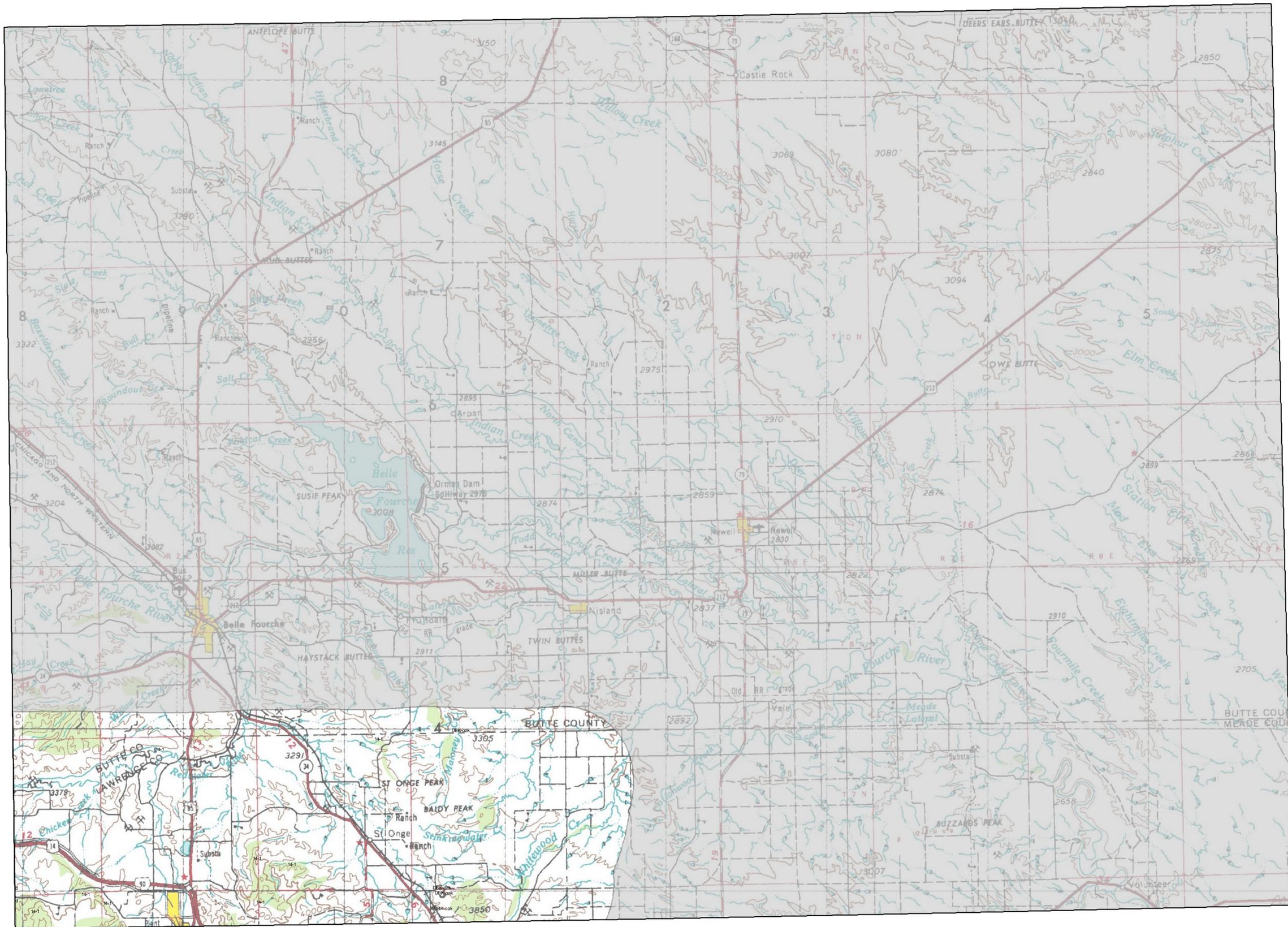


2009 Aerial Insect and Disease Survey Belle Fourche, South Dakota USGS 100K DRG: 44103-E1

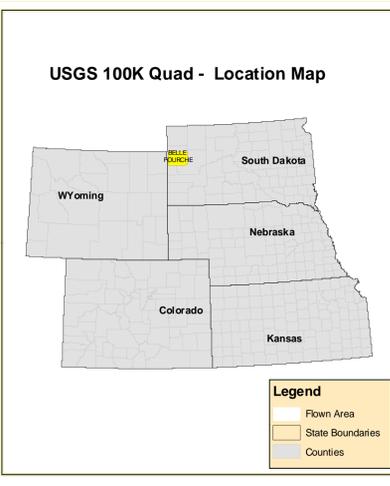


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Legend

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, Moderate, and 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, 5-1/22A = 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	Code	Causal Agent	Primary Host
1	Douglas-fir beetle	Douglas-fir	107	fall webworm	Cottonwood/Poplar
2	Engelmann spruce beetle	Engelmann Spruce	108	fox squirrel feeding	Cottonwood/Poplar
3	Mountain pine beetle	Ponderosa Pine	109	road salt	Softwoods
4	Mountain pine beetle	Lodgepole Pine	110	pine wood nematode	Scottish Pine
5	Mountain pine beetle	5-Needle Pine	111	oak wilt	Oak
6	Western pine beetle	Ponderosa Pine	112	ring-neck disease	All Tree Species
7	White fir	All Tree Species	113	spruce ips	White Spruce
8	Douglas-fir engraver beetle	Douglas-fir	114	twisted chestnut borer	Oak
9	Western balsam bark beetle	Subspline Fir	115	anthracnose like foliar disease	Bur Oak
10	Unidentified bark beetle	Softwoods	116	Dieback	All Tree Species
11	Pine engraver	Lodgepole Pine	117	Mortality	All Tree Species
12	Pine engraver	Ponderosa Pine	118	Discoloration	All Tree Species
13	Ponderosa pine needle miner	Lodgepole Pine	119	Herbicide	All Tree Species
14	Ponderosa pine needle miner	Ponderosa Pine	120	aspen tortrix	Quaking Aspen
15	Jack pine budworm	Jack Pine	121	Mesquona Blight	Quaking Aspen
16	Spruce budworm, light defol.	Douglas-fir	200	Dieback (ash)	Ash
17	Spruce budworm, medium defol.	Douglas-fir	201	Dieback (cottonwood)	Cottonwood/Poplar
18	Spruce budworm, heavy defol.	Douglas-fir	202	Dieback (hardwood)	Hardwoods
19	Douglas-fir tussock moth	Douglas-fir	203	Dieback (oak)	Oak
20	Pine looper	Ponderosa Pine	204	Mortality (cottonwood)	Cottonwood/Poplar
21	Pine tortrix	Ponderosa Pine	205	Mortality (eastern cedar)	Eastern Red Cedar
22	Tent caterpillars	Hardwoods	206	Mortality (hardwood)	Hardwoods
23	Leaf beetles	Hardwoods	207	Mortality (oak)	Oak
24	Oak leaf roller	Hardwoods	208	Mortality (spruce)	Spruce
25	Pine needle-sheath miner	Ponderosa Pine	209	Discoloration (ash)	Ash
26	Pine sawflies	Ponderosa Pine	210	Discoloration (conifer)	Softwoods
27	Pine tussock moth	Ponderosa Pine	211	Discoloration (cottonwood)	Cottonwood/Poplar
