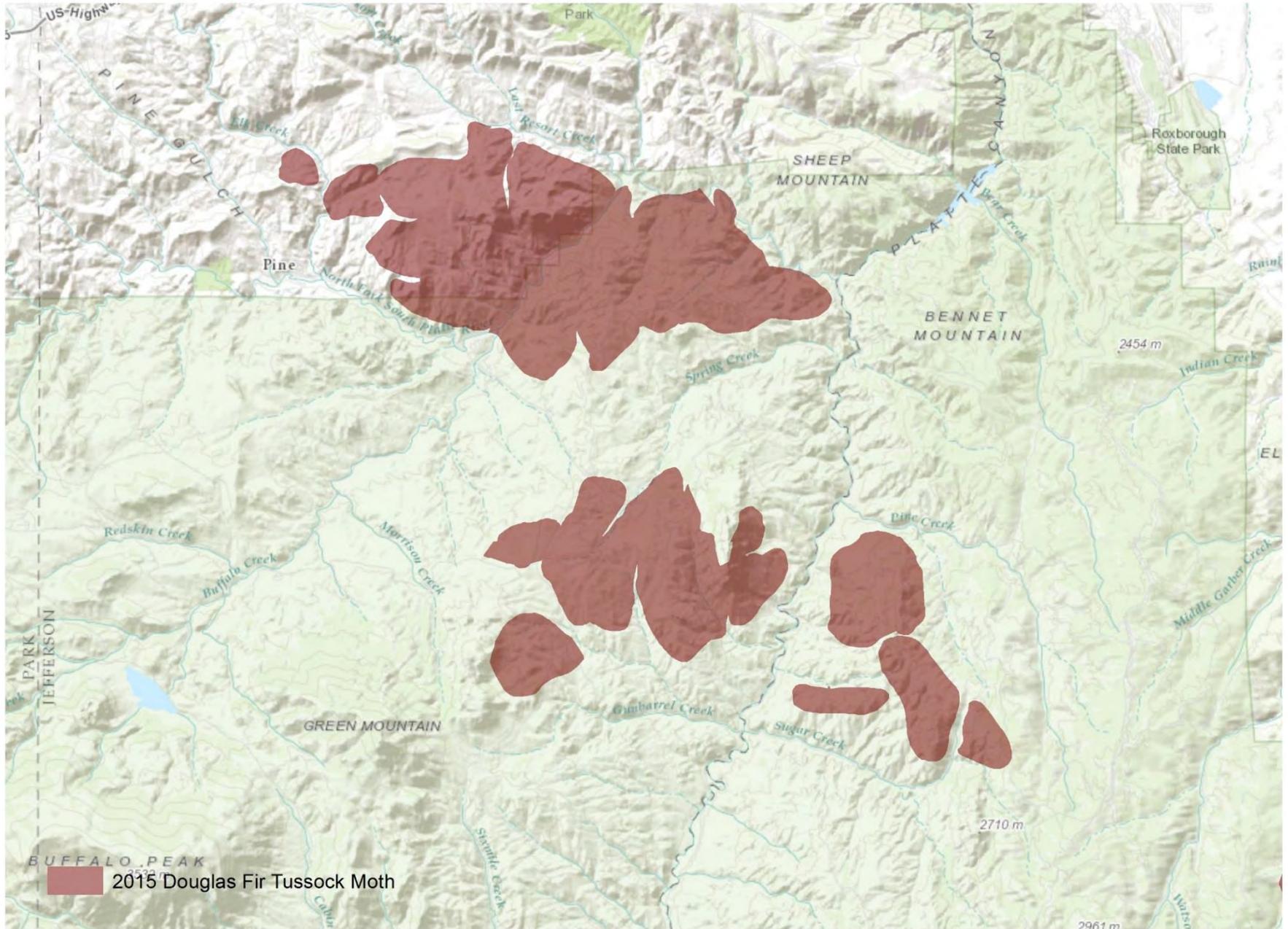
Cheyenne Mtn Area 2015

# 2015 Outbreak Douglas County Greater Larkspur Area

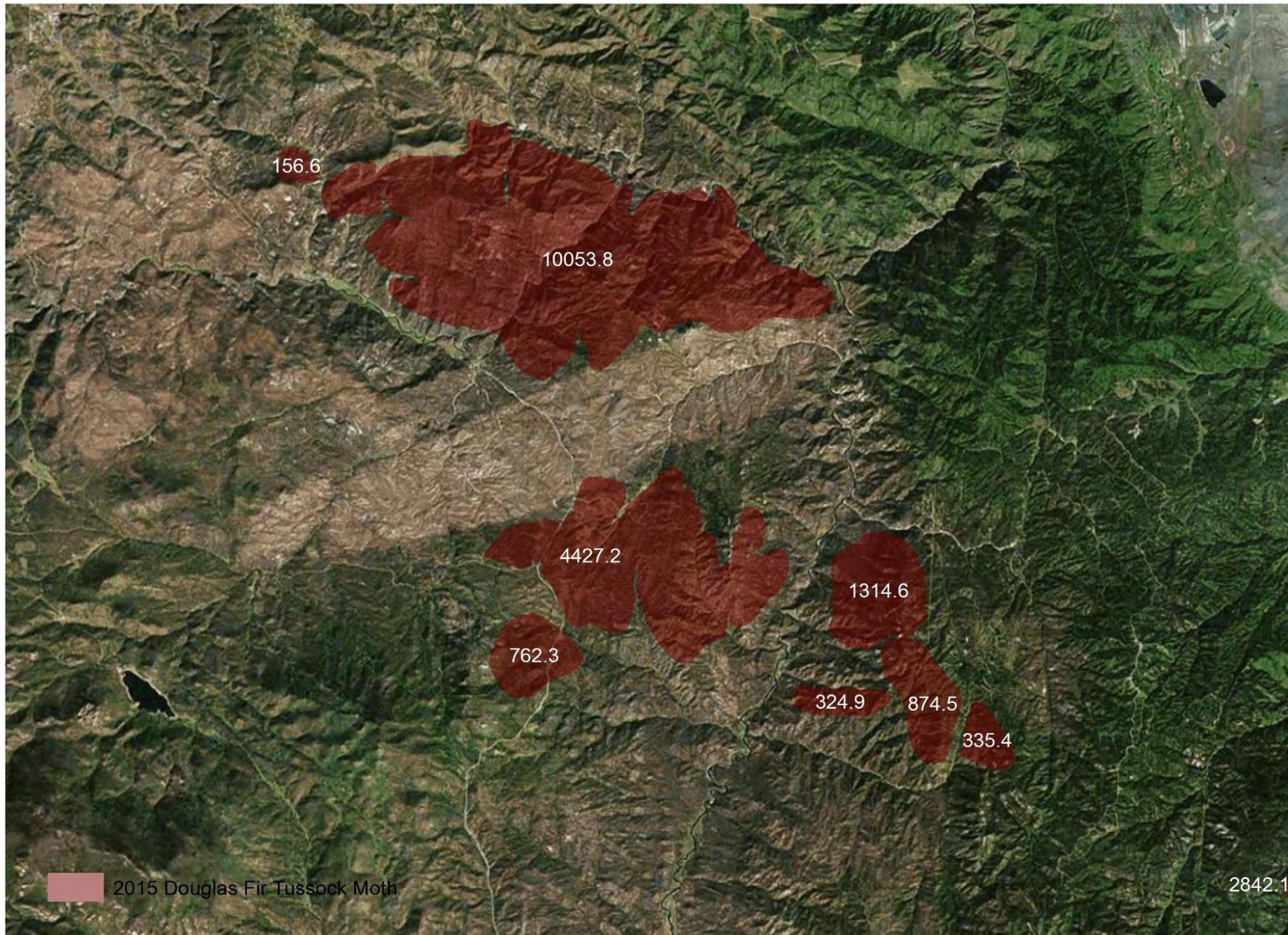
# Aerially Visible Defoliation 2015 – Jefferson, Douglas Counties



