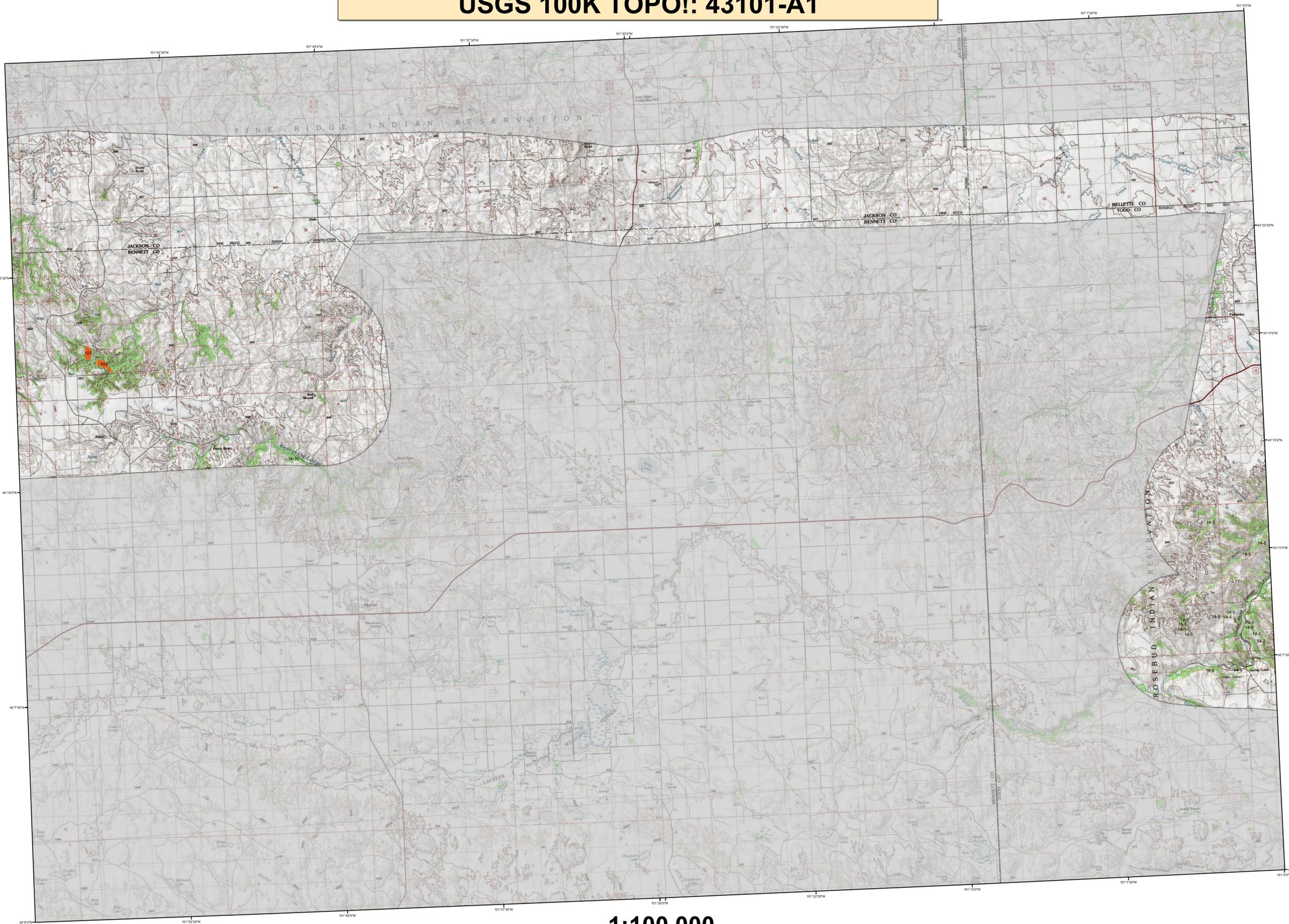
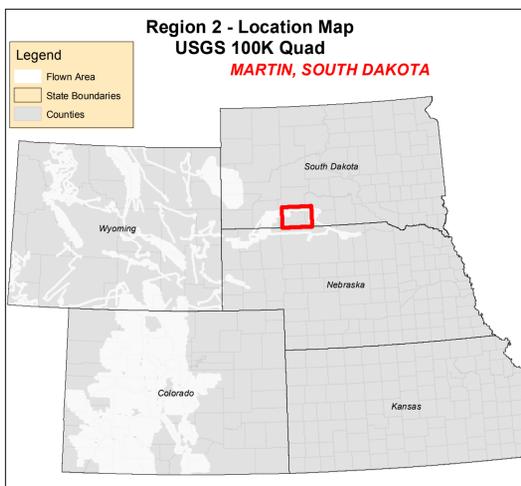


