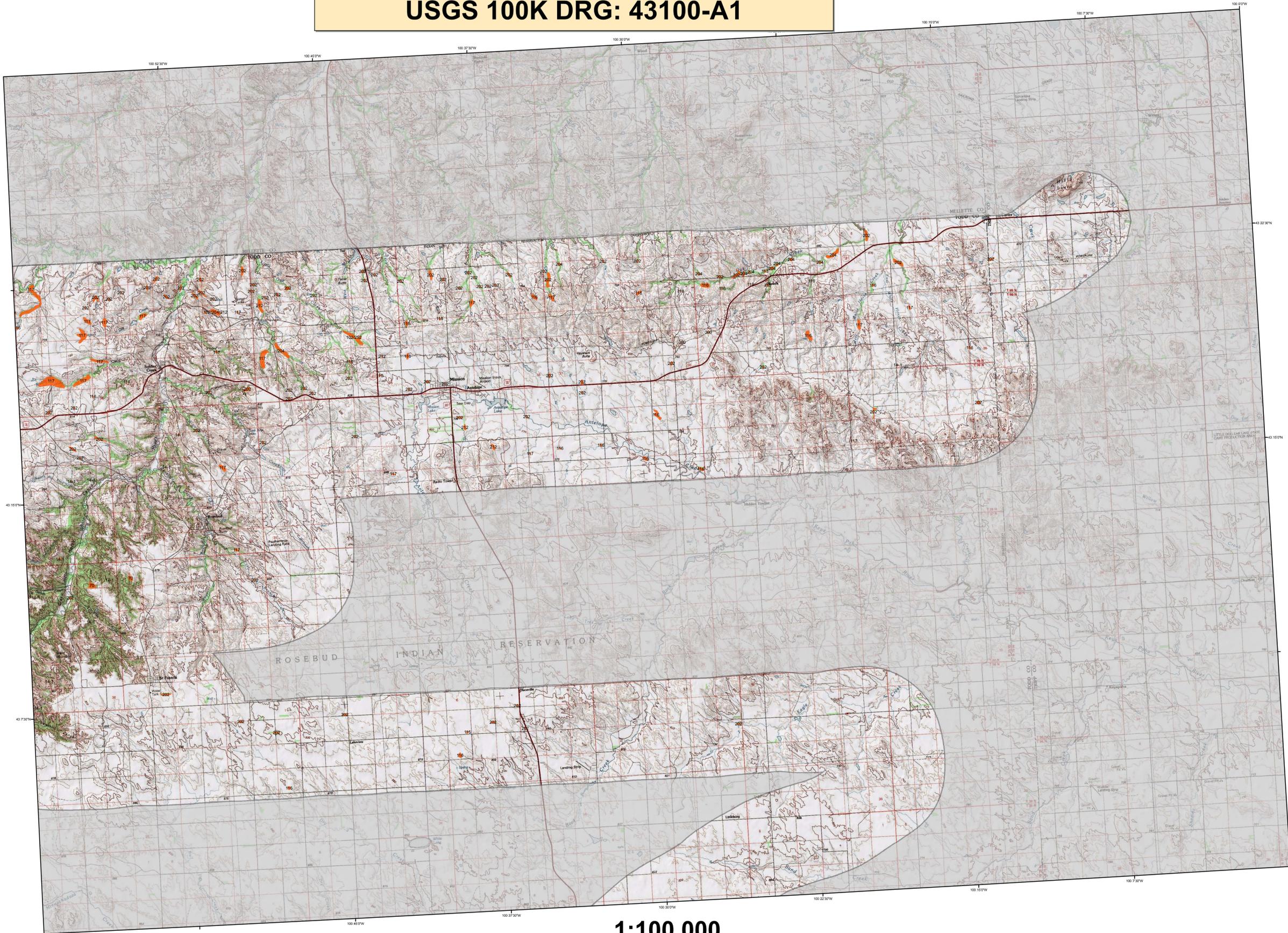


2006 Aerial Insect and Disease Survey Mission, South Dakota USGS 100K DRG: 43100-A1



1:100,000

Code	Causal Agent(s)	Primary Host	Code	Causal Agent(s)	Primary Host	Code	Causal Agent(s)	Primary Host
1	Douglas-fir beetle	Douglas-fir	40	Anthracnose	Lodgepole Pine	100	Ice storm flagging	Cottwood/Poplar
2	Engelmann Spruce Beetle	Engelmann Spruce	41	White pine blister rust	5-Needle Pine	107	fall sawworm	Cottwood/Poplar
3	Mountain pine beetle	Ponderosa Pine	42	Dwarf mistletoe	Softwoods	108	road salt	Softwoods
4	Mountain pine beetle	Lodgepole Pine	43	European spruce sawfly	Ponderosa Pine	109	pine wood nematode	Scots Pine
5	Mountain pine beetle	5-Needle Pine	44	Inclusus #55, 55 & 55	All Tree Species	110	oak wilt	Oak
6	Western pine beetle	Ponderosa Pine	45	Air pollution	All Tree Species	111	foliage disease	All Tree Species
7	Fire Engraver	White Fir	46	Chemical damage	All Tree Species	112	spruce ips	White Spruce
8	Douglas-fir engraver beetle	Douglas-fir	47	Lophodermium pinastri	Softwoods	113	woolly chestnut borer	Oak
9	Western bark beetle	Subsopine Fir	48	Rhabdocline pseudotsugae	Douglas-fir	114	anthracnose like foliar disease	Bur Oak
10	Unidentified bark beetle	Softwoods	49	Lophodermium arcutum	Softwoods	115	Diaback	All Tree Species
11	Pine engraver	Lodgepole Pine	50	Leucostoma acicola	Softwoods	116	Mortality	All Tree Species
12	Pine engraver	Ponderosa Pine	51	Lophodermium concolor	Softwoods	117	Discoloration	All Tree Species
13	Pine engraver	Lodgepole Pine	52	Dichostoma sp.	Softwoods	118	Herbicide	All Tree Species
14	Pine engraver	Ponderosa Pine	53	Needle cast (Hypodermatoceae)	Softwoods	119	Flagging	All Tree Species
15	Ponderosa pine needle miner	Lodgepole Pine	54	Root Rot	All Tree Species	120	aspen tortrix	Quaking Aspen
16	Lodgepole pine needle miner	Ponderosa Pine	55	Undersized disease	Softwoods	121	Marsippos Blight	Quaking Aspen
17	Jack pine budworm	Jack Pine	56	Winter damage light	All Tree Species	200	Diaback (ash)	Ash
18	Spruce budworm, light defol.	Douglas-fir	57	Winter damage medium	All Tree Species	201	Diaback (cottonwood)	Cottonwood/Poplar
19	Spruce budworm, medium defol.	Douglas-fir	58	Winter damage heavy	All Tree Species	202	Diaback (hardwood)	Hardwoods
20	Spruce budworm, heavy defol.	Douglas-fir	59	Winter damage very heavy	All Tree Species	204	Diaback (oak)	Oak
21	Douglas-fir tussock moth	Douglas-fir	60	Diaback	All Tree Species	210	Mortality (red cottonwood)	Cottonwood/Poplar
22	Pine Butterfly	Ponderosa Pine	61	Diaback (cedar)	All Tree Species	211	Mortality (eastern cedar)	Eastern Red Cedar
23	Pine looper	Ponderosa Pine	62	Diaback (spruce)	All Tree Species	212	Mortality (spruce)	Spruce