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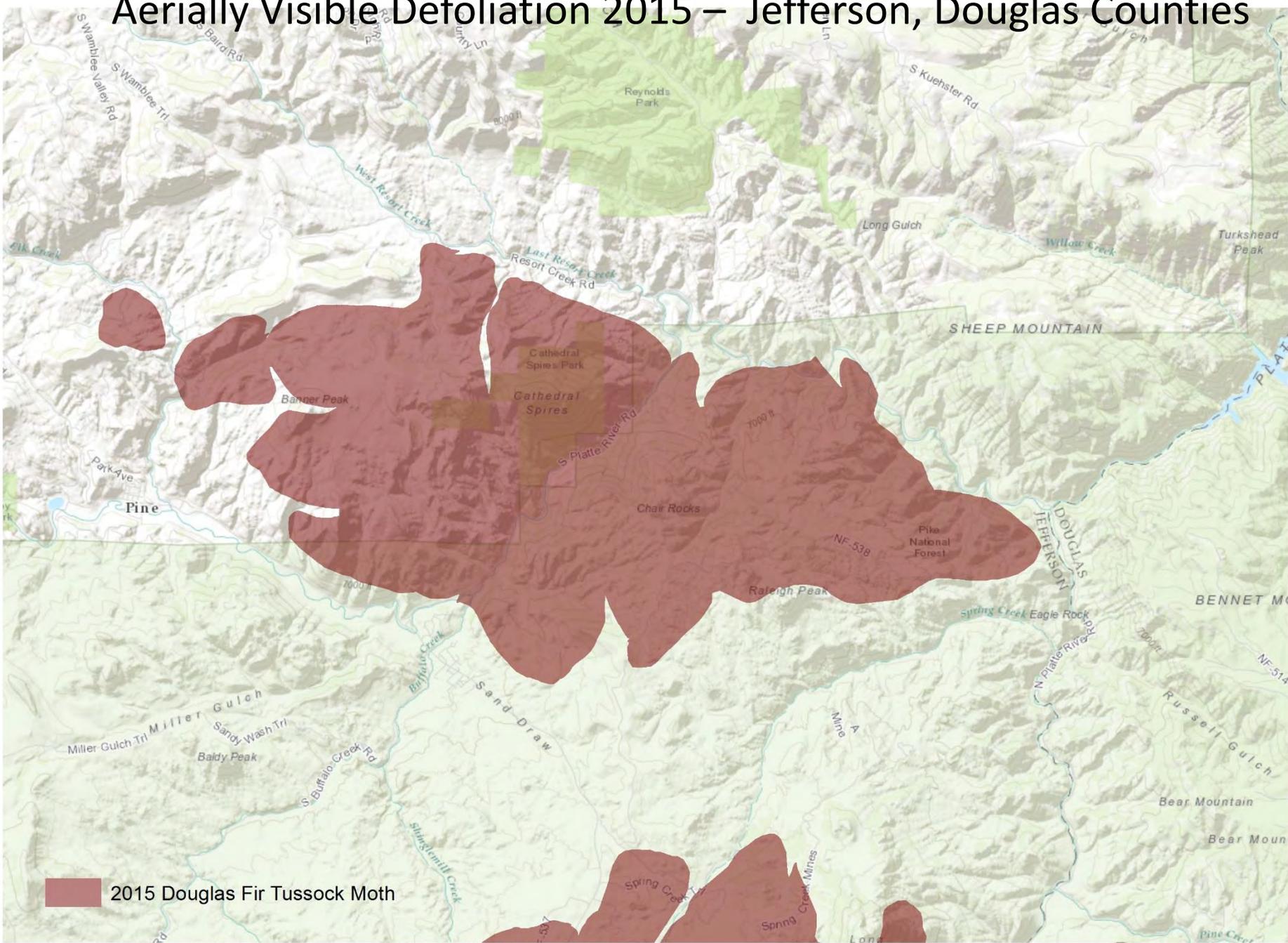


