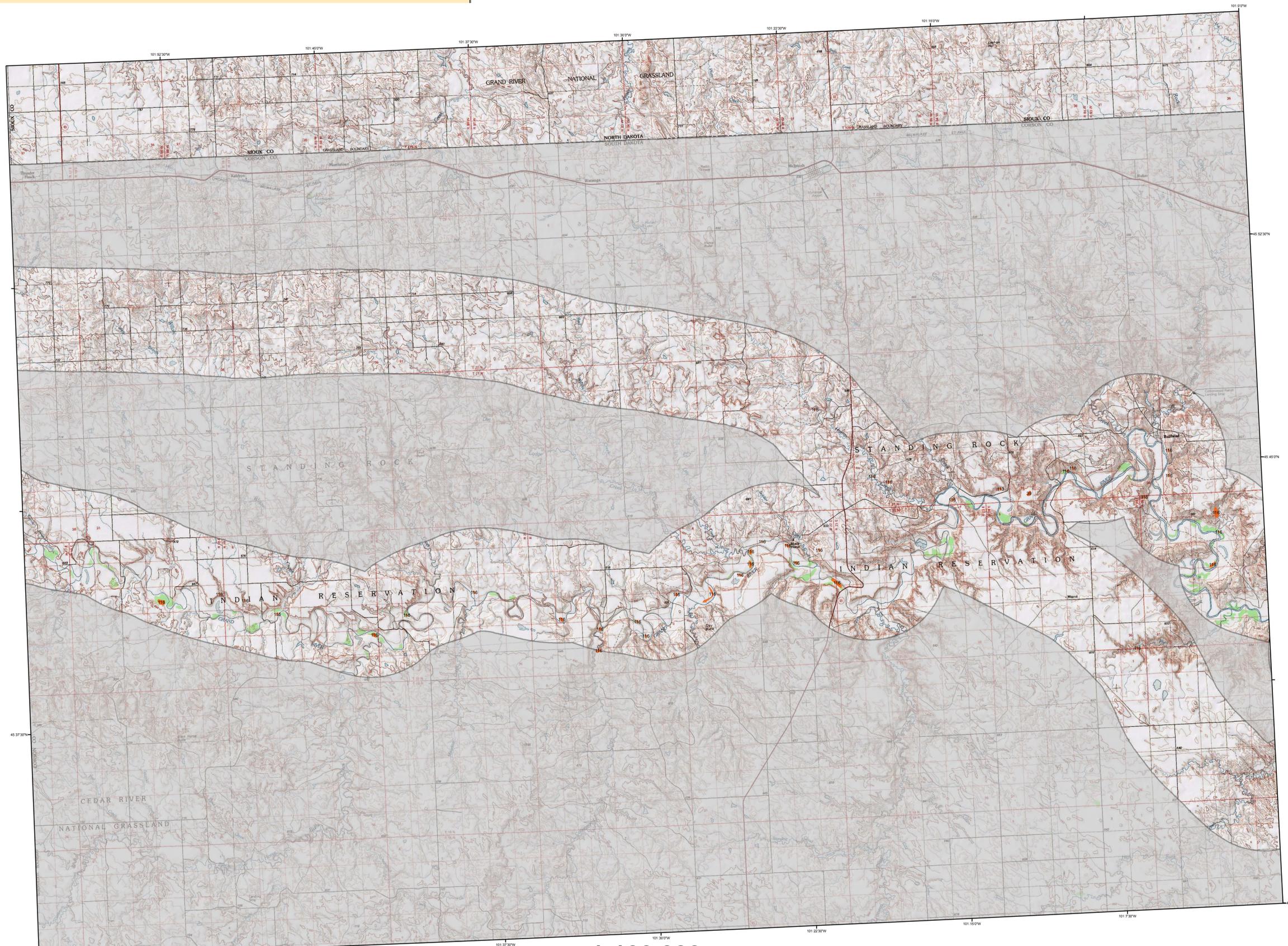
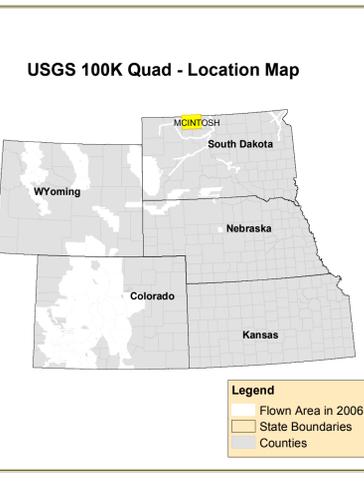


