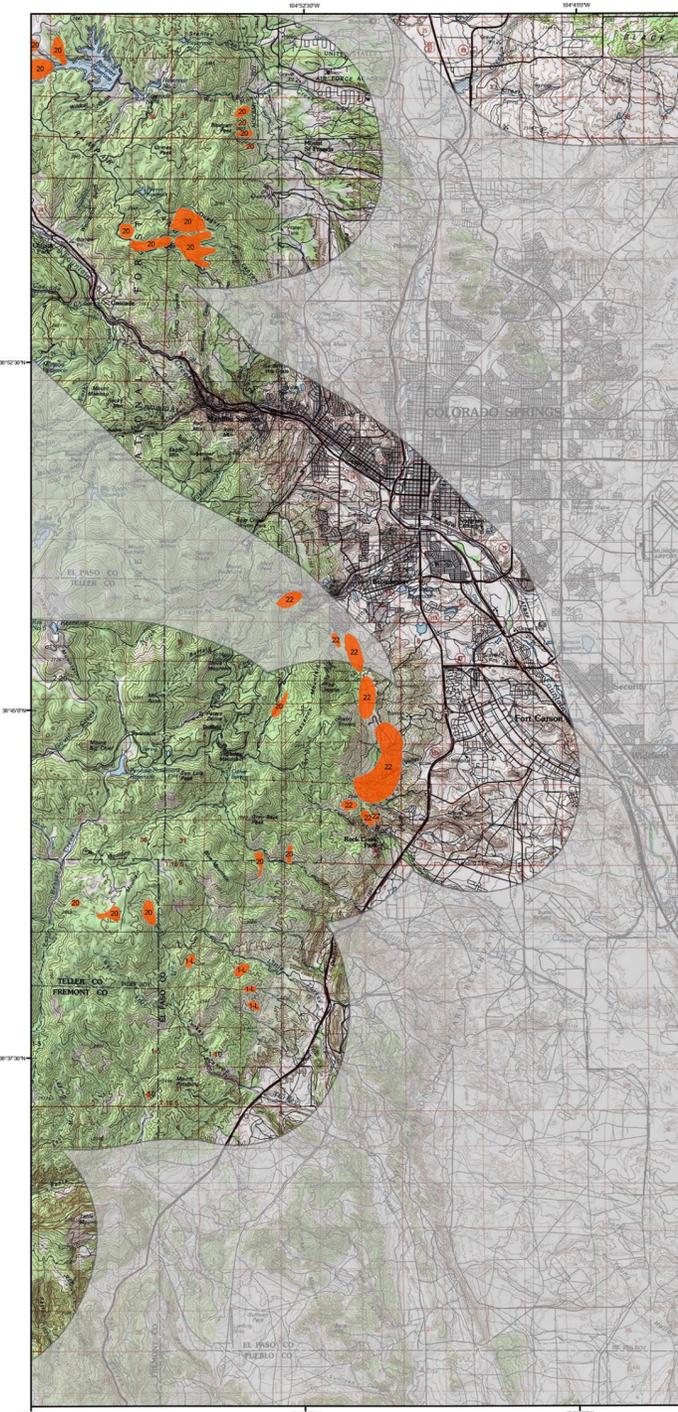
