Using .NET for ArcGIS Map & Data Development

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