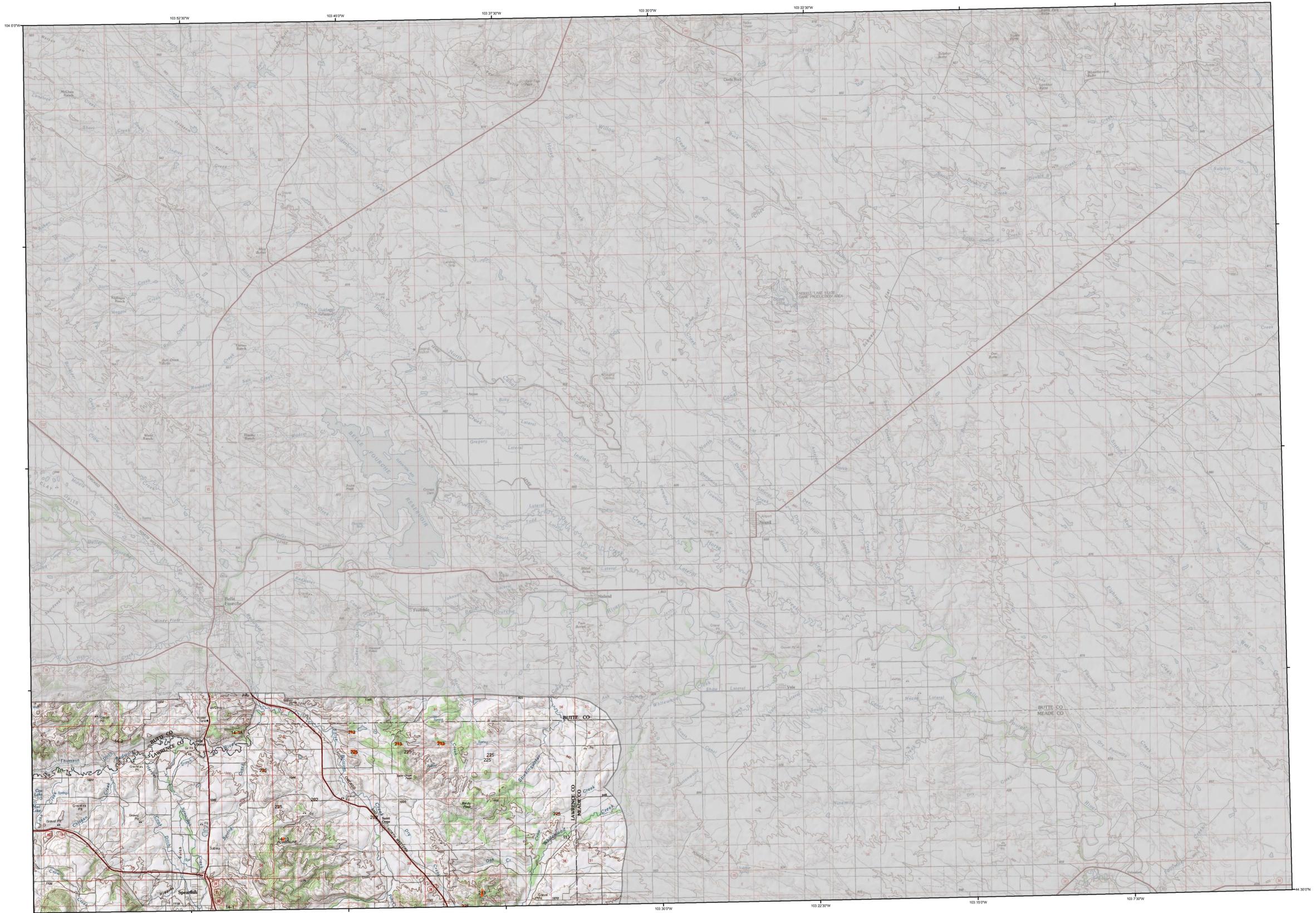
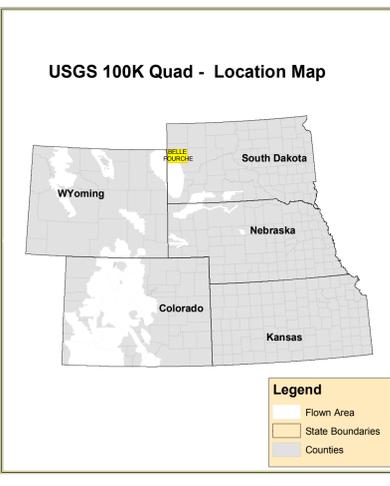