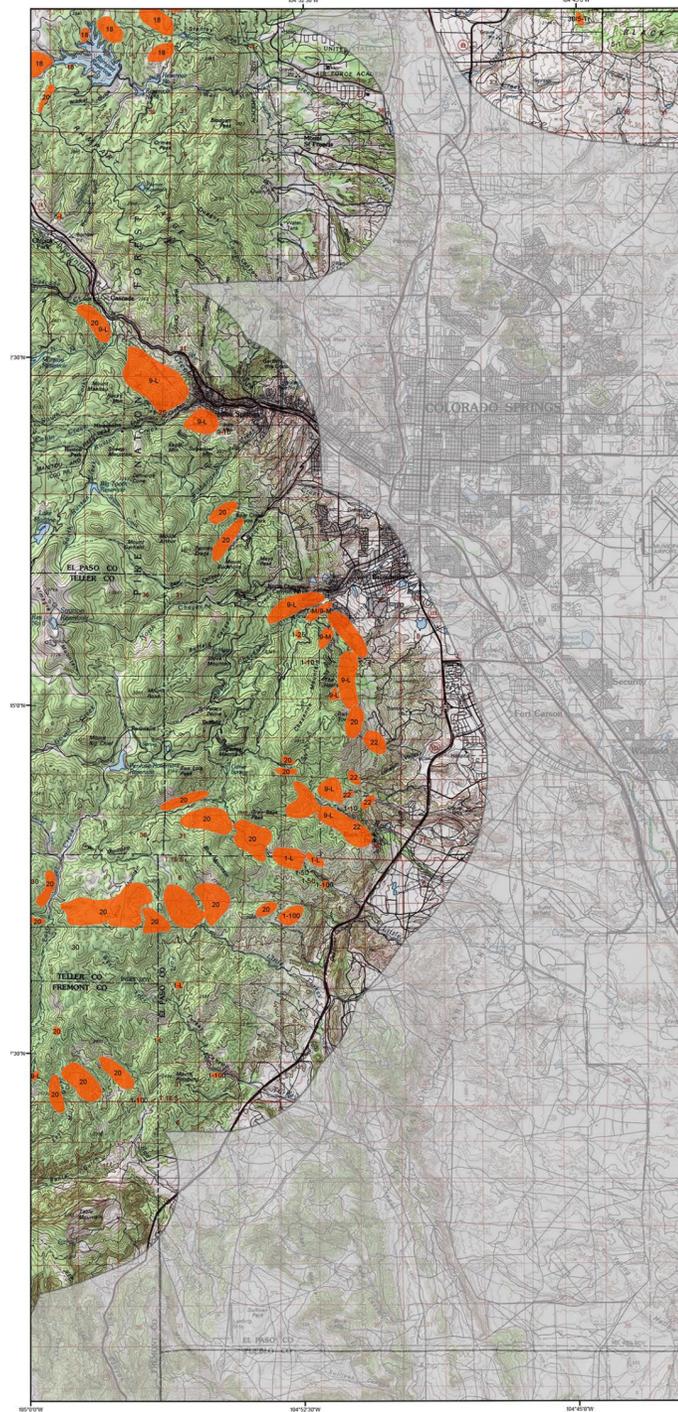
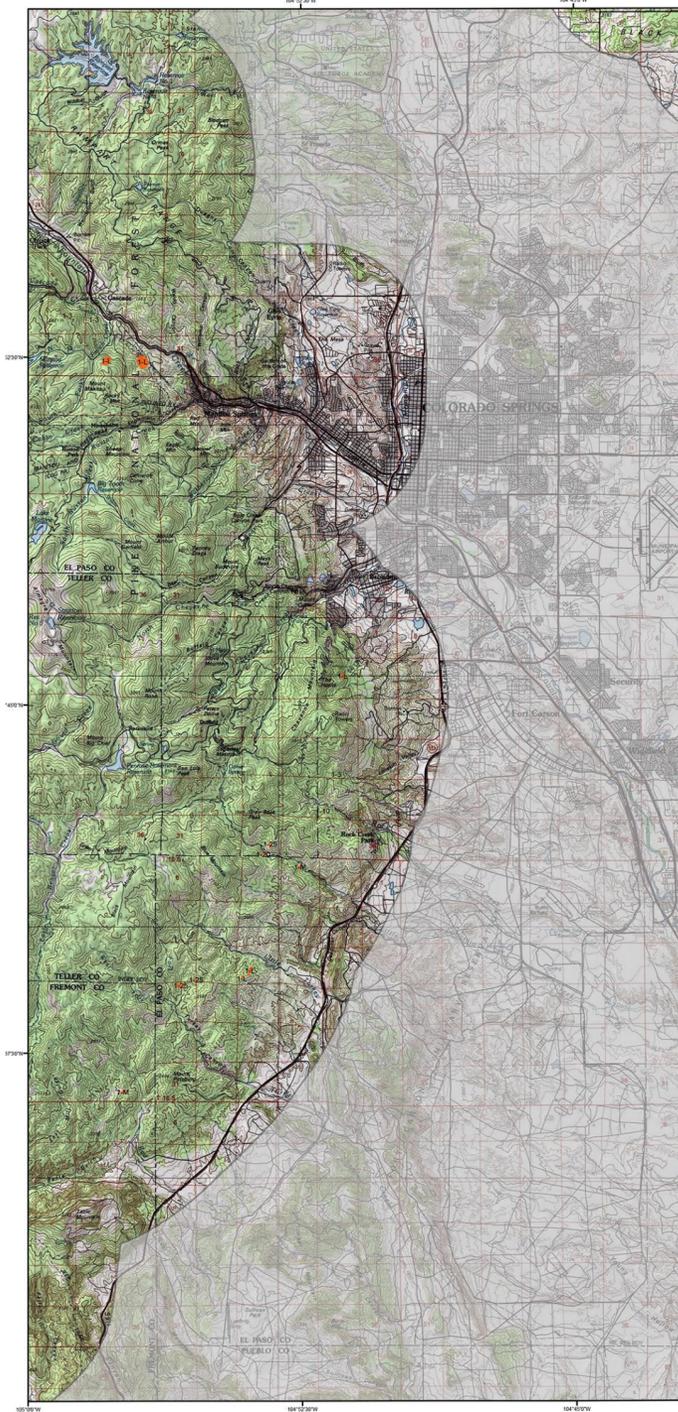