0 1.25 2.5 5 Miles

1 in = 2 miles

Created by: D. West  
Feb 2016

# Aerially Visible Defoliation 2015 – Jefferson, Douglas Counties

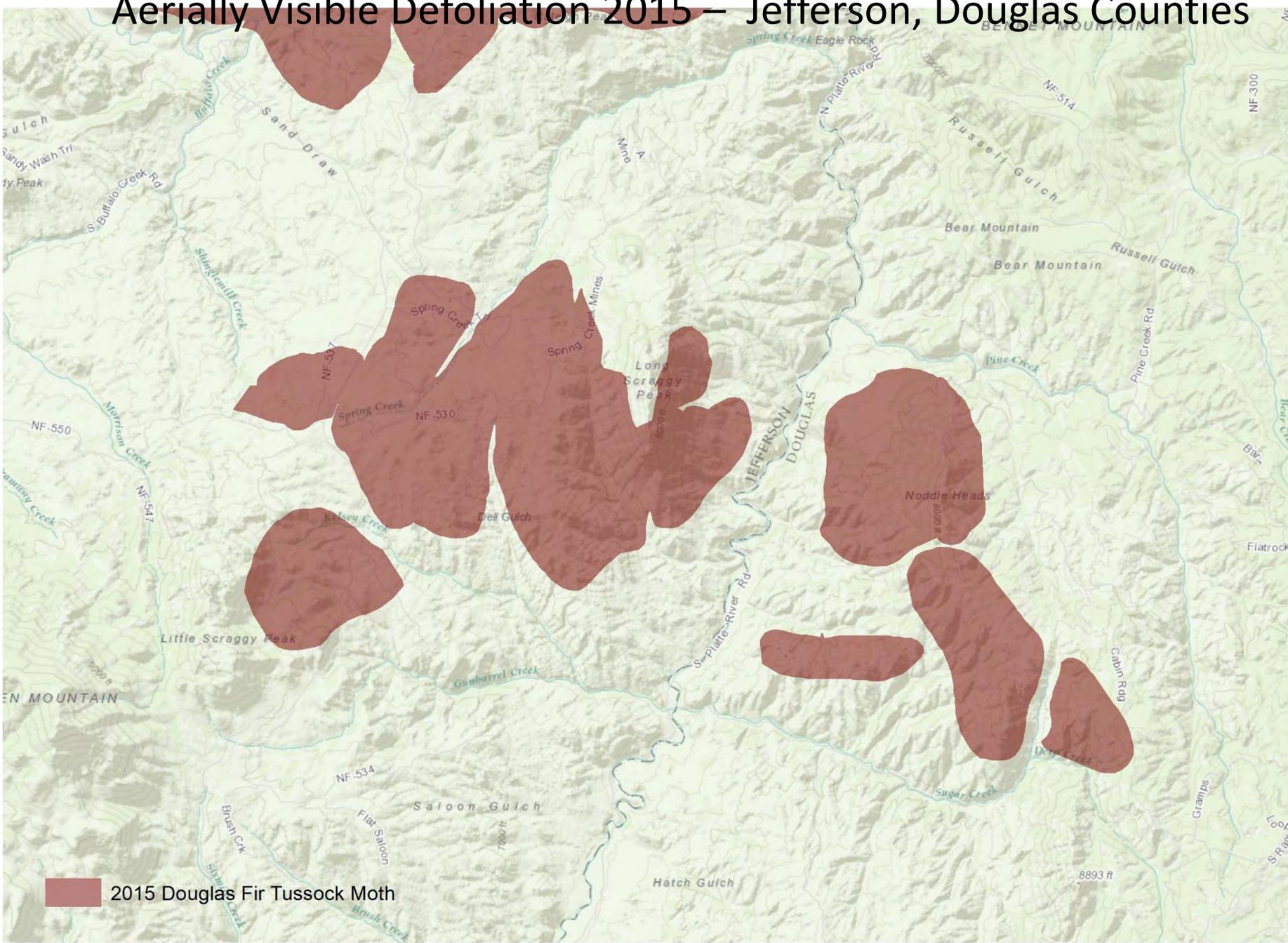


2015 Douglas Fir Tussock Moth

0 0.75 1.5 3 Miles 1 in = 1 miles

Created by: D. West  
Feb 2016

# Aerially Visible Defoliation 2015 – Jefferson, Douglas Counties



 2015 Douglas Fir Tussock Moth

0 0.75 1.5 3 Miles 1 in = 1 miles

Created by: D. West  
Feb 2016



Valley View, Larkspur Area - 2015

# Valley Park – Sept 2015



# Valley Park – Sept 2015





Perry Park (looking North), Larkspur Area 2015



Ciesla

Perry Park Area, Larkspur (Looking West) 2015

# Perry Park Area, Larkspur





## Noddles Area, South Platte Area



# 2015 Outbreak Jefferson County South Platte Area



Giesla

North Long Scraggy Peak – Aug 2015



Long Scraggy Peak – Aug 2015



Ciesla

Raleigh Peak – Aug 2015



Cesla

Raleigh Peak – Aug 2015



Between Buffalo Creek and Foxton – July 2015



Between Buffalo Creek and Foxton – July 2015

# Current outbreak (See Map)

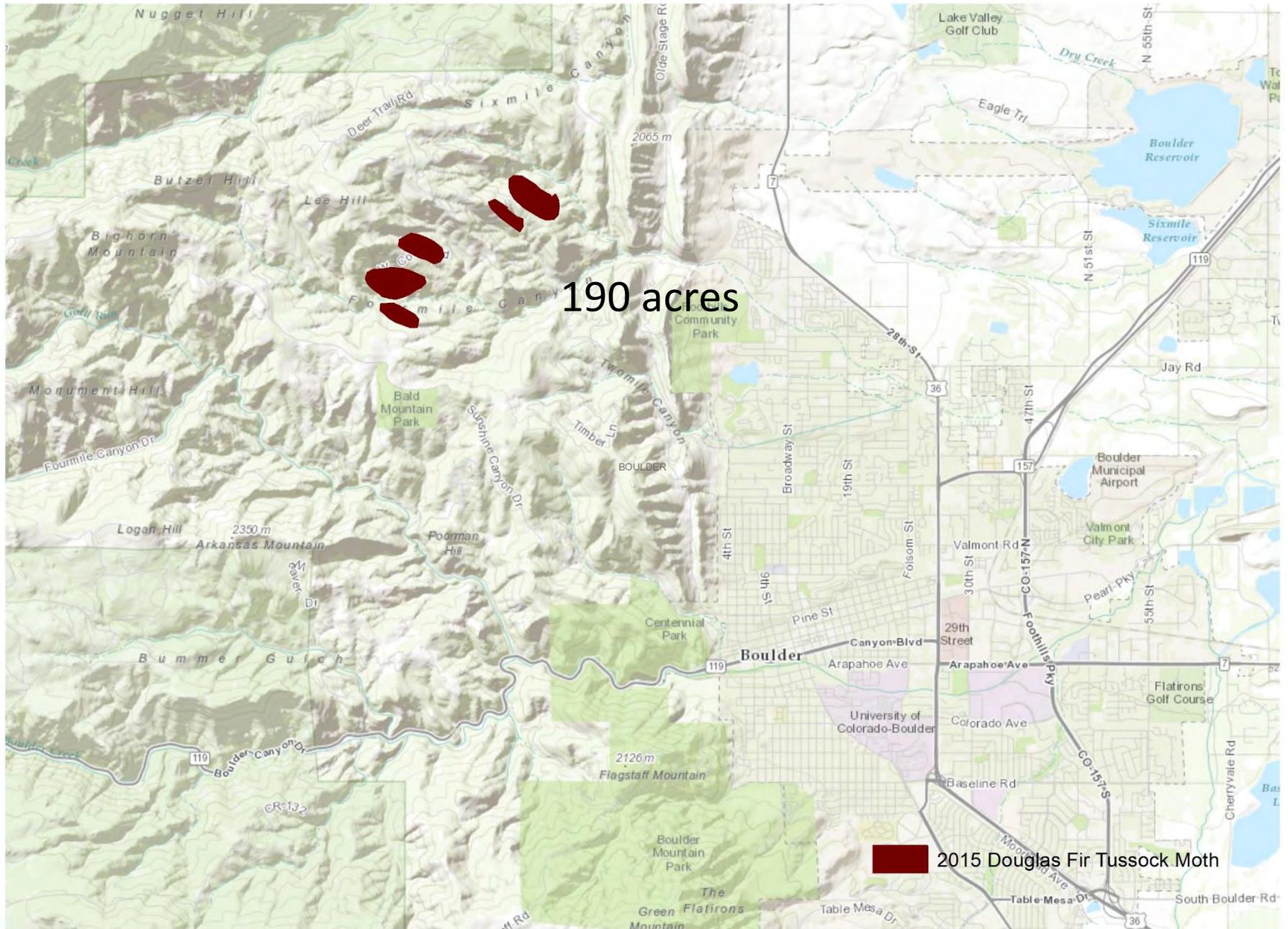
## Boulder Area

Initiated in 2014 – Visible larvae but no significant defoliation

Carriage Hills and Boulder Heights Communities  
2015 – Less than **200** acres



# Aerially visible Defoliation – Boulder



190 acres

2015 Douglas Fir Tussock Moth

0 0.5 1 2 Miles

1 in = 1 miles

Created by: D. West  
Nov 2015