24	Pine tortrix	Ponderosa Pine	63	Diaback (oak)	All Tree Species	213	Mortality (oak)	Oak
25	Tent caterpillars	Hardwoods	64	Diaback (cedar)	All Tree Species	214	Mortality (cedar)	Cedar
26	Leaf beetles	Hardwoods	65	Diaback (oak)	All Tree Species	215	Mortality (oak)	Oak
27	Oak leaf roller	Hardwoods	66	Diaback (cedar)	All Tree Species	216	Mortality (cedar)	Cedar
28	Pine needle-sheath miner	Ponderosa Pine	67	Diaback (oak)	All Tree Species	217	Mortality (oak)	Oak
29	Pine sawflies	Ponderosa Pine	68	Diaback (cedar)	All Tree Species	218	Mortality (cedar)	Cedar
30	Pine tussock moth	Ponderosa Pine	69	Diaback (oak)	All Tree Species	219	Mortality (oak)	Oak
31	Cankerworms	Hardwoods	70	Diaback (cedar)	All Tree Species	220	Discoloration (spruce)	Softwoods
32	Variable oak leaf caterpillar	Hardwoods	71	Diaback (oak)	All Tree Species	221	Discoloration (cottonwood)	Cottonwood/Poplar
33	Unidentified defoliator	All Tree Species	72	Diaback (cedar)	All Tree Species	222	Discoloration (eastern cedar)	Eastern Red Cedar
34	Heterobasidium annosum (Pines annosus)	Softwoods	73	Diaback (oak)	All Tree Species	223	Discoloration (oak)	Oak
35	Armillaria ostroyae (Armillaria mellea)	Softwoods	74	Diaback (cedar)	All Tree Species	224	Discoloration (cedar)	Cedar
36	Polygonus softweaver	Softwoods	75	Diaback (oak)	All Tree Species	225	Discoloration (oak)	Oak
37	Phymastis	Softwoods	76	Diaback (cedar)	All Tree Species	226	Discoloration (cedar)	Cedar
38	Cytospora	All Tree Species	77	Diaback (oak)	All Tree Species	227	Discoloration (oak)	Oak
39	Western gall rust	Unknown	78	Diaback (cedar)	All Tree Species	228	Discoloration (cedar)	Cedar
40	Concordia rust	Unknown	79	Diaback (oak)	All Tree Species	229	Discoloration (oak)	Oak
41	Stachyform rust	Lodgepole Pine	80	Diaback (cedar)	All Tree Species	230	Discoloration (cedar)	Cedar
42			81	Diaback (oak)	All Tree Species	231	Discoloration (oak)	Oak
43			82	Diaback (cedar)	All Tree Species	232	Discoloration (cedar)	Cedar
44			83	Diaback (oak)	All Tree Species	233	Discoloration (oak)	Oak
45			84	Diaback (cedar)	All Tree Species	234	Discoloration (cedar)	Cedar
46			85	Diaback (oak)	All Tree Species	235	Discoloration (oak)	Oak
47			86	Diaback (cedar)	All Tree Species	236	Discoloration (cedar)	Cedar
48			87	Diaback (oak)	All Tree Species	237	Discoloration (oak)	Oak
			88	Diaback (cedar)	All Tree Species	238	Discoloration (cedar)	Cedar
			89	Diaback (oak)	All Tree Species	239	Discoloration (oak)	Oak
			90	Diaback (cedar)	All Tree Species	240	Discoloration (cedar)	Cedar
			91	Diaback (oak)	All Tree Species	241	Discoloration (oak)	Oak
			92	Diaback (cedar)	All Tree Species	242	Discoloration (cedar)	Cedar
			93	Diaback (oak)	All Tree Species	243	Discoloration (oak)	Oak
