

AERIAL SURVEY GROUND CHECK GUIDELINES

Forest Health Protection January 23, 2007

Background

Aerial Detection Surveys (ADS) are completed as annual overview or special surveys. Special ADS are conducted in response to emerging forest health issues and typically not repeated over long periods of time. Though the guidelines established herein may be applicable at least in part to special ADS, the site visits following are usually customized and unique to specific pests, are not within the scope of this document, and will not be discussed further.

To varying degrees, regions currently conduct ground checks to evaluate forest damage mapped during ADS to provide quality assurance/quality control (QA/QC) of observations made during annual overview ADS. Nationally, various methods have been employed sporadically without a standardized approach to collection and application of information collected from the ground. Guidelines for ground checks have become necessary due to increasing interest in utilizing ADS data and a continuing need to improve sketchmapper proficiency. Recognizing that methods described herein may not suit all situations, these guidelines are provided as optional standards for collecting and utilizing field data gathered following annual overview ADS.

For the purposes of this document, a distinction is made between Ground Checks (GC) and Accuracy Assessments (AA). GC are a necessary component of ADS to calibrate aerial observations and investigate unusual or elevated levels of forest damage. AA implies quantifying accuracy through a more detailed examination and sampling design, considering spatial tolerance, presence or absence of damage, evaluating errors of commission or omission. Though AA may provide improved statistical validation and perhaps greater analytical capability over GC, routine AA is not possible due to labor costs and budget/staffing limitations. AA may, in fact, encourage inappropriate use of ADS. Therefore, AA is not within the scope of this document and will not be discussed further.

Current Direction & Existing Documentation

Aerial Survey Standards, October 1999 outlines the minimum components of a QA/QC program.

A Guide to Conducting Aerial Sketchmapping Surveys, March 2000 details factors affecting quality and accuracy of ADS data (human, aviation, meteorological conditions); outlines the purpose of QA “to determine that damaged areas have been detected... mapped in the correct location... are the correct size, with the correct attributes...” Checks may be used to refine the original map or quantify accuracy. The guide continues with recommendations on how to conduct “ground-truthing or check surveys”.

Aerial Survey GIS Handbook, November 2005 addresses metadata documentation. Ensures users are aware of data limitations and able to determine appropriate uses; metadata should include any relevant information needed by anyone using the data to conduct analysis or make decisions.

Aerial Survey Working Group (ASWG) January 18-19 2006 and Forest Health Monitoring Working Group (FHMWG) January 31-Feb 2 2006 meetings revealed several pertinent Key Issues and Resolutions respectively. Additionally, the ASWG met January 17-18 2007 and provided final input to this document.

ADS Data, Metadata, Disclaimers and Relevance to GC

ADS data are made part of the public domain and as such eventual use or miss-use of the data is completely user-dependant. It is desirable to make ADS data available and support additional analyses within reasonable data limitations. Forest Health Protection is responsible to ensure appropriate disclaimers are published with ADS data as it is disseminated. Some key points to emphasize pertaining to appropriate use are: 1) ADS is intended to capture small-scale information at a broad landscape level, 2) provide a means by which general trends in forest health may be described, 3) ADS data is not intended to replace site-specific, on-the-ground information if available. Some examples of how Region 5 publishes similar disclaimers are found on line and within the metadata distributed with ADS data (Appendix I). Additionally, software enhancements are currently being developed for digital sketchmapping systems enabling aerial observers to input pre/post survey information retained as metadata. The interface will allow surveyor inputs such as name, type of survey, conditions during survey, etc... that will be helpful in interpreting survey quality.

GC data are typically used in-house by aerial observers and data stewards to verify aerial observations from the ground and make reasonable adjustments to the ADS before reporting final results. To date, there has been no mechanism in place to retain GC information in a format of value to users and analysts of ADS data. A field form to be used during GC is provided containing minimum, suggested, entries and instructions for use (Appendix II). ADS data will be updated as necessary and as soon as practicable upon completion of GC prior to reporting final ADS to FHTET. ADS metadata will be updated to indicate GC completed for portions of the survey.

