



Section Outline

- Accuracy Assessment Overview
- AA Preparation, Design and Implementation
- AA Field Products
- Data Management
- Final Analysis

Section Objectives

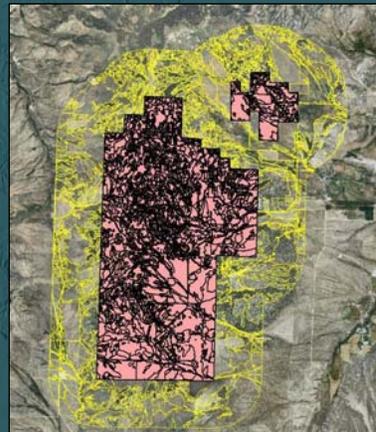
- Goals of an Accuracy Assessment
- Better Understand How to Conduct an Accuracy Assessment
- Explore and Discuss the Basic Steps
- Provide Tips and Discuss Pit-falls to Avoid

Accuracy Assessment Goals

- Better Understand the Strengths and Weaknesses of Your Vegetation Map
- Quantify the Error in the Map Classes
 - Under-mapped (Producers' Error or Errors of Omission)
 - Over-mapped or Mismatched (User's Error or Errors of Commission)
- Yields Information on Where the Error Occurred
- Provides Ideas on How to Improve the Map

Preparing Map for AA

- Determine Area of Interest
 - Whole Site
 - Subset of Site
 - Multiple Unit
- Create AA Map
 - Fully Attribute
 - Clip if Buffered
 - Correct Projection
 - Calculate Area



Picking Points

- Define Sampling Strategy
 - Stratified by Map Class, Unstratified (Random), Grid
- Determine Number of Points per Class

Scenario	Description	Polygons in class	Area occupied by class	Recommended number of samples in class
Scenario A:	The class is abundant. It covers more than 50 hectares of the total area and consists of at least 20 polygons. In this case, the recommended sample size is 30.	> 30	> 50 ha	30
Scenario B:	The class is relatively abundant. It covers more than 50 hectares of the total area but consists of fewer than 20 polygons. In this case, the recommended sample size is 20. The rationale for reducing the sample size for this type of class is that sample sites are more difficult to find because of the lower frequency of the class.	< 30	> 50 ha	20
Scenario C:	The class is relatively rare. It covers less than 50 hectares of the total area but consists of more than 20 polygons. In this case, the recommended sample size is 20. The rationale for reducing the sample size is that the class occupies a small area. At the same time, however, the class consists of a considerable number of distinct polygons that are possibly widely distributed. The number of samples therefore remains relatively high because of the high frequency of the class.	> 20	< 50 ha	20
Scenario D:	The class is rare. It has more than 5 but fewer than 20 polygons and covers less than 50 hectares of the area. In this case, the recommended number of samples is 5. The rationale for reducing the sample size is that the class consists of small polygons and the frequency of the polygons is low. Specifying more than 5 sample sites will therefore probably result in multiple sample sites within the same (small) polygon. Collecting 5 sample sites will allow an accuracy estimate to be computed, although it will not be very precise.	5-20	< 50 ha	5
Scenario E:	The class is very rare. It has fewer than 5 polygons and occupies less than 50 hectares of the total area. In this case, it is recommended that the existence of the class be confirmed by visit to each sample site. The rationale for the recommendation is that with fewer than 5 sample sites (assuming 1 site per polygon) no estimate of level of confidence can be established for the sample (the existence of the class can only be confirmed through field checking).	< 5	< 50 ha	Visit all and confirm

Picking Points (cont.)