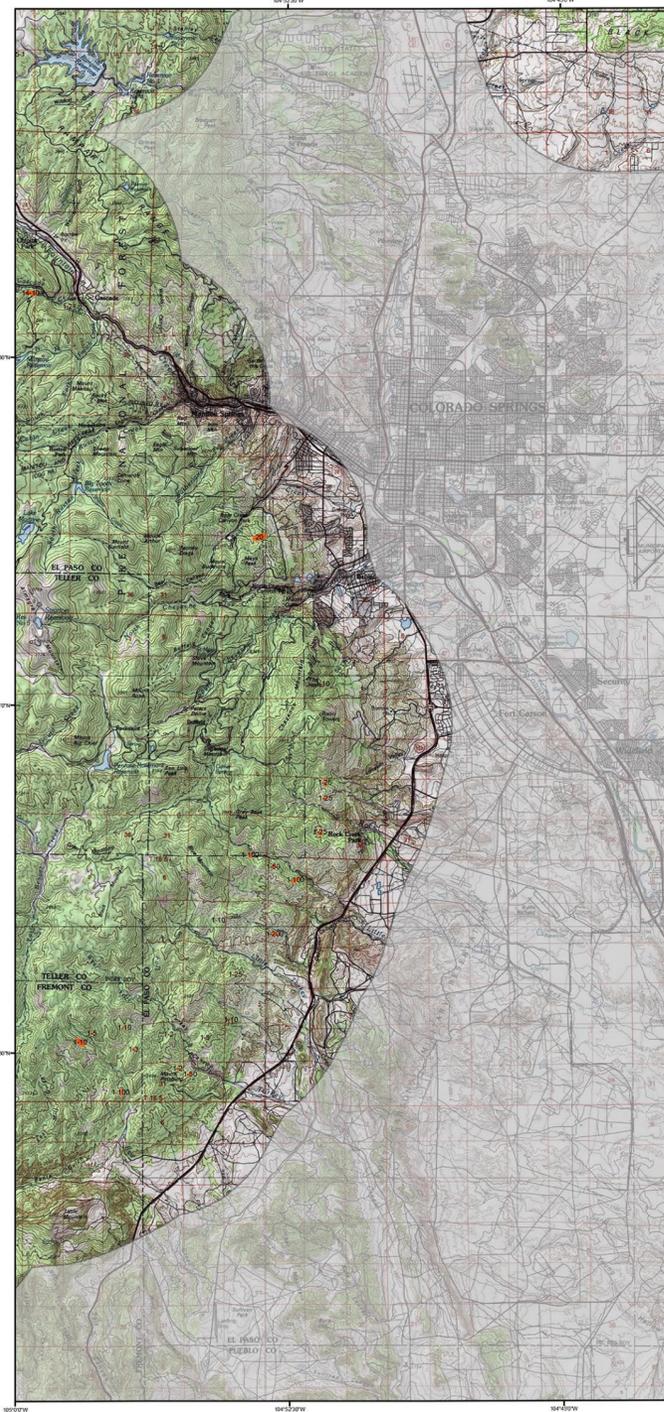