# Boulder Area - Aug 2015



# Douglas-fir tussock moth, *Orgyia pseudotsugata*



Larva



Pupa



Adult male



Adult female/egg mass



Eggs hatch shortly  
after bud break

Larvae first consume the  
current season needles



# Feeding on older foliage



Feeding on older foliage



Full-grown larvae wander. They may pupate on the plant or in the vicinity





Wingless females lay eggs  
where they pupated

Males are winged



on typically occurs in a top-down

in Colorado on Spruce and  
-Fir



Ponderosa Pine – Perry Park July 2015



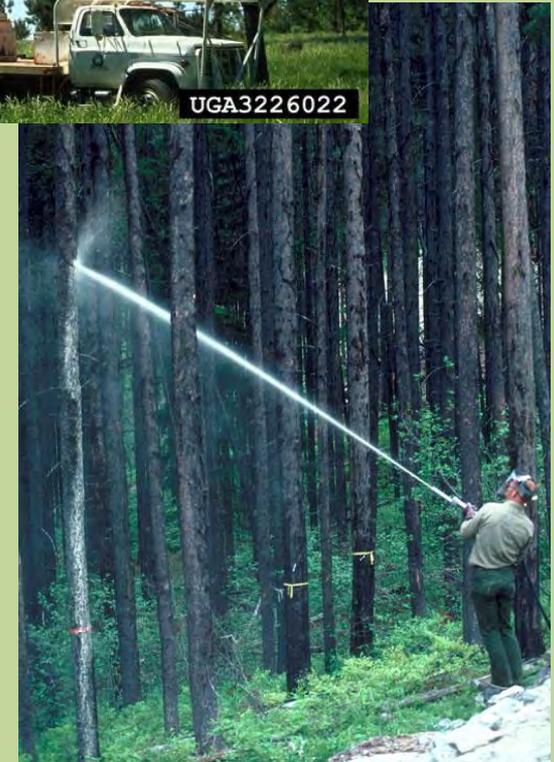
DFTM pupal cases and egg masses on building



'Tussockosis' due to exposure to DFTM larval hairs

# Control strategies for DFTM

- Use of aerial applied insecticides
- Use of ground-base insecticides



# Control strategies for DFTM

1. Topical/Contact sprays (Contact insecticides – nerve receptor disruption)

Active Ingredients: A. Carbaryl B. Permethrin

Timed with bud break (very early in spring before defoliation begins)

2. *Bacillus thuringiensis* spp. *kurstaki* (Ingested – bacterium; crytalized)

3. Mechanical removal (Caution: irritating hair)

# Natural Control



Nucleopolyhedrosis virus



*Entomophaga* spp.

Parasitoids

UGA3066023

([www.forestryimages.org](http://www.forestryimages.org))



# Sevin<sup>®</sup> 80 WSP

## CARBARYL INSECTICIDE

FOR AGRICULTURAL OR COMMERCIAL USE ONLY

**ACTIVE INGREDIENT:**

Carbaryl  
(1-naphthyl N-methylcarbamate) ..... 80% by wt.

