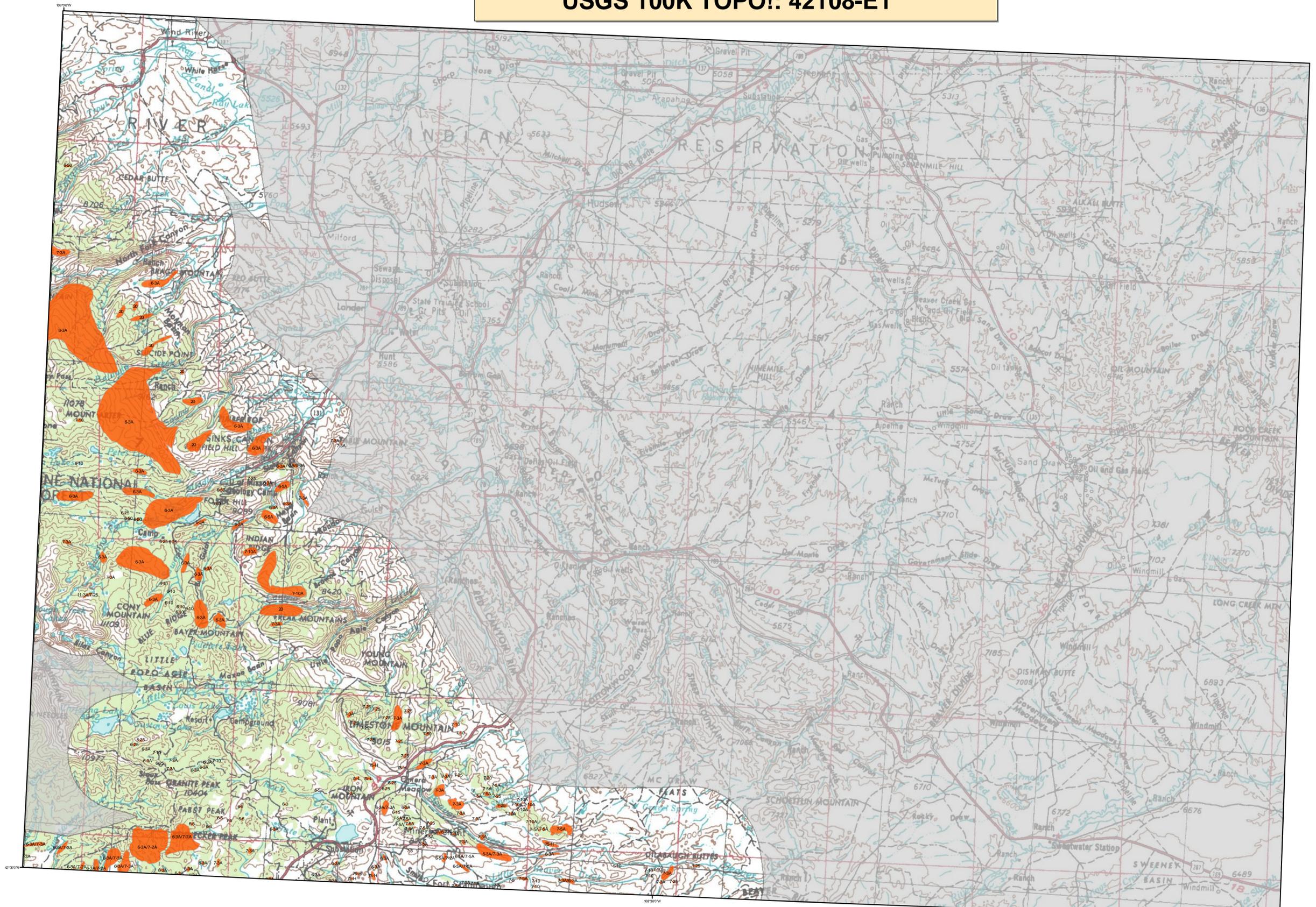
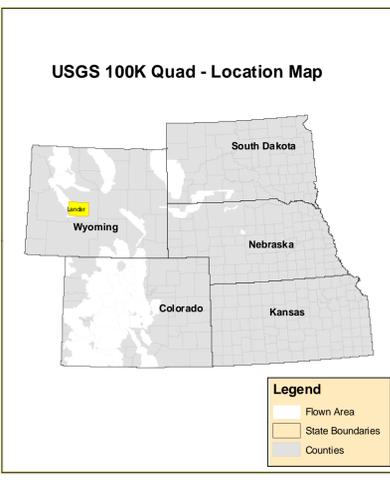