# 2006 Aerial Insect and Disease Survey McIntosh, South Dakota



1:100,000

Code	Causal Agent(s)	Primary Host	Code	Causal Agent(s)	Primary Host
1	Douglas-fir beetle	Douglas-fir	100	fox squirrel flagging	Cottonwood/Poplar
2	Engelmann spruce beetle	Engelmann Spruce	107	fall webworm	Cottonwood/Poplar
3	Mountain pine beetle	Ponderosa Pine	108	oak leaf	Softwoods
4	Mountain pine beetle	Lodgepole Pine	109	pinewood nematode	Scotch Pine
5	5-needle pine	5-Needle Pine	110	oak wilt	Oak
6	Western pine beetle	Ponderosa Pine	111	foliage disease	All Tree Species
7	9 Fir engraver	White Fir	112	spruce iris	White Spruce
8	Douglas-fir engraver beetle	Douglas-fir	113	bedford chestnut borer	Oak
9	Western balsam bark beetle	Subsopine Fir	114	anthracnose like foliar disease	Bur Oak
10	Unidentified bark beetle	Softwoods	115	Dieback	All Tree Species
11	Lodgepole pine needle miner	Lodgepole Pine	116	Mortality	All Tree Species
12	Jack pine budworm	Jack Pine	117	Discoloration	All Tree Species
13	Pine engraver	Ponderosa Pine	118	Heterodera	All Tree Species
14	Pondosa 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	Marssonina Blight	Quaking Aspen
17	Spruce budworm, heavy defol.	Douglas-fir	122	Dieback (ash)	Ash
18	Douglas-fir tussock moth	Douglas-fir	200	Dieback (cottonwood)	Hardwoods
19	Pine butterfly	Ponderosa Pine	201	Mortality (hardwood)	Oak
20	Pine looper	Ponderosa Pine	210	Mortality (old cottonwood)	Cottonwood/Poplar
21	Tent caterpillars	Hardwoods	211	Mortality (eastern cedar)	Eastern Red Cedar
22	Leaf beetles	Hardwoods	212	Mortality (hardwood)	Hardwoods
23	Oak leaf roller	Ponderosa Pine	213	Mortality (oak)	Oak
24	Pine needle-sheath miner	Ponderosa Pine	214	Mortality (spruce)	Spruce
25	Pine sawflies	Ponderosa Pine	220	Discoloration (ash)	Ash
26	Pine tussock moth	Ponderosa Pine	221	Discoloration (spruce)	Softwoods
27	Carabid weevils	Hardwoods	222	Discoloration (cottonwood)	Cottonwood/Poplar
28	Variable oak leaf caterpillar	Hardwoods	223	Discoloration (eastern cedar)	Eastern Red Cedar
29	Unidentified defoliator	All Tree Species	224	Discoloration (hardwood)	Hardwoods
30	Heterodactylon anomum (Fomes anomus)	Softwoods	225	Discoloration (oak)	Oak
31	Armillaria ostoyae (Armillaria mellea)	Softwoods	230	Heterodera (cottonwood)	Cottonwood/Poplar
32	Polygonus sallowi	Softwoods	231	Heterodera (eastern cedar)	Eastern Red Cedar
33	Chrysopa	All Tree Species	240	Flagging (hardwood)	Hardwoods
34	Western gall rust	Unknown	250	Unidentified defoliator (cottonwood)	Cottonwood/Poplar
35	Commandra rust	Unknown	251	Unidentified defoliator (oak)	Hardwoods
36	Stemflow rust	Lodgepole Pine	252	Unidentified defoliator (hardwood)	Hardwoods
37			300	Mortality (pine)	Pine



**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 AI Dymerski 07/10/2006**  
**Map Created: 01/19/2007**  
**Projection: UTM NAD83 Zone 13**  
**Author: J. Ross, USDA Forest Service**

**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**  
**Renewable Resources**  
**Forest Health Management**  
**PO Box 25127**  
**Lakewood, Colorado 80225**

\*\*\*\*\*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/>