**INERT INGREDIENTS:** ..... 20% by wt.

**TOTAL** ..... 100% by wt.

**KEEP OUT OF REACH OF CHILDREN  
WARNING AVISO**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.  
(If you do not understand the label, find someone to explain it to you in detail.)

EPA Reg. No. 432-1226

EPA Est. No.

IN CASE OF MEDICAL, ENVIRONMENTAL, OR  
TRANSPORTATION EMERGENCIES OR INJURIES,  
CALL 1-800-334-7577 (24 HOURS/DAY).

FOR PRODUCT INFORMATION,  
CALL TOLL-FREE: 1-800-331-2867

**NET CONTENTS:**

### ENVIRONMENTAL HAZARDS

This product is extremely toxic to aquatic and estuarine invertebrates. For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Discharge from rice fields may kill aquatic and estuarine invertebrates. Do not apply when weather conditions favor drift from area treated. Do not contaminate water by cleaning equipment or disposal of wastes. Do not contaminate water when disposing of equipment washwaters.

### BEE CAUTION: MAY KILL HONEYBEES IN SUBSTANTIAL NUMBERS.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Contact your Cooperative Agricultural Extension Service or your local Bayer Environmental Science representative for further information.

### DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read the entire label before using this product.



**Demand® CS Insecticide**

For use in, on and around buildings and structures for the control of listed pests, including on lawns, ornamental trees and shrubs around residential, institutional, public, commercial, agricultural and industrial buildings; and parks, recreational areas and athletic fields.

Active Ingredient:	
Lambda-cyhalothrin <sup>1</sup> .....	9.7%
Other Ingredients:	90.3%
Total:	100.0%

<sup>1</sup>Synthetic pyrethroid, capsule suspension (microencapsulated)

**KEEP OUT OF REACH OF CHILDREN.  
CAUTION/PRECAUCIÓN**

*Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)*

See additional precautionary statements and directions for use in booklet.

EPA Reg. No. 100-1066                      EPA Est. 61282-WI-1

Product of the United Kingdom        Formulated in the USA

SCP 1066A-L1J 0810

1 quart  
Net Contents

FIRST AID	
If on skin or clothing	<ul style="list-style-type: none"> <li>Take off contaminated clothing.</li> <li>Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>Call a poison control center or doctor for treatment advice.</li> </ul>
If in eyes	<ul style="list-style-type: none"> <li>Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>Call a poison control center or doctor for treatment advice.</li> </ul>
If swallowed	<ul style="list-style-type: none"> <li>Call a poison control center or doctor immediately for treatment advice.</li> <li>Do not give any liquid to the person.</li> <li>Do not induce vomiting unless told to do so by the poison control center or doctor.</li> <li>Do not give anything by mouth to an unconscious person.</li> </ul>
If inhaled	<ul style="list-style-type: none"> <li>Move person to fresh air.</li> <li>If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.</li> <li>Call a poison control center or doctor for further treatment advice.</li> </ul>
Have the product container or label with you when calling a poison control center or doctor, or going for treatment.	

**HOT LINE NUMBER**  
For 24-Hour Medical Emergency Assistance (Human or Animal)  
Or Chemical Emergency Assistance (Spill, Leak, Fire or Accident)  
Call  
**1-800-888-8372**

**PRECAUTIONARY STATEMENTS**

**Hazards to Humans and Domestic Animals**

**CAUTION/PRECAUCIÓN**

Harmful if absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. Avoid contact with skin, eyes, or clothing. Avoid breathing spray mist or vapor. Wash thoroughly with soap and water after handling, and before eating, drinking, chewing gum or using tobacco. Remove contaminated clothing and wash before reuse.

**Environmental Haz:**

This product is extremely allow pesticide to enter gutters, or surface water rain is not predicted for rain does not blow or 1 application equipment water bodies or drains; may be hazardous to ac product only as specific should be used to avoid

This product is highly residues on blooming or it to drift to blooming or area.

**Physical and Chem**

Do not use this product of shock hazard.

**CONDITIONS OF SALE AND LIABILITY**

**NOTICE:** Read the Sale and Limitation of this product. If the ter once, unopened, and

The Directions for Use impossible to eliminate product. Crop injury, in may result because of weather or crop conditions, presence or other materials or other

influencing factors in the use of the product, which are beyond the control of SYNGENTA CROP PROTECTION, Inc. or Seller. To the extent permitted by applicable law, Buyer and User agree to hold SYNGENTA and Seller harmless for any claims relating to such factors.

SYNGENTA warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, when used in accordance with directions under normal use conditions. To the extent permitted by applicable law: (1) this warranty does not extend to the use of this product contrary to label instructions, or under conditions not reasonably foreseeable to or beyond the control of Seller or SYNGENTA, and (2) Buyer and User assume the risk of any such use. To the extent permitted by applicable law, SYNGENTA MAKES NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS WARRANTED BY THIS LABEL.

To the extent permitted by applicable law, in no event shall SYNGENTA be liable for any incidental, consequential or special damages resulting from the use or handling of this product. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF SYNGENTA AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF SYNGENTA OR SELLER, THE REPLACEMENT OF THE PRODUCT.

**Environmental Hazards**

This product is extremely toxic to fish. To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters, or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run-off to water bodies or drainage systems. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Apply this product only as specified on this label. When making applications, care should be used to avoid household pets, particularly fish and reptile pets.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.



## INSECTICIDE

For Use by Individuals/Firms licensed by the State to apply insecticide products.

For use to control insect pests on lawns, ornamental trees and shrubs and around buildings for perimeter insect control including landscaped areas around residential, institutional, public, commercial and industrial buildings, parks, recreational areas and athletic fields.

EPA Reg. No. 279-3141

EPA Est. 39578-TX-1

<b>Active Ingredient:</b>	<b>By Wt.</b>
Permethrin**	36.8%
Other Ingredients***	63.2%
	100.0%

\*\*cis/trans ratio: Max. 55% (±) cis and min. 45% (±) trans

\*\*\*Contains petroleum distillates.

