****DRAFT****

# 2008 Aerial Insect and Disease Survey
# Denver West, Colorado
# USGS 100K DRG: 39105-E1

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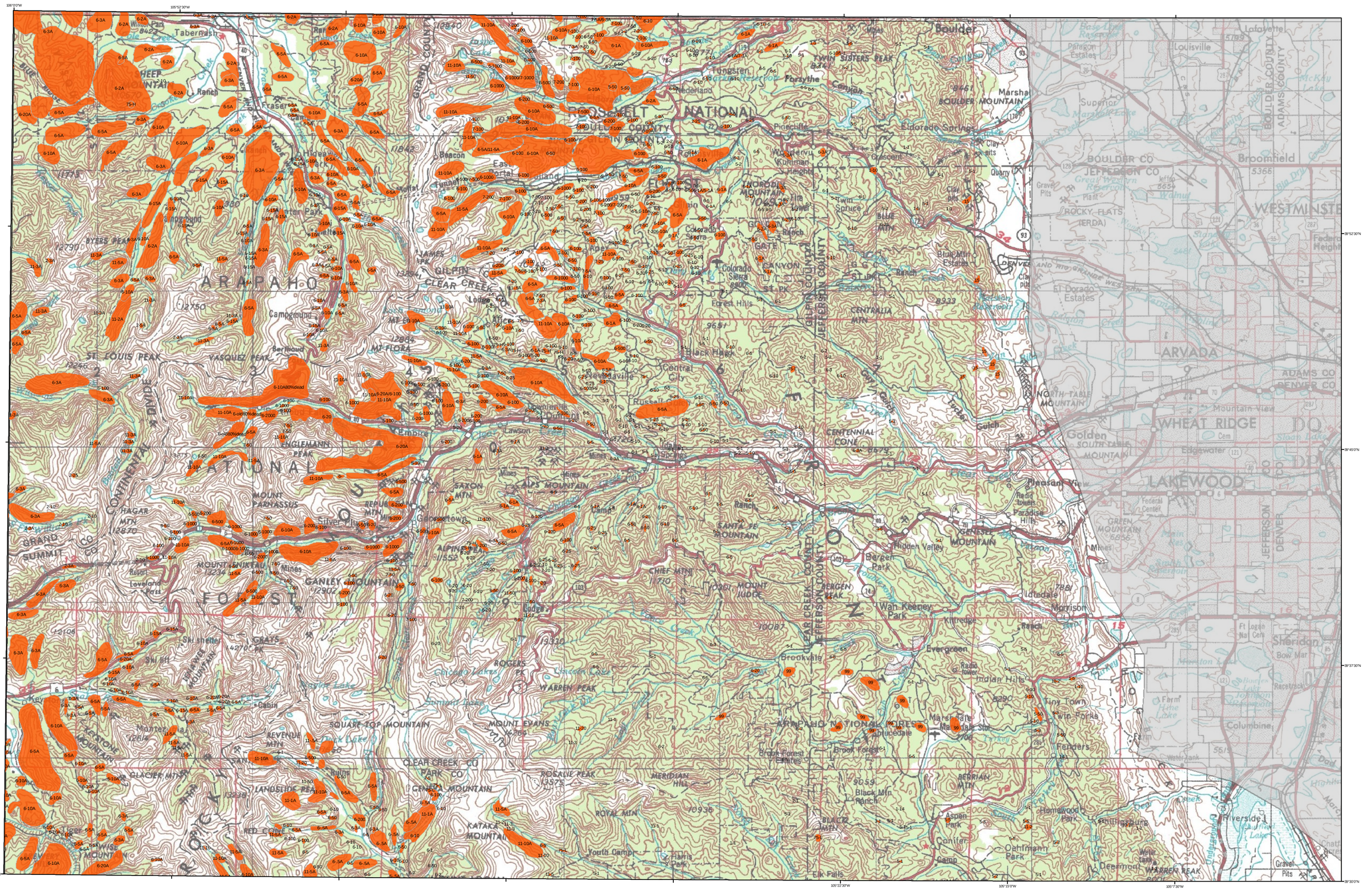



## 1:100,000

## Legend

Causal Agent(s)

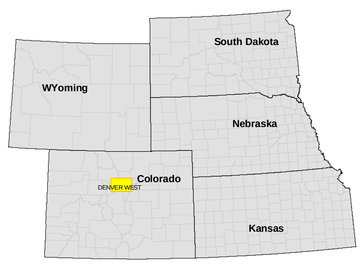
Not Flown

Use of the Number System

Example: 5-25 = The first number before the dash is the causal agent code. The number after the dash is the number of dead "fader" trees in the polygon or point. When recent dead trees are not counted, an intensity code of L-light, M-moderate, and H-high may be used after the causal agent code. Periodically, trees per acreage estimates are used after the causal agent code instead of number of dead "fader" trees (or an intensity code). For example: 5-1/2A = The first number before the dash is the causal agent code. The number after the dash is an estimation of the number of dead "fader" trees in the polygon per acre. In this case it would be an estimation that, on the average, one tree per every two acres would be a dead "fader" tree. In another example: 5-3A = that on the average, an estimated three trees per acre are dead "fader" trees. A "/" is used as a separator when a point/ polygon has more than one causal agent code.