2009 Aerial Insect and Disease Survey Lander, Wyoming USGS 100K TOPO!: 42108-E1



1:100,000

| Code | Causal Agent | Primary Host | Code | Causal Agent | Primary Host |
|------|-------------------------------|------------------|------|-----------------------------------|-------------------|
| 1 | Douglas fir beetle | Douglas fir | 107 | Grasshopper | Cottonwood |
| 2 | Englemann spruce beetle | Englemann spruce | 108 | fall webworm | Cottonwood |
| 3 | Mountain pine beetle | Ponderosa pine | 109 | road kill | Softwoods |
| 4 | Mountain pine beetle | Lodgepole pine | 110 | oak wilt | Softwoods |
| 5 | Needle miner | 5-Needle Pine | 111 | foliage disease | Oak |
| 6 | Mountain pine beetle | Ponderosa pine | 112 | spine ips | All Tree Species |
| 7 | Western pine beetle | Ponderosa pine | 113 | twisted chestnut borer | Oak |
| 8 | White fir | White fir | 114 | anthracnose leaf blight disease | Bur Oak |
| 9 | White fir | White fir | 115 | Chaback | All Tree Species |
| 10 | Douglas fir engraver beetle | Douglas fir | 116 | Mortality | All Tree Species |
| 11 | Western balsam bark beetle | Softwoods | 117 | Discoloration | All Tree Species |
| 12 | Unidentified bark beetle | Softwoods | 118 | Hemlock | All Tree Species |
| 13 | Pine engraver | Lodgepole pine | 119 | Flugging | All Tree Species |
| 14 | Pine engraver | Ponderosa pine | 120 | aspex tortrix | Quaking Aspen |
| 15 | Ponderosa pine needle miner | Ponderosa pine | 121 | Masquerade Blight | Quaking Aspen |
| 16 | Lodgepole pine needle miner | Ponderosa pine | 200 | Chaback (ash) | Ash |
| 17 | Jack pine budworm | Jack pine | 201 | Chaback (cottonwood) | Cottonwood |
| 18 | Spruce budworm, light defol. | Douglas fir | 202 | Chaback (hardwood) | Hardwoods |
| 19 | Spruce budworm, medium defol. | Douglas fir | 204 | Chaback (oak) | Oak |
| 20 | Spruce budworm, heavy defol. | Douglas fir | 210 | Mortality (old cottonwood) | Cottonwood |
| 21 | Douglas fir tussock moth | Douglas fir | 211 | Mortality (eastern cedar) | Eastern Red Cedar |
| 22 | Pine butterfly | Ponderosa pine | 212 | Mortality (oak) | Oak |
| 23 | Pine looper | Ponderosa pine | 213 | Mortality (spruce) | Softwoods |
| 24 | Need miner | Hardwoods | 214 | Discoloration (hardwood) | Hardwoods |
| 25 | Leaf beetles | Hardwoods | 215 | Discoloration (oak) | Oak |
| 26 | Oak leaf roller | Hardwoods | 216 | Discoloration (spruce) | Spruce |
| 27 | Pine sawfly | Ponderosa pine | 217 | Hemlock (cottonwood) | Cottonwood |
| 28 | Pine sawfly | Ponderosa pine | 218 | Mortality (eastern cedar) | Eastern Red Cedar |
| 29 | Pine sawfly | Ponderosa pine | 219 | Unidentified defolator (hardwood) | Hardwoods |
| 30 | Pine sawfly | Ponderosa pine | 220 | Unidentified defolator (oak) | Oak |
| 31 | Pine sawfly | Ponderosa pine | 221 | Unidentified defolator (oak) | Oak |
| 32 | Pine sawfly | Ponderosa pine | 222 | Unidentified defolator (oak) | Oak |
| 33 | Pine sawfly | Ponderosa pine | 223 | Unidentified defolator (oak) | Oak |
| 34 | Pine sawfly | Ponderosa pine | 224 | Unidentified defolator (oak) | Oak |
| 35 | Pine sawfly | Ponderosa pine | 225 | Unidentified defolator (oak) | Oak |
| 36 | Pine sawfly | Ponderosa pine | 226 | Unidentified defolator (oak) | Oak |