GC Prioritization Within Existing Workplans

It is assumed GC will continue to occur at an intensity specified by regional survey units and completion of the enclosed form will be accomplished with negligible increased cost. Cooperation with partners and other forest health professionals outside the agency should be considered. Following ADS, aerial observers should work closely with program managers, entomologists and pathologists to determine which ADS polygons to visit. GC should be conducted so as to visit a variety of host types/damage agents, focusing efforts where significant damage was detected. Considerations when prioritizing or stratifying ADS polygons for GC (not necessarily in order of importance):

1. Inordinately high levels of mortality or other damage
2. Areas where damage is repeatedly mapped
3. Visiting a range of forest host types
4. Visiting a range of suspected damage agents/damage types
5. Utilizing agent-specific or general risk maps

6. Proximity to other resource values at risk
7. Observer-judgment re: puzzling signatures or otherwise unique situations

Within the ADS polygon being checked, GC transects should be located in sufficient number and spatial distribution so as to reasonably represent variability within the polygon. Field personnel must exercise judgment to determine number and location of transects necessary. Smaller polygons may accommodate only one transect. Larger polygons in the 10s or 100s of acres will accommodate multiple transects, 3-5 transects may be sufficient if properly distributed within large polygons. These are not FIA plots, nor is this a timber cruise. The intent is to get a rough idea of what's happening on the ground and see how closely the ADS mapping and attributing approximates reality.

Timing, Results and Reporting GC

The primary purpose of GC is to hone observer skills, gather more specific information about interesting and (or) potentially significant events, and make adjustments to final maps. GC must be accomplished within a fairly short timeframe, sometime after the first survey of the season and prior to final reporting. Frequency and intensity of GC is to be established locally. Aerial observers must be involved in GC; it would be prudent to also include local entomologists, pathologists and foresters.

GC data can be used to adjust any of the location or attribute information collected during ADS, immediately improving the quality and precision of the ADS. It is advised that any changes to original ADS based on GC be confined to the area visited on the ground. Global edits to an entire ADS data set based on relatively few GC observations are inappropriate. Over time GC will improve observer's mapping and attributing skills, contributing to overall accuracy of ADS. Uses of the data may increase or become more limited as a result but overall credibility and confidence will improve.

The intent of this document is to establish guidelines for collection and application of GC data to ADS. Results from GC will be utilized locally, completed GC forms will not be provided as part of annual ADS reporting.

Appendix I

Examples of ADS QA/QC and Data Documentation in Region 5

QA/QC

Consistent with national Aerial Survey Standards, a general QA/QC program is described for Region 5 <http://www.fs.fed.us/r5/spf/fhp/fhm/aerial/index.shtml>, an excerpt follows:

11) **Quality Control/Quality Assurance.** At a minimum, new and returning surveyors should have aviation safety and management training. New surveyors should have some familiarization with how sketch mapping is accomplished. As mentioned earlier in these guidelines an integral part of QA/QC is having pre and post-flight meetings.

Data capture of the sketch maps should be checked for accuracy at various stages. Digitizers must map to the National Accuracy Mapping Standards (+/- 40FT). Data should be cleaned and checked before final acceptance into the GIS.

Observers should visit several sites on the ground to spot check their maps for location and attributing accuracy. Maps may be modified based on spot checks, probably not appropriate to unilaterally modify other areas mapped and not visited - it's recommended that only those areas actually visited be modified if deemed necessary. Additionally, FHP will conduct ground checking of the maps in at least one area within each service area using a variety of supporting data including, inventory data, special project data, and data from the current change detection project

Data Documentation

Upon completion of an ADS two output coverages are generated, 1) damage coverage, and 2) flown coverage. Information pertaining to scale of capture, appropriate data use is typically provided with layer descriptions and metadata accompanying damage coverages. Flown coverages include items such as "who flew, where, when..." and provide a comments field to input other details of the survey (such as meteorological conditions). Following are examples of the documentation accompanying ADS and metadata in Region 5:

From the Aerial Survey page <http://www.fs.fed.us/r5/spf/fhp/fhm/aerial/index.shtml> users access the GIS Clearing House <http://www.fs.fed.us/r5/rsl/clearinghouse/tree-mort.shtml> to download damage coverages and metadata. Within the above link, there is standard disclaimer <http://www.fs.fed.us/r5/rsl/about/disclaimers.shtml> for all types of data, including the ADS data available through the clearing house.