28	Variable oak leaf caterpillar	Hardwoods	212	Discoloration (eastern cedar)	Eastern Red Cedar
29	Carpenorhynchus	Hardwoods	213	Mortality (hardwood)	Hardwoods
30	Unidentified defoliator	Softwoods	214	Mortality (spruce)	Spruce
31	Heterostichus annosus (Pines annosus)	Softwoods	215	Discoloration (oak)	Oak
32	Armillaria ostoyae (Armillaria mellea)	Softwoods	216	Discoloration (spruce)	Spruce
33	Unidentified defoliator	Softwoods	217	Herbicide (eastern cedar)	Eastern Red Cedar
34	Polyporus schweinitzi	Softwoods	218	Discoloration (hardwood)	Hardwoods
35	Leptomyces	Softwoods	219	Herbicide (western cedar)	Western Red Cedar
36	Cytospora	All Tree Species	220	Unidentified defoliator (cottonwood)	Cottonwood/Poplar
37	Western gall rust	Unknown	221	Unidentified defoliator (spruce)	Spruce
38	Concordia rust	Spruce, White Spruce	222	Unidentified defoliator (hardwood)	Hardwoods
39	Stachytaraxia rust	Lodgepole Pine	223	Mortality (pine)	Pine
40	White pine blister rust	5-Needle Pine			
41	Elm Yellows	Softwoods			
42	Elm Yellows	Ponderosa Pine			
43	Elm Yellows	5-Needle Pine			
44	Elm Yellows	All Tree Species			
45	Elm Yellows	Softwoods			
46	Elm Yellows	Hardwoods			
47	Elm Yellows	Unknown			
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102	Elm Yellows	Unknown			
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104	Elm Yellows	Unknown			
105	Elm Yellows	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 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.

Map Created December 1 2009
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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*****DISCLAIMER*****

Forest Health Protection (FHP) and its partners strive to maintain an accurate Aerial Detection Survey (ADS) Dataset, but due to the conditions under which the data are collected, FHP and its partners shall not be held responsible for missing or inaccurate data. ADS are not intended to replace more specific information. An accuracy assessment has not been done for this dataset; however, ground checks are completed in accordance with local and national guidelines <http://www.fs.fed.us/foresthealth/aviation/qualityassurance.shtml>. Maps and data may be updated without notice. Please cite "USDA Forest Service, Forest Health Protection and its partners" as the source of this data in maps and publications.

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.