| 37 | Pine sawfly | Ponderosa pine | 227 | Unidentified defolator (oak) | Oak |
| 38 | Pine sawfly | Ponderosa pine | 228 | Unidentified defolator (oak) | Oak |
| 39 | Pine sawfly | Ponderosa pine | 229 | Unidentified defolator (oak) | Oak |
| 40 | Pine sawfly | Ponderosa pine | 230 | Unidentified defolator (oak) | Oak |
| 41 | Pine sawfly | Ponderosa pine | 231 | Unidentified defolator (oak) | Oak |
| 42 | Pine sawfly | Ponderosa pine | 232 | Unidentified defolator (oak) | Oak |
| 43 | Pine sawfly | Ponderosa pine | 233 | Unidentified defolator (oak) | Oak |
| 44 | Pine sawfly | Ponderosa pine | 234 | Unidentified defolator (oak) | Oak |
| 45 | Pine sawfly | Ponderosa pine | 235 | Unidentified defolator (oak) | Oak |
| 46 | Pine sawfly | Ponderosa pine | 236 | Unidentified defolator (oak) | Oak |
| 47 | Pine sawfly | Ponderosa pine | 237 | Unidentified defolator (oak) | Oak |
| 48 | Pine sawfly | Ponderosa pine | 238 | Unidentified defolator (oak) | Oak |
| 49 | Pine sawfly | Ponderosa pine | 239 | Unidentified defolator (oak) | Oak |
| 50 | Pine sawfly | Ponderosa pine | 240 | Unidentified defolator (oak) | Oak |
| 51 | Pine sawfly | Ponderosa pine | 241 | Unidentified defolator (oak) | Oak |
| 52 | Pine sawfly | Ponderosa pine | 242 | Unidentified defolator (oak) | Oak |
| 53 | Pine sawfly | Ponderosa pine | 243 | Unidentified defolator (oak) | Oak |
| 54 | Pine sawfly | Ponderosa pine | 244 | Unidentified defolator (oak) | Oak |
| 55 | Pine sawfly | Ponderosa pine | 245 | Unidentified defolator (oak) | Oak |
| 56 | Pine sawfly | Ponderosa pine | 246 | Unidentified defolator (oak) | Oak |
| 57 | Pine sawfly | Ponderosa pine | 247 | Unidentified defolator (oak) | Oak |
| 58 | Pine sawfly | Ponderosa pine | 248 | Unidentified defolator (oak) | Oak |
| 59 | Pine sawfly | Ponderosa pine | 249 | Unidentified defolator (oak) | Oak |
| 60 | Pine sawfly | Ponderosa pine | 250 | Unidentified defolator (oak) | Oak |
| 61 | Pine sawfly | Ponderosa pine | 251 | Unidentified defolator (oak) | Oak |
| 62 | Pine sawfly | Ponderosa pine | 252 | Unidentified defolator (oak) | Oak |
| 63 | Pine sawfly | Ponderosa pine | 253 | Unidentified defolator (oak) | Oak |
| 64 | Pine sawfly | Ponderosa pine | 254 | Unidentified defolator (oak) | Oak |
| 65 | Pine sawfly | Ponderosa pine | 255 | Unidentified defolator (oak) | Oak |
| 66 | Pine sawfly | Ponderosa pine | 256 | Unidentified defolator (oak) | Oak |
| 67 | Pine sawfly | Ponderosa pine | 257 | Unidentified defolator (oak) | Oak |
| 68 | Pine sawfly | Ponderosa pine | 258 | Unidentified defolator (oak) | Oak |
| 69 | Pine sawfly | Ponderosa pine | 259 | Unidentified defolator (oak) | Oak |
| 70 | Pine sawfly | Ponderosa pine | 260 | Unidentified defolator (oak) | Oak |
| 71 | Pine sawfly | Ponderosa pine | 261 | Unidentified defolator (oak) | Oak |
| 72 | Pine sawfly | Ponderosa pine | 262 | Unidentified defolator (oak) | Oak |
| 73 | Pine sawfly | Ponderosa pine | 263 | Unidentified defolator (oak) | Oak |
| 74 | Pine sawfly | Ponderosa pine | 264 | Unidentified defolator (oak) | Oak |
| 75 | Pine sawfly | Ponderosa pine | 265 | Unidentified defolator (oak) | Oak |
| 76 | Pine sawfly | Ponderosa pine | 266 | Unidentified defolator (oak) | Oak |