2007 Aerial Insect and Disease Survey Belle Fourche, South Dakota USGS 100K DRG: 44103-E1



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Code	Causal Agent(s)	Primary Host	Code	Causal Agent(s)	Primary Host
1	Douglas-fir beetle	Douglas-fir	105	fox squirrel trapping	Cottonwood/Poplar
2	Engelmann spruce beetle	Engelmann spruce	107	fall webworm	Cottonwood/Poplar
3	Mountain pine beetle	Ponderosa pine	108	road salt	Softwoods
4	Mountain pine beetle	Lodgepole pine	109	pinewood nematode	Scottish Pine
5	Mountain pine beetle	5-Needle Pine	110	oak wilt	Oak
6	Western pine beetle	Ponderosa pine	111	ring disease	All Tree Species
7	White fir	White fir	112	spruce ips	White Spruce
8	Douglas-fir engraver beetle	Douglas-fir	113	hearted chestnut borer	Oak
9	Western balsam bark beetle	Subalpine fir	114	anthracnose like foliar disease	Bur Oak
10	Unidentified bark beetle	Softwoods	115	Dieback	All Tree Species
11	Pine engraver	Lodgepole pine	116	Mortality	All Tree Species
12	Pine engraver	Ponderosa pine	117	Discoloration	All Tree Species
13	Ponderosa pine needle miner	Lodgepole pine	118	Hemlock	All Tree Species
14	Lodgepole pine needle miner	Lodgepole pine	119	Flagging	All Tree Species
15	Jack pine budworm	Jack pine	120	aspen tortrix	Quaking Aspen
16	Spruce budworm, light defol.	Douglas-fir	121	Marsdenia Blight	Quaking Aspen
17	Spruce budworm, medium defol.	Douglas-fir	200	Dieback (ash)	Ash
18	Spruce budworm, heavy defol.	Douglas-fir	202	Dieback (hardwood)	Hardwoods
19	Douglas-fir tussock moth	Douglas-fir	204	Dieback (oak)	Oak
20	Pine butterfly	Ponderosa pine	210	Mortality (eastern cedar)	Eastern Red Cedar
21	Pine looper	Ponderosa pine	211	Mortality (hardwood)	Hardwoods
22	Pine tortrix	Ponderosa pine	212	Mortality (oak)	Oak
23	Leaf beetles	Hardwoods	213	Mortality (spruce)	Spruce
24	Oak leaf roller	Hardwoods	220	Discoloration (ash)	Ash
25	Pine needle-sheath miner	Ponderosa pine	221	Discoloration (conifer)	Softwoods
26	Pine sawflies	Ponderosa pine	222	Discoloration (cottonwood)	Cottonwood/Poplar
27	Pine tussock moth	Ponderosa pine	223	Discoloration (eastern cedar)	Eastern Red Cedar
28	Variable oak leaf caterpillar	Hardwoods	224	Discoloration (hardwood)	Hardwoods
29	Carabid beetle	Hardwoods	225	Discoloration (oak)	Oak
30	Unidentified defoliator	Softwoods	226	Discoloration (spruce)	Spruce
31	Heterostichus annosus (Pinosus annosus)	Hardwoods	227	Discoloration (cottonwood)	Cottonwood/Poplar
32	Armillaria ostroyae (Armillaria mellea)	Hardwoods	230	Flagging (hardwood)	Hardwoods
33	Polytopus schweinitzi	Softwoods	231	Hemlock (eastern cedar)	Eastern Red Cedar
34	Phytophthora	Softwoods	240	Flagging (hardwood)	Hardwoods
35	Cytospora	All Tree Species	250	Unidentified defoliator (cottonwood)	Cottonwood/Poplar
36	Western gall rust	Softwoods	251	Unidentified defoliator (elm)	Elm
37	Comandra rust	Unknown	252	Unidentified defoliator (hardwood)	Hardwoods
38	Stactobromus rust	Lodgepole pine	300	Mortality (pine)	Pine
39	Unidentified defoliator	Softwoods			
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104	Unidentified defoliator	Softwoods			
105	Unidentified defoliator	Softwoods			



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 Bill Schaupp & Al Dymerski
Map Created: 12/12/2007
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 causal 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/>