2012

2013

2014

2015

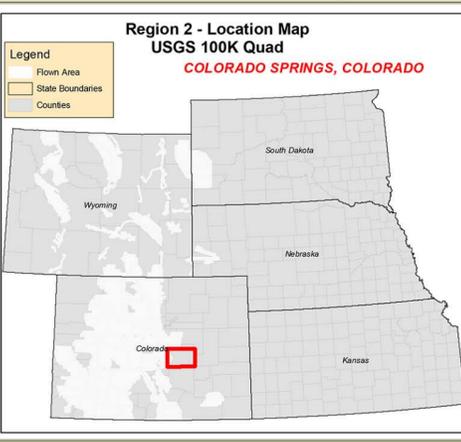


1:100,000

**Legend**

Use of the Number System  
 Example: S-1 = The first number before the dash is the causal agent code. The letter after the dash is the estimate of dead "faded" trees in the polygon or point as a percentage of the total trees within the delineated area. An intensity code of Light, M-moderate, S-severe, and VS - very severe may be used after the causal agent code.  
 Light: 1-10%, M-moderate: 11-20%, S-severe: 20-50%, VS - very severe: >50%. Value ranges represent the percent of current "faded" in relation to the total forested area within the polygon. Periodically, whole numbers of trees can be used as an intensity code for small groups of trees. For example: 5-10 = The first number before the dash is the causal agent code, the number after the dash is an estimation of the number of dead "faded" trees in the polygon.