| 77 | Pine sawfly | Ponderosa pine | 267 | Unidentified defolator (oak) | Oak |
| 78 | Pine sawfly | Ponderosa pine | 268 | Unidentified defolator (oak) | Oak |
| 79 | Pine sawfly | Ponderosa pine | 269 | Unidentified defolator (oak) | Oak |
| 80 | Pine sawfly | Ponderosa pine | 270 | Unidentified defolator (oak) | Oak |
| 81 | Pine sawfly | Ponderosa pine | 271 | Unidentified defolator (oak) | Oak |
| 82 | Pine sawfly | Ponderosa pine | 272 | Unidentified defolator (oak) | Oak |
| 83 | Pine sawfly | Ponderosa pine | 273 | Unidentified defolator (oak) | Oak |
| 84 | Pine sawfly | Ponderosa pine | 274 | Unidentified defolator (oak) | Oak |
| 85 | Pine sawfly | Ponderosa pine | 275 | Unidentified defolator (oak) | Oak |
| 86 | Pine sawfly | Ponderosa pine | 276 | Unidentified defolator (oak) | Oak |
| 87 | Pine sawfly | Ponderosa pine | 277 | Unidentified defolator (oak) | Oak |
| 88 | Pine sawfly | Ponderosa pine | 278 | Unidentified defolator (oak) | Oak |
| 89 | Pine sawfly | Ponderosa pine | 279 | Unidentified defolator (oak) | Oak |
| 90 | Pine sawfly | Ponderosa pine | 280 | Unidentified defolator (oak) | Oak |
| 91 | Pine sawfly | Ponderosa pine | 281 | Unidentified defolator (oak) | Oak |
| 92 | Pine sawfly | Ponderosa pine | 282 | Unidentified defolator (oak) | Oak |
| 93 | Pine sawfly | Ponderosa pine | 283 | Unidentified defolator (oak) | Oak |
| 94 | Pine sawfly | Ponderosa pine | 284 | Unidentified defolator (oak) | Oak |
| 95 | Pine sawfly | Ponderosa pine | 285 | Unidentified defolator (oak) | Oak |
| 96 | Pine sawfly | Ponderosa pine | 286 | Unidentified defolator (oak) | Oak |
| 97 | Pine sawfly | Ponderosa pine | 287 | Unidentified defolator (oak) | Oak |
| 98 | Pine sawfly | Ponderosa pine | 288 | Unidentified defolator (oak) | Oak |
| 99 | Pine sawfly | Ponderosa pine | 289 | Unidentified defolator (oak) | Oak |
| 100 | Pine sawfly | Ponderosa pine | 290 | Unidentified defolator (oak) | Oak |
| 101 | Pine sawfly | Ponderosa pine | 291 | Unidentified defolator (oak) | Oak |
| 102 | Pine sawfly | Ponderosa pine | 292 | Unidentified defolator (oak) | Oak |
| 103 | Pine sawfly | Ponderosa pine | 293 | Unidentified defolator (oak) | Oak |
| 104 | Pine sawfly | Ponderosa pine | 294 | Unidentified defolator (oak) | Oak |
| 105 | Pine sawfly | Ponderosa pine | 295 | Unidentified defolator (oak) | Oak |
| 106 | Pine sawfly | Ponderosa pine | 296 | Unidentified defolator (oak) | Oak |
| 107 | Pine sawfly | Ponderosa pine | 297 | Unidentified defolator (oak) | Oak |
| 108 | Pine sawfly | Ponderosa pine | 298 | Unidentified defolator (oak) | Oak |
| 109 | Pine sawfly | Ponderosa pine | 299 | Unidentified defolator (oak) | Oak |
| 110 | Pine sawfly | Ponderosa pine | 300 | Unidentified defolator (oak) | Oak |



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 3 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/>

DIRECT ALL INQUIRIES TO:

Wyoming State Forestry Division
 1100 West 22nd Street
 Cheyenne, Wyoming 82002

USDA Forest Service, Region 2
 Renewable Resources
 Forest Health Management
 PO Box 25127
 Lakewood, Colorado 80225

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 2 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.