Contains 3.2 pounds permethrin per gallon

**KEEP OUT OF REACH OF CHILDREN**  
**CAUTION**

See other panels for additional precautionary information.

FMC Corporation  
Agricultural Products Group  
1735 Market Street  
Philadelphia PA 19103

**Net Contents: 1 Gallon**

### FIRST AID

<b>If swallowed</b>	<ul style="list-style-type: none"> <li>• Call poison control center or doctor immediately for treatment advice.</li> <li>• Do not induce vomiting unless told to do so by the poison control center or doctor.</li> <li>• Do not give any liquid to the person.</li> <li>• Do not give anything by mouth to an unconscious person.</li> </ul>
<b>If inhaled</b>	<ul style="list-style-type: none"> <li>• Move to fresh air.</li> <li>• If person is not breathing, call 911 or doctor.</li> <li>• Call doctor.</li> </ul>
<b>If on skin or clothing</b>	<ul style="list-style-type: none"> <li>• Take off contaminated clothing.</li> <li>• Rinse with water for 15 minutes.</li> <li>• Call doctor.</li> </ul>
<b>If in eyes</b>	<ul style="list-style-type: none"> <li>• Hold eye open and rinse with water for 15 minutes.</li> <li>• Remove contact lenses, if present, after the first rinsing.</li> <li>• Call doctor.</li> </ul>

**HI**

Have the product container and label with you when you call the poison control center or doctor. Contact 1-(800)-331-3148 for more information.

**NO**

This product contains a severe pneumonitis if asphyxiated. Rinse mouth with water. If asphyxiated, remove to fresh air. If breathing is difficult, use oxygen. If breathing is severely affected, use a respirator or endotracheal tube. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

For Information Regarding the Use of this Product Call 1-800-321-1FMC (1362).

### Environmental Hazards

This pesticide is highly toxic to bees exposed to direct treatment or residues on crops or weeds. Do not apply this product or allow it to drift to crops or weeds on which bees are actively foraging. Additional information may be obtained from your Cooperative Extension Service.

This product is extremely toxic to fish and aquatic invertebrates. Do not apply when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems.

### Physical and Chemical Hazards

Do not use or store near heat or open flame.

### PRECAUTIONARY STATEMENTS

#### Hazards to Humans (and Domestic Animals)

##### CAUTION

Harmful if swallowed, inhaled or absorbed through the skin. Avoid contact with skin, eyes or clothing. Avoid breathing vapor or spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

Flowable Concentrate

# Foray® 48B

Biological Insecticide

For Commercial Forestry and Wide-Area Pest Treatment - **Aerial Application Only**

List No. 60181-04

 FOR ORGANIC PRODUCTION

Active Ingredient:

Bacillus thuringiensis subsp. kurstaki, Strain ABTS-351, fermentation solids, spores and insecticidal toxins	12.65%
Other Ingredients	87.35%
Total	100.00%

Potency: 10,600 Cabbage Looper Units (CLU) per mg of product (equivalent to 48 billion CLU per gallon).

The percent active ingredient does not indicate product performance and potency measurements are not federally standardized.

**KEEP OUT OF REACH OF CHILDREN  
CAUTION**

**FIRST AID**

<b>If in eyes</b>	<ul style="list-style-type: none"> <li>• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes.</li> <li>• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
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**CALL 1-800-4-A-GRASS**

**AGRICULTURAL USE REQUIREMENTS**

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under "Agricultural Use Requirements" in the Directions For Use section for information about this standard.

Refer to the Directions For Use (below) for further directions.

**STORAGE AND DISPOSAL**

Do not contaminate water, food or feed by storage or disposal.

**Pesticide Storage:** Store in a cool, dry place. Keep containers tightly closed when not in use. Store in temperatures above freezing and below 32 degrees C (90 degrees F).

**Pesticide Disposal:** To avoid wastes, use all material in this container by application according to label directions. If wastes can not be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (often such programs are run by state or local governments or by industry).

**Container Disposal:** Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more

## Environmental Hazards

Except under the forest canopy, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

This product must not be applied aerially within 1/4 mile of any habitats of threatened or endangered Lepidoptera.

## DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. For any requirements specific to your State or Tribe, consult the State or Tribal agency responsible for pesticide regulation.

**Non-agricultural Use Requirements:**  
Mixers/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH

or through drift. Only protected handlers may be in the area during application.  
Do not enter or allow unauthorized persons into treated areas during the restricted entry interval.

# Non-Target Impacts

Pawnee Montane Skipper  
(*Hesperia leonardus montana*)

- Threatened species- 1992
- Dryland ponderosa pine forests  
(South Platte River Drainage)

Larvae: Blue Gramma Grasses

Adults: Nectar on *Liatris punctata*,  
prairie gayfeather



# Non-Target Impacts

Colorado Hairstreak: Larvae and Adults- Gambel Oak



# Factors affecting tree impact

1. Spring vs. mid summer vs. late summer
2. Repeated defoliation
3. Old needles vs. new needles vs. both
4. Location in crown and extent
5. Compensatory growth
  - a. Thinning stand
  - b. Nutrient release
  - c. Younger leaves are more efficient
6. Winter/Spring severity



# Will the impacted trees survive?



# Survivability?



Most trees have set buds



Light – Moderate Defoliation (June 2015)



Severe Defoliation (June 2015)



# Western spruce budworm, *Choristoneura freemani*



Larva



Pupa



Adult

# Western Spruce Budworm



- Adults emerge in July-August
- Egg masses on underside of needles

# Western Spruce Budworm



- Eggs hatch in about 10 days
- Larvae are protected in the winter by hibernacula

# Western Spruce Budworm

- Defoliator, late May-June



(CSFS)