- Load AA Map in ArcGIS
- Open Hawth's or AA Tool
- Select Input Layer
- Define Parameters
- Use Minimum Distances
 - Between Points (40 - 50 Meters)
 - From Poly. Edge (if possible)

Random Point Generation

Input:

Reference layer:

Polygon layers (points generated within all selected polygons)

Raster layers (points generated within extent of layer)

Select layer:

Use selected features only

Prevent points from occurring in the polygons of this layer:

Minimum distance between points:

Enforce minimum distance between points:

Enforce minimum distance between ALL points

Enforce minimum distance only within each polygon

Sample Size

Unstratified sampling design:

Generate this number of random points:

Stratified sampling design:

Polygon unique ID field:

Generate this number of points per polygon:

Generate this density of points per polygon:

Generate number of points per polygon specified in this field:

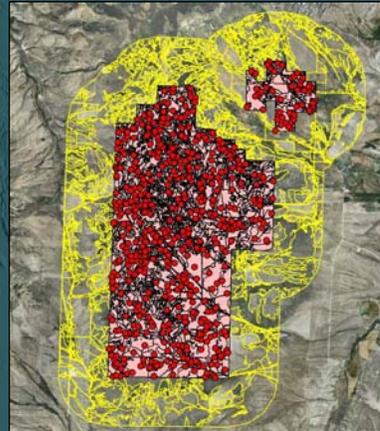
Output:

Output shapefile:

Web Help |

Review and Clean

- Examine Points
- Move Points
 - Away from Edges
 - From Sampled Areas
 - Into Different Map Type
- Delete Points
 - Out of Dangerous Areas
 - From Recently Burned or Disturbed Sites
- Add Points
 - Into Linear/Small Polygons

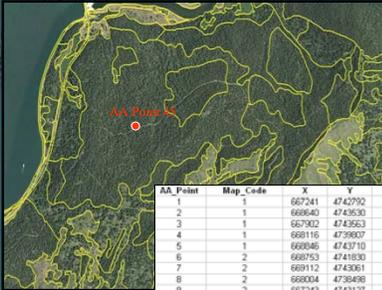


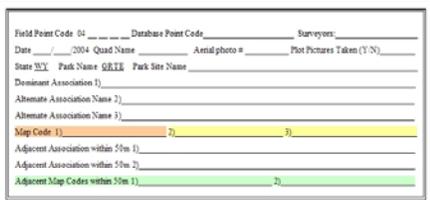
Finalize Points

- Generate More Points if Missing and Append
- Overlay Masking Layer (Optional)
 - Clip out Points from Sensitive Areas
 - Clip out Points Based on Cost (Distance from Roads/Trails)
 - Clip out Points Based on Dangerous Geology or Hydrology
- Generate Back-up Points (Optional)
- Attribute with X and Y Coordinates
- Assign Unique Numbers

Create AA Point Products

Field Maps





Spreadsheet

AA Point	Map Code	X	Y	VALUE
1	1	667241	4742792	Primary Points
2	1	668640	4743630	Primary Points
3	1	667302	4743663	Primary Points
4	1	668116	4739807	Primary Points
5	1	668846	4743710	Primary Points
6	2	668753	4741830	Primary Points
7	2	669112	4743661	Primary Points
8	2	668004	4738498	Primary Points
9	2	667343	4743127	Primary Points
10	2	668917	4742590	Primary Points
11	2	670160	4735685	Primary Points
12	2	670169	4735758	Primary Points
13	2	668831	4742431	Primary Points
14	2	667170	4739224	Primary Points
15	2	668324	4742824	Primary Points
16	2	667263	4738836	Primary Points
17	2	668811	4736427	Primary Points
18	2	667825	4739197	Primary Points
19	2	667571	4743391	Primary Points
20	2	668960	4742785	Primary Points
21	2	667473	4739345	Primary Points
22	2	668930	4741129	Primary Points
23	2	668909	4740155	Primary Points
24	2	668745	4739849	Primary Points
25	2	668932	4740324	Primary Points
26	3	670262	4736186	Primary Points
27	3	668170	4738636	Primary Points
28	3	670211	4736104	Primary Points
29	4	668048	4740332	Primary Points
30	4	668028	4740298	Primary Points
31	4	668501	4742671	Primary Points
32	7	667956	4738128	Primary Points