			94	Diaback (cedar)	All Tree Species	244	Discoloration (cedar)	Cedar
			95	Diaback (oak)	All Tree Species	245	Discoloration (oak)	Oak
			96	Diaback (cedar)	All Tree Species	246	Discoloration (cedar)	Cedar
			97	Diaback (oak)	All Tree Species	247	Discoloration (oak)	Oak
			98	Diaback (cedar)	All Tree Species	248	Discoloration (cedar)	Cedar
			99	Diaback (oak)	All Tree Species	249	Discoloration (oak)	Oak
			100	Diaback (cedar)	All Tree Species	250	Discoloration (cedar)	Cedar
			101	Diaback (oak)	All Tree Species	251	Discoloration (oak)	Oak
			102	Diaback (cedar)	All Tree Species	252	Discoloration (cedar)	Cedar
			103	Diaback (oak)	All Tree Species	253	Discoloration (oak)	Oak
			104	Diaback (cedar)	All Tree Species	254	Discoloration (cedar)	Cedar
			105	Diaback (oak)	All Tree Species	255	Discoloration (oak)	Oak
			106	Diaback (cedar)	All Tree Species	256	Discoloration (cedar)	Cedar
			107	Diaback (oak)	All Tree Species	257	Discoloration (oak)	Oak
			108	Diaback (cedar)	All Tree Species	258	Discoloration (cedar)	Cedar
			109	Diaback (oak)	All Tree Species	259	Discoloration (oak)	Oak
			110	Diaback (cedar)	All Tree Species	260	Discoloration (cedar)	Cedar
			111	Diaback (oak)	All Tree Species	261	Discoloration (oak)	Oak
			112	Diaback (cedar)	All Tree Species	262	Discoloration (cedar)	Cedar
			113	Diaback (oak)	All Tree Species	263	Discoloration (oak)	Oak
			114	Diaback (cedar)	All Tree Species	264	Discoloration (cedar)	Cedar
			115	Diaback (oak)	All Tree Species	265	Discoloration (oak)	Oak
			116	Diaback (cedar)	All Tree Species	266	Discoloration (cedar)	Cedar
			117	Diaback (oak)	All Tree Species	267	Discoloration (oak)	Oak
			118	Diaback (cedar)	All Tree Species	268	Discoloration (cedar)	Cedar
			119	Diaback (oak)	All Tree Species	269	Discoloration (oak)	Oak
			120	Diaback (cedar)	All Tree Species	270	Discoloration (cedar)	Cedar
			121	Diaback (oak)	All Tree Species	271	Discoloration (oak)	Oak
			122	Diaback (cedar)	All Tree Species	272	Discoloration (cedar)	Cedar
			123	Diaback (oak)	All Tree Species	273	Discoloration (oak)	Oak
			124	Diaback (cedar)	All Tree Species	274	Discoloration (cedar)	Cedar
			125	Diaback (oak)	All Tree Species	275	Discoloration (oak)	Oak
			126	Diaback (cedar)	All Tree Species	276	Discoloration (cedar)	Cedar
			127	Diaback (oak)	All Tree Species	277	Discoloration (oak)	Oak
			128	Diaback (cedar)	All Tree Species	278	Discoloration (cedar)	Cedar
			129	Diaback (oak)	All Tree Species	279	Discoloration (oak)	Oak
			130	Diaback (cedar)	All Tree Species	280	Discoloration (cedar)	Cedar



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 Schupp & Al Dymerski 07/12/2006
Map Created: 01/17/2007
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/>