# Western Spruce Budworm

- After bud break, they feed on new growth
- Pupation occurs among the foliage





West 2015

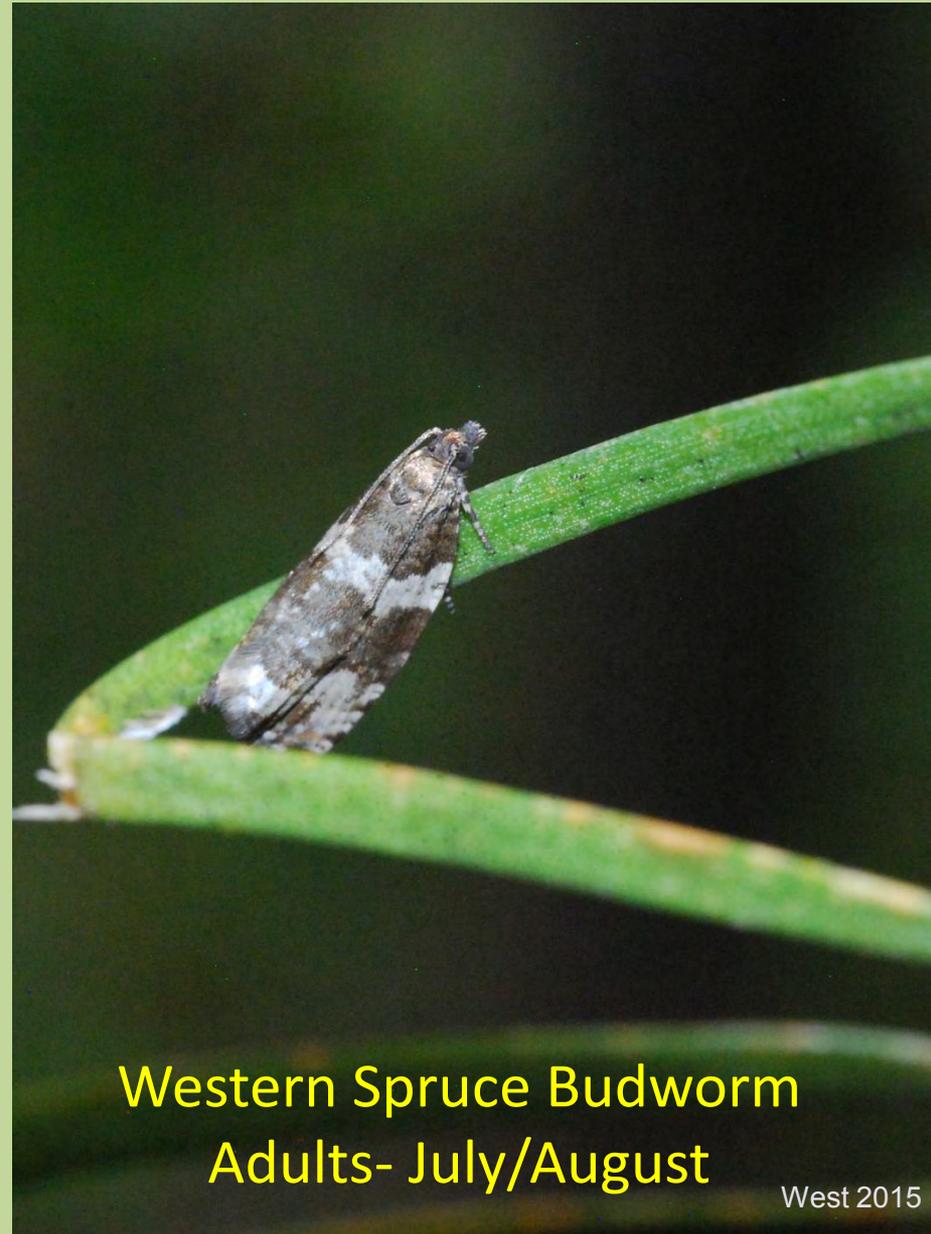


West 2015

# Western Spruce Budworm Defoliation - 2015



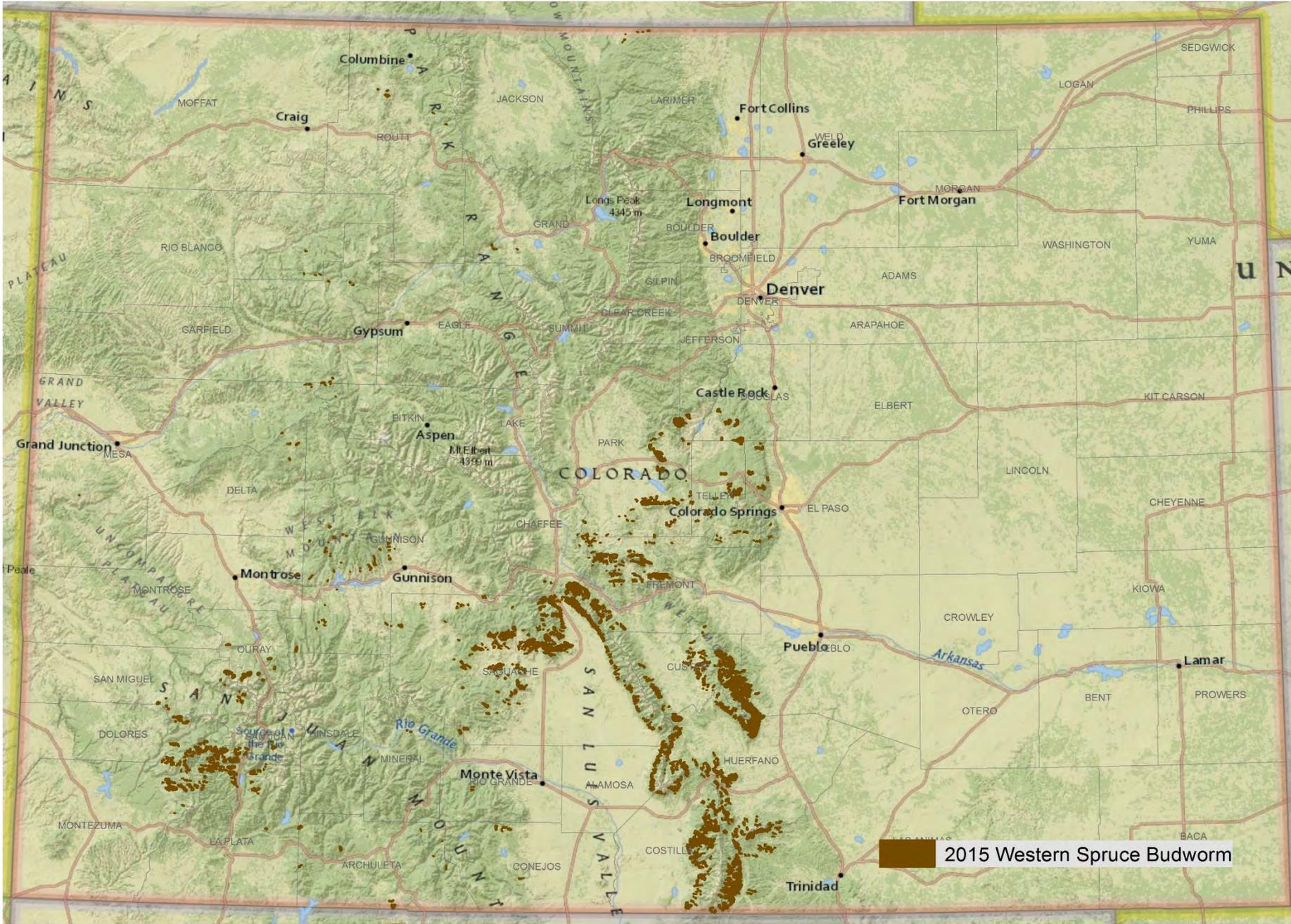
West 2015



Western Spruce Budworm  
Adults- July/August

West 2015

# Western Spruce Budworm Defoliation - 2015



0 25 50 100 Miles

1 in = 36 miles

Created by: D. West  
Nov 2015

# Douglas Fir Tussock Moth Update- 2015



Thank you!



[www.csfs.colostate.edu](http://www.csfs.colostate.edu)





# Management Options for Landowners



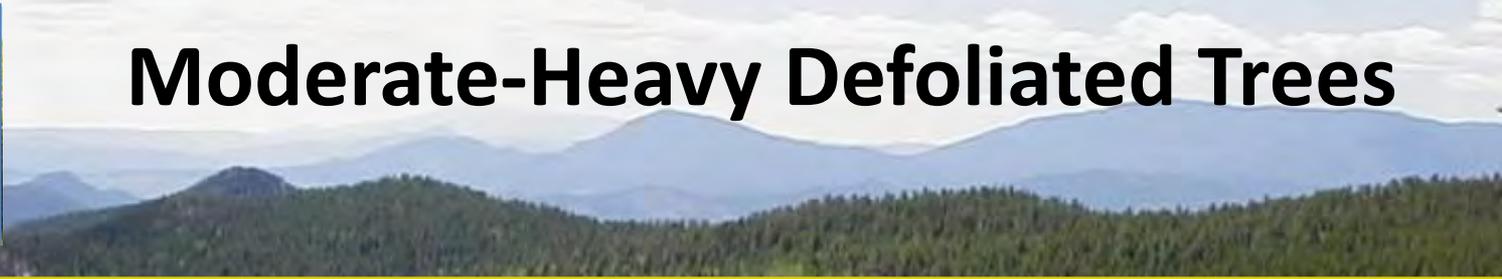
Photo: Keith Worley



# Management Options for Landowners

- Light-No Defoliation Areas
- Moderate-Heavy Defoliation Areas
- Potential Fuels Mitigation Grant Opportunities
- Moving Forest Products
- 2016 Activity/Actions
- Questions and Answers

# Moderate-Heavy Defoliated Trees



## Priority within Home Ignition Zone (HIZ)

- 100-200 feet from home
- See how trees recover in spring
  - Trees with limited to no growth recovery, dwarf mistletoe, overstocked areas priority for removal
- Remove dead trees within 30 feet of home





# Moderate-Heavy Defoliated Trees



## Priority within Home Ignition Zone (HIZ)

- Thin trees to increase crown spacing, reduce competition
- Remove all ladder fuels from dripline of residual trees



# Moderate-Heavy Defoliated Trees



## Beyond Home Ignition Zone:

- See how trees recover in spring
  - Trees with limited to no growth recovery, dwarf mistletoe, overstocked areas priority for removal
- Leave 2-3 snags per acre
- Thin trees to increase crown spacing, reduce competition



# Light-No Defoliated Trees





# Light-No Defoliated Trees

2015:

- Lots of larvae activity
- Light defoliation in tops of trees
- Larvae on homes, roads, and vehicles
- Cocoons on tree trunks, homes, vehicles
- Light/sporadic spruce budworm activity

2016:

- During winter and early spring monitor your property for the presence of egg masses.
- Look for larvae and defoliation of new growth in late May following bud break
- Determine if spraying is warranted
- Communicate with each other and work in a larger and collaborative effort if decide to spray aerially



# Potential Grant Opportunities

- Grant Opportunities are for Timber Stand Improvement and Mitigation Efforts.
- Community
  - Department of Natural Resources (DNR)
  - State Fire Assistance slippage
  - Requirements: 50/50 match, reimbursable
- Individual Landowners
  - Larger landowners: NRCS Environmental Quality Incentives Program, State Fire Assistance slippage



# Moving Forest Products

- Look for egg masses on firewood, Christmas trees, etc.
  - Remove egg masses before transporting products



# 2016 Activity/Actions



- Start looking for larvae in May and take appropriate action given level of infestation
  - Timing of spraying is critical (if applicable)
  - Coordinate control efforts on a community-wide basis where feasible
  - Share what you are seeing with adjoining landowners

# 2016 Activity/Actions



- Wait to see how defoliated trees recover from winter/spring moisture (and other factors)
  - Trees with limited to no growth recovery, dwarf mistletoe, overstocked areas priority for removal
- Work on Home Ignition Zone first and then focus on remainder of property
- Monitor for bark beetle activity
  - Douglas-fir beetle (larger diameter trees)
  - Ips/engraver beetles (smaller diameter trees)