Code	Causal Agent	Primary Host	Code	Causal Agent	Primary Host	Code	Causal Agent	Primary Host
11	Douglas beetle	Douglas-fir	46	Aspen	Lodgepole Pine	109	Ice cream fungus	Cottonwood/Poplar
2	Englemann spruce beetle	Englemann Spruce	48	Stachytarax rust	Lodgepole Pine	107	fall webworm	Cottonwood/Poplar
3	Blue spruce bark beetle	Blue Spruce	50	White pine blister rust	Sierradene Pine	108	road kill	Softwoods
4	Mountain pine beetle	Ponderosa Pine	51	Dwarf mistletoe	Softwoods	109	pine-weevil nematode	Sierradene Pine
5	Mountain pine beetle	Lodgepole Pine	52	Elysioides	Proctorus Pine	110	oak wilt	Oak
6	Mountain pine beetle	Sierradene Pine	53	Inclusus 66, 68 & 69	All Tree Species	111	foliar disease	All Tree Species
7	Western pine beetle	Ponderosa Pine	54	Air pollutants	All Tree Species	112	spine us	White Spruce
8	Fire Enginer	White Fir	55	Chemical damage	All Tree Species	113	honey chestnut borer	White Spruce
9	Douglas-fir engraver beetle	Douglas-fir	56	Lophodermium pinastri	Softwoods	114	anthracnose like solar disease	Bur Oak
10	Western balsam bark beetle	Subalpine Fir	57	Rhododendron pseudotsugae	Douglas-fir	115	Dieback	All Tree Species
11	Unidentified bark beetle	Softwoods	58	Lophodermium acicola	Softwoods	116	Mortality	All Tree Species
12	Pine engraver	Lodgepole Pine	59	Lecanotia acicola	Softwoods	117	Discoloration	All Tree Species
13	Pine engraver	Ponderosa Pine	60	Lophodermium concolor	Softwoods	118	Herbicide	All Tree Species
14	Pine engraver	Lodgepole Pine	61	Dactynotia pin	Softwoods	119	Flanging	Quaking Aspen
15	Ponderosa pine needle miner	Ponderosa Pine	62	Needle cast (Phyodermataceae)	Softwoods	120	aspen tortix	Quaking Aspen
16	Jack pine budworm	Jack Pine	63	Road kill	Softwoods	121	Mansuetio blight	Ash
17	Douglas-fir bark beetle	Douglas-fir	64	Unidentified disease	Softwoods	200	Dieback (ash)	Cottonwood/Poplar
18	Spineus barkworm, light defol.	Douglas-fir	65	Winter damage light	All Tree Species	201	Dieback (cottonwood)	Hardwoods
19	Spineus barkworm, medium defol.	Douglas-fir	66	Winter damage medium	All Tree Species	202	Dieback (hardwood)	Hardwoods
20	Spineus barkworm, heavy defol.	Douglas-fir	67	Winter damage heavy	All Tree Species	204	Dieback (oak)	Oak
21	Douglas-fir hawck moth	Douglas-fir	68	Diploia	Softwoods	210	Mortality (old cottonwood)	Cottonwood/Poplar
22	Pine butterfly	Ponderosa Pine	69	Phyton black stain	Common Phylon	211	Mortality (eastern cedar)	Eastern Red Cedar
23	Pine looper	Ponderosa Pine	70	Pine	Softwoods	212	Mortality (oak)	Oak
24	Pine tortix	Hardwoods	71	Ponaspine	All Tree Species	214	Mortality (spruce)	Spruce
25	Teft caterpillar	Hardwoods	72	Windthrow	All Tree Species	220	Discoloration (ash)	Ash
26	Leaf beetles	Hardwoods	73	High water damage	All Tree Species	221	Discoloration (sawyer)	Softwoods
27	Aspen defoliation	Hardwoods	74	Avalanche	All Tree Species	222	Discoloration (cottonwood)	Cottonwood/Poplar
28	Pine needle-shaft miner	Ponderosa Pine	75	Aspen decline (multiple agents)	Quaking Aspen	223	Discoloration (eastern cedar)	Eastern Red Cedar
29	Pine sawflies	Ponderosa Pine	76	Pineen pine mortality	Common Phylon	224	Discoloration (hardwood)	Hardwoods
30	Pine hawck moth	Ponderosa Pine	77	Juniper mortality (unknown agent(s))	Juniper	228	Discoloration (spruce)	Spruce
31	Cambium borers	Hardwoods	78	Quercus oak decline (unknown agent(s))	Chamber Oak	230	Herbicide (cottonwood)	Cottonwood/Poplar
32	Variable oak leaf caterpillar	Hardwoods	79	Liriodendron (multiple agents)	Liriodendron	231	Herbicide (eastern cedar)	Eastern Red Cedar
33	Unidentified defoliation	All Tree Species	80	Half damage	Common Phylon	240	girdling (hardwood)	Hardwoods
34	Cottonwood Decline/Mortality	Cottonwood	89	Unknown polygon	Unknown	241	Herbicide (eastern cedar)	Eastern Red Cedar
35	Herbivore damage (Pinus arvensis)	Softwoods	90	old pine mortality	Lodgepole Pine	242	Unidentified defoliation (cottonwood)	Cottonwood/Poplar
36	Unidentified defoliation	Softwoods	91	road kill tip	Softwoods	243	Unidentified defoliation (hardwood)	Hardwoods
37	Amelanchier (Amelanchier medialis)	Softwoods	92	oak wilt disease	Ponderosa Pine	282	Unidentified defoliation (hardwood)	Hardwoods
38	Cytospora	All Tree Species	93	diploia blight	Ponderosa Pine	300	Mortality (pine)	Pine
39	Western gall wasp	Unknown	95	drought killed narrow leaf cottonwood	Narrowleaf Cottonwood			
40	Comandra rust	Unknown						



**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 used 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.

**Map Created: 2/15/2013**  
**Projection: UTM NAD83 Zone 13**  
**Author: J. Ross, USDA Forest Service**

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/>

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**740 Simms St.**  
**Golden, CO 80401**

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 causal agent. Shaded areas show locations where true 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.