Upon opening the metadata for a particular damage coverage (example [anfmort05_1r.htm](http://www.fs.fed.us/r5/rsl/projects/gis/data/angeles/anfmort05_1r.htm) http://www.fs.fed.us/r5/rsl/projects/gis/data/angeles/anfmort05_1r.htm#1) users read brief abstract, purpose, and supplemental information statements describing the "how, what, when, where" for the ADS. Future metadata will contain the following Use Constraint statement:

Region 5 Forest Health Protection (FHP) strives to maintain an accurate dataset, but due to the conditions under which the data is collected FHP shall not be held responsible for missing or inaccurate data. The purpose of annual FHP Aerial Detection Surveys is to capture broad-scale information as to forest condition. Accuracy assessment has not been done for this dataset. Please cite Region 5 FHP as the source of this data in maps and publications.

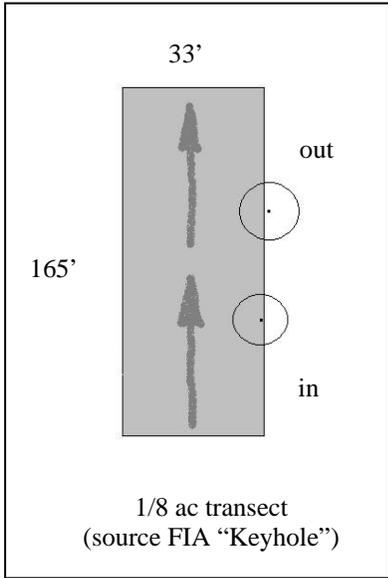
Within the example, users are also referred to the Insects and Disease Aerial Detection Surveys Standards and Guidelines http://www.fs.fed.us/foresthealth/technology/ads_standards.shtml and linked to the layer description <http://www.fs.fed.us/r5/rsl/projects/frdb/layers/mort.html> which includes general information about ADS in Region 5, detailed information about the data collected, how surveys have changed over time and the following accuracy statement:

Accuracy:

Aerial survey polygons are sketch-mapped and intended to be used as a detection tool and not intended to replace more specific, on-the-ground information. Ground truthing is completed to the extent necessary for entomologists, pathologists, and aerial observers to ensure appropriate coding on the sketch maps for host forest type and damage causing agent. Accuracies and ground truth information are not retained within these data layers.

Appendix II Ground Check Field Data Form & Instructions

- Multiple transects are recommended, emphasis on good judgment to distribute sufficient number to reasonably represent polygon
- Use one sheet per transect, indicate transect “# of #” for multiple transects in polygon
- GPS & record starting point (or offset)
- Record direction of travel in degrees
- Measure out from center 16.5’ to calibrate your eye (estimate as you walk measuring at intervals to check width and borderline trees)
- Record info. while pacing 165’ (or 2.5 chains)
- Tally by species ONLY recently dead trees that would have been visible during ADS
- Use ADS coding as in GIS Handbook
- Briefly investigate DCA and document



Polygon ID _____; Acres _____; Completed By: _____; Date: _____

1st Year Damage					2nd Year Damage				
Host Tree Species Code (a)	Forest Type Code (b)	Damage Type Code (c)	Number of Trees (tally) (d)	TPA (calc) (d*8)	Host Tree Species Code (a)	Forest Type Code (b)	Damage Type Code (c)	Number of Trees (tally) (d)	TPA (calc) (d*8)
TRANSECT - 1		GPS Starting Point (WGS 84):						Heading:	
TRANSECT - 2		GPS Starting Point (WGS 84):						Heading:	
TRANSECT - 3		GPS Starting Point (WGS 84):						Heading:	
TRANSECT - 4		GPS Starting Point (WGS 84):						Heading:	
TRANSECT - 5		GPS Starting Point (WGS 84):						Heading:	

TRANSECT - 6	GPS Starting Point (WGS 84):							Heading:	
TRANSECT - 7	GPS Starting Point (WGS 84):							Heading:	
TRANSECT - 8	GPS Starting Point (WGS 84):							Heading:	
Weighted Average TPA all Transects (sum d*8 / number of transects) =				Weighted Average TPA all Transects (sum d*8 / number of transects) =					

Remarks (identify DCA, describe complex, other conditions, location):

ANSWER THESE QUESTIONS:

Area size, shape and location accurately mapped? Yes or No or Undetermined

Area properly attributed for Host, Forest Type, Damage Type, DCA, Trees? Yes or No

If "No" to either, polygon and/or attributes edited in ADS By: _____ Date: _____

Metadata updated to reflect Ground Truthing done? By: _____ Date: _____