Field Forms



GPS

were used in the following levels of accuracy assessment: **Map Code 1) = Binary**, **4 3) = Acceptable**, and **Map Codes 1-3 + Adjacent Codes within 50m 1) and 2) = Reasonable**

AA Field Work

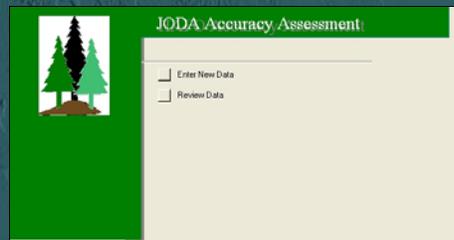
- Navigate to Points (the closer the better)
- Record Data Thoroughly
- Make Notes
- Take Pictures





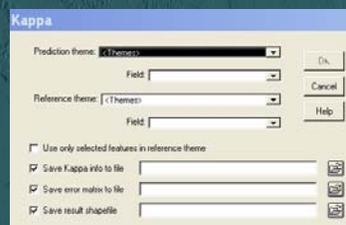
Manage AA Data

- 🌐 Design Database or Spreadsheet to Store Data
- 🌐 Paper Field Forms or Data Loggers?
 - Hardcopy = Daily Storage and Data Entry
 - Digital = Downloads, Batteries and Backup
- 🌐 Keep Master Tally of Points
- 🌐 Cross-out or Remove Points After Sampling
- 🌐 Enter, Edit and Review Data



Prepare and Analyze Data

- 🌐 Create GIS Point File from Database
- 🌐 Make Sure to Use the Same Codes
- 🌐 Overlay Points and Compare Field Calls (Observed) to Map Codes (Predicted)
- 🌐 Manually Enter into an Error Matrix
- 🌐 Or Use a Custom Extension (Kappa Tool) in Arc
- 🌐 Throw out Points (e.g. Burned Sites)



Sample Error Matrix

Observed AA Point Data		User's Error (Commission)								
M a p C l a s s D a t a		A	B	C	D	E	F	G	Total	%
	A	17	2	0	0	0	0	1	20	85%
	B	4	42	0	0	0	0	0	46	91%
	C	2	2	1	3	1	0	0	9	11%
	D	1	0	0	16	5	0	0	22	72%
	E	1	0	0	0	2	0	0	3	66%
	F	0	1	0	0	0	18	10	29	62%
	G	0	0	1	1	1	4	15	22	68%
	Total	25	47	2	20	9	22	25		
	%	68%	89%	50%	80%	22%	81%	60%		

Producer's Error (Errors of Omission)
111 Correct 151 Total
74% Overall Accuracy

Interpreting Results

- 🌐 User's Error = Polygons Incorrectly Labeled
- 🌐 Producer's Errors = Under-mapped
- 🌐 Outliers = Indicate Key or Plant ID Issues
- 🌐 Low Accuracy = Aggregate Similar Types
- 🌐 Marginal Accuracy = Keep As Is and Improve
- 🌐 Marginal Accuracy = Aggregate but Add Data to a Comments or Modifier Field
- 🌐 Unexplainable Errors = Check for GIS Layer Issues (i.e. Unclosed Polygons, Missing Lines, Polygon Coding Errors)
- 🌐 Use Secondary Calls and Read Field Notes to Improve
- 🌐 Most Error Should Reflect Mapping Issues
 - Similar Signatures on Imagery
 - Understory Masking, Sparse Types...

AA Results can be hard to get your head and hands around!



AA Tips and Pitfalls

- Preparation, Testing and Training
 - Prepare for Consistency and the Inevitable
 - Test Field Key, Field Forms, GPS
 - Train Field Crews in a Run-through
- Check Projections, Datums, Zones and GPS
- Avoid Over- or Under-Sampling by Keeping Daily Tallies
- Work with Crews on How to Use the Field Maps
- Create Reasonable Work Zones
- Allow for Multiple Calls in Ecotones, Disturbed Areas, or Mixed Types
- Back-up and Safely Store Data
- During Analysis Check Every Point