| Code | Causal Agent | Primary Host |
|---|---|---|
| 1 | Douglas-fir beetle | Douglas-fir |
| 2 | Engelmann Spruce Beetle | Englemann Spruce |
| 5 | Mountain pine beetle | Ponderosa Pine |
| 6 | Mountain pine beetle | Lodgepole Pine |
| 7 | Mountain pine beetle | 5-Needle Pine |
| 8 | Western pine beetle | Ponderosa Pine |
| 9 | Fir Engraver | White Fir |
| 10 | Douglas-fir engraver beetle | Douglas-fir |
| 11 | Western balsam bark beetle | Subalpine Fir |
| 12 | Unidentified bark beetle | Softwoods |
| 13 | Pine engraver | Lodgepole Pine |
| 14 | Pine engraver | Ponderosa Pine |
| 15 | Ponderosa pine needle miner | Lodgepole Pine |
| 16 | Lodgepole pine needle miner | Ponderosa Pine |
| 17 | Jack pine budworm | Jack Pine |
| 18 | Spruce budworm, light defol. | Douglas-fir |
| 19 | Spruce budworm, medium defol. | Douglas-fir |
| 20 | Spruce budworm, heavy defol. | Douglas-fir |
| 22 | Douglas-fir tussock moth | Douglas-fir |
| 23 | Pine Butterfly | Ponderosa Pine |
| 26 | Pine looper | Ponderosa Pine |
| 27 | Pine tortrix | Ponderosa Pine |
| 28 | Tent caterpillars | Hardwoods |
| 29 | Leaf beetles | Hardwoods |
| 33 | Oak leaf roller | Hardwoods |
| 34 | Pine needle-sheath miner | Ponderosa Pine |
| 35 | Pine sawflies | Ponderosa Pine |
| 36 | Pine tussock moth | Ponderosa Pine |
| 37 | Cankerworms | Hardwoods |
| 38 | Variable oak leaf caterpillar | Hardwoods |
| 39 | Unidentified defoliator | All Tree Species |
| 41 | Heterobasidion annosum (Fomes annosus) | Softwoods |
| 42 | Armillaria ostoyae (Armillaria mellea) | Softwoods |
| 43 | Polyporus schweinitzii | Softwoods |
| 44 | Phomopsis | Softwoods |
| 45 | Cytospora | All Tree Species |
| 46 | Western gall rust | Unknown |
| 47 | Comandra rust | Unknown |
| 48 | Stalactiforme rust | Lodgepole Pine |
| 49 | Atropellis | Lodgepole Pine |
| 50 | White pine blister rust | 5-Needle Pine |
| 51 | Dwarf mistletoe | Softwoods |
| 52 | Elytroderma | Ponderosa Pine |
| 53 | Includes #55, 56 & 68 | All Tree Species |
| 54 | Air pollutants | All Tree Species |
| 55 | Chemical damage | All Tree Species |
| 56 | Lophodermium pinastri | Softwoods |
| 57 | Rhabdocline pseudotsugae | Douglas-fir |
| 58 | Lophodermella arcuata | Softwoods |
| 59 | Lecanostica acicocola | Softwoods |
| 60 | Lophodermella concolor | Softwoods |
| 61 | Dothistroma pini | Softwoods |
| 62 | Needle cast (Hypodermataceae) | Softwoods |
| 63 | Root Rot | All Tree Species |
| 64 | Unidentified disease | Softwoods |
| 65 | Winter damage light | All Tree Species |
| 66 | Winter damage medium | All Tree Species |
| 67 | Winter damage heavy | All Tree Species |
| 68 | Diplodia | Softwoods |
| 69 | Pinyon black stain | Common Pinyon |
| 70 | Fire | All Tree Species |
| 71 | Porcupine | Softwoods |
| 72 | Windthrow | All Tree Species |
| 73 | High water damage | All Tree Species |
| 74 | Avalanche | All Tree Species |
| 75 | Aspen decline-multiple agent(s) | Quaking Aspen |
| 76 | Pinyon pine mortality | Common Pinyon |
| 77 | Juniper mortality-unknown agent(s) | Juniper |
| 78 | Gamble oak decline-unknown agent(s) | Gambel Oak |
| 79 | Limber pine decline-multiple agent(s) | Limber Pine |
| 80 | Hail damage | All Tree Species |
| 99 | Unknown polygon | Unknown |
| 100 | old pinion mortality | Common Pinyon |
| 101 | road salt tpp | Lodgepole Pine |
| 102 | dutch elm disease | Elm |
| 103 | diplodia blight | Ponderosa Pine |
| 104 | Ips hunterii | Spruce, White Spruce |
| 105 | drought killed narrow leaf cottonwood | Narrowleaf Cottonwood |
| 105 | fox squirrel flagging | Cottonwood,Poplar |
| 107 | fall webworm | Cottonwood,Poplar |
| 108 | road salt | Softwoods |
| 109 | pinewood nematode | Scotch Pine |
| 110 | oak wilt | Oak |
| 111 | foliage disease | All Tree Species |
| 112 | spruce ips | White Spruce |
| 113 | twolined chestnut borer | Oak |
| 114 | anthracnose like foliar disease | Bur Oak |
| 115 | Dieback | All Tree Species |
| 116 | Mortality | All Tree Species |
| 117 | Discoloration | All Tree Species |
| 118 | Herbicide | All Tree Species |
| 119 | Flagging | All Tree Species |
| 120 | aspen tortrix | Quaking Aspen |
| 121 | Marssonina Blight | Quaking Aspen |
| 200 | Dieback (ash) | Ash |
| 201 | Dieback (cottonwood) | Cottonwood,Poplar |
| 202 | Dieback (hardwood) | Hardwoods |
| 204 | Dieback (oak) | Oak |
| 210 | Mortality (old cottonwood) | Cottonwood,Poplar |
| 211 | Mortality (eastern cedar) | Eastern Red Cedar |
| 212 | Mortality (hardwood) | Hardwoods |
| 213 | Mortality (oak) | Oak |
| 214 | Mortality (spruce) | Spruce |
| 220 | Discoloration (ash) | Ash |
| 221 | Discoloration (conifer) | Softwoods |
| 222 | Discoloration (cottonwood) | Cottonwood,Poplar |
| 223 | Discoloration (eastern cedar) | Eastern Red Cedar |
| 224 | Discoloration (hardwood) | Hardwoods |
| 225 | Discoloration (oak) | Oak |
| 226 | Discoloration (spruce) | Spruce |
| 230 | Herbicide (cottonwood) | Cottonwood,Poplar |
| 231 | Herbicide (eastern cedar) | Eastern Red Cedar |
| 240 | Flagging (hardwood) | Hardwoods |
| 250 | Unidentified defoliator (cottonwood) | Cottonwood,Poplar |
| 251 | Unidentified defoliator (elm) | Elm |
| 252 | Unidentified defoliator (hardwood) | Hardwoods |
| 300 | Mortality (pine) | Pine |