# 2014 Aerial Insect and Disease Survey MARTIN, SOUTH DAKOTA USGS 100K TOPO!: 43101-A1



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	39	Phytophthora	Lodgepole Pine	106	Tree squirrel girdling	Cottonwood Poplar
2	Engelmann spruce beetle	Engelmann spruce	48	Stalactiform rust	Lodgepole Pine	107	fall webworm	Cottonwood Poplar
3	Blue spruce ips	Blue spruce	50	White pine blister rust	5-Needle Pine	108	moist soil	Softwoods
4	Mountain pine beetle	Ponderosa Pine	51	Dwarf mistletoe	Softwoods	109	pinewood nematode	Scotch Pine
5	Mountain pine beetle	Lodgepole Pine	52	Elytomyces	Ponderosa Pine	110	oak wilt	Oak
6	Mountain pine beetle	5-Needle Pine	53	Arctosia 86, 86 & 88	All Tree Species	111	foliage disease	All Tree Species
7	Mountain pine beetle	Ponderosa Pine	54	Air pollutants	All Tree Species	112	spruce ips	White Spruce
8	Western pine beetle	White fir	55	Chemical damage	All Tree Species	113	basalrot chestnut borer	Oak
9	Fir engraver	Douglas fir	56	Lophodermium prasinii	Softwoods	114	anthracnose like foliar disease	Bur Oak
10	Douglas fir engraver beetle	Subalpine fir	57	Rhabdocline pseudotsugae	Douglas fir	115	Dieback	All Tree Species
11	Western balsam bark beetle	Softwoods	58	Lophodermium arcauata	Softwoods	116	Mortality	All Tree Species
12	Unidentified bark beetle	Lodgepole Pine	59	Lecanosticella 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	Dofthstromia pini	Softwoods	119	Flagging	All Tree Species
15	Ponderosa pine needle miner	Ponderosa Pine	62	Needle cast (Hypodermataceae)	Softwoods	120	aspen tortrix	Quaking Aspen
16	Lodgepole pine needle miner	Jack pine	63	Root Rot	All Tree Species	121	Marsdenia Blight	Quaking Aspen
17	Jack pine budworm	Douglas fir	64	Unidentified disease	Softwoods	200	Dieback (ash)	Ash
18	Spruce budworm, light defol.	Douglas fir	65	Winter damage light	All Tree Species	201	Dieback (cottonwood)	Cottonwood Poplar
19	Spruce budworm, medium defol.	Douglas fir	66	Winter damage medium	All Tree Species	202	Dieback (hardwood)	Hardwoods
20	Spruce budworm, heavy defol.	Douglas fir	67	Winter damage heavy	All Tree Species	204	Dieback (oak)	Oak
21	Douglas fir tussock moth	Ponderosa Pine	68	Dipodia	Softwoods	210	Mortality (oak cottonwood)	Cottonwood Poplar
22	Pine butterfly	Ponderosa Pine	69	Prion black stain	Common Prinson	211	Mortality (eastern cedar)	Eastern Red Cedar
23	Pine looper	Ponderosa Pine	70	Fire	All Tree Species	212	Mortality (hardwood)	Hardwoods
24	Pine tortrix	Hardwoods	71	Periphrone	Softwoods	213	Mortality (spruce)	Spruce
25	Text caterpillars	Hardwoods	72	Windthrow	All Tree Species	214	Mortality (spruce)	Ash
26	Leaf beetles	Hardwoods	73	High water damage	All Tree Species	215	Discoloration (oak)	Oak
27	Leaf beetles	Hardwoods	74	Avalanche	All Tree Species	221	Discoloration (cottonwood)	Softwoods
28	Aspen defoliation	Hardwoods	75	Aspen decline-multiple agents)	Quaking Aspen	222	Discoloration (cottonwood)	Cottonwood Poplar
29	Oak leaf roller	Ponderosa Pine	76	Prion pine mortality	Common Prinson	223	Discoloration (eastern cedar)	Eastern Red Cedar
30	Pine sawflies	Ponderosa Pine	77	Juniper mortality-unknown agent(s)	Juniper	224	Discoloration (hardwood)	Hardwoods
31	Pine tussock moth	Hardwoods	78	Gambel oak decline-unknown agent(s)	Gambel Oak	225	Discoloration (oak)	Oak
32	Cankers/dieback	Hardwoods	79	Limber pine decline-multiple agent(s)	Limber Pine	226	Discoloration (spruce)	Spruce
33	Variable oak leaf caterpillar	Hardwoods	80	Hail damage	All Tree Species	230	Herbicide (cottonwood)	Cottonwood Poplar
34	Unidentified defoliator	All Tree Species	81	Unknown polygon	Unknown	231	Herbicide (eastern cedar)	Eastern Red Cedar
35	Cottonwood Decline/Mortality	Softwoods	82	Unknown polygon	Unknown	240	Flagging (hardwood)	Hardwoods
36	Heterobasidion annosum (Fomes annosus)	Softwoods	83	Unknown polygon	Unknown	241	Mortality (hardwood)	Hardwoods
37	Amelanchier (Amelanchier alnifolia)	Softwoods	84	Unknown polygon	Unknown	250	Unidentified defoliator (cottonwood)	Cottonwood Poplar
38	Phomopsis	Softwoods	85	Unknown polygon	Unknown	251	Unidentified defoliator (elm)	Elm
39	Cytospora	All Tree Species	86	Unknown polygon	Unknown	252	Unidentified defoliator (hardwood)	Hardwoods
40	Western gall rust	Unknown	87	Unknown polygon	Unknown	300	Mortality (spruce)	Pine
41	Comandra rust	Unknown	88	Unknown polygon	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: 2/10/2015**  
**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/>

**DIRECT ALL INQUIRIES TO:**

**Resource Conservation and Forestry Division**  
 3305 1/2 West South Street  
 Rapid City, SD 57702 - 8160

**USDA Forest Service, Region 2**  
 State and Private Forestry  
 Forest Health Protection  
 740 Simms St.  
 Golden, CO 80401

\*\*\*\*\*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/ads/quality/resource.html>). 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.