### USGS 100K Quad - Location Map




### How Aerial Surveys Are Conducted

Data represented on this map are based on aerial observations manually recorded onto a map. This procedure is considered both an art form and a form of scientific data collection, and is highly subjective. An observer only has a few seconds to recognize the color difference between healthy and damaged trees of different species; diagnose causal agents correctly; estimate intensity; delineate the extent of damage; and precisely record this information on a georeferenced map. Air turbulence, cloud shadows, distance from aircraft, haze, smoke, and observer experience can all affect the quality of the survey. These data summaries provide an estimate of conditions on the ground and may differ from estimates derived by other methods.

Aerial surveys provide information on the current status for many causal agents, and are important when examining insect activity trends by comparing historical and current survey data over large areas.

Overview surveys are a 'snap shot' in time and therefore may not be timed to accurately capture the true extent or severity of a particular disturbance activity. Aerial surveys can be thought of as the first stage in a multi-stage sampling design. Other remote sensing approaches, including aerial photography, electro-optical sensors, and specially designed aerial surveys with modified flight patterns, can be used to more accurately delineate the extent and severity of a particular disturbance agent. The preceding methods are often more costly than overview surveys, and are generally reserved to address situations of sufficient environmental, economic, or political importance.

**Area surveyed by**
**Map Created:**
**Projection: UTM NAD83 Zone 13**
**Author: J. Ross, USDA Forest Service**

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*****DISCLAIMER*****

Due to the nature of aerial surveys, the data on this map will only provide rough estimates of location, intensity and the resulting trend information for agents detectable from the air. Many of the most destructive diseases are not represented on this map because these agents are not detectable from aerial surveys. The data presented on this map should only be used as a partial indicator of insect and disease activity, and should be validated on the ground for actual location and casual agent. Shaded areas show locations where tree mortality or defoliation were apparent from the air. Intensity of damage is variable and not all trees in shaded areas are dead or defoliated.

The insect and disease data represented on this map are available digitally from the USDA Forest Service, Region Two Forest Health Management group. The cooperators reserve the right to correct, update, modify or replace GIS products. Using this map for purposes other than those for which it was intended may yield inaccurate or misleading results.

**A data dictionary and digital copies of this map and the insect and disease data are available at: http://www.fs.fed.us/r2/resources/fhm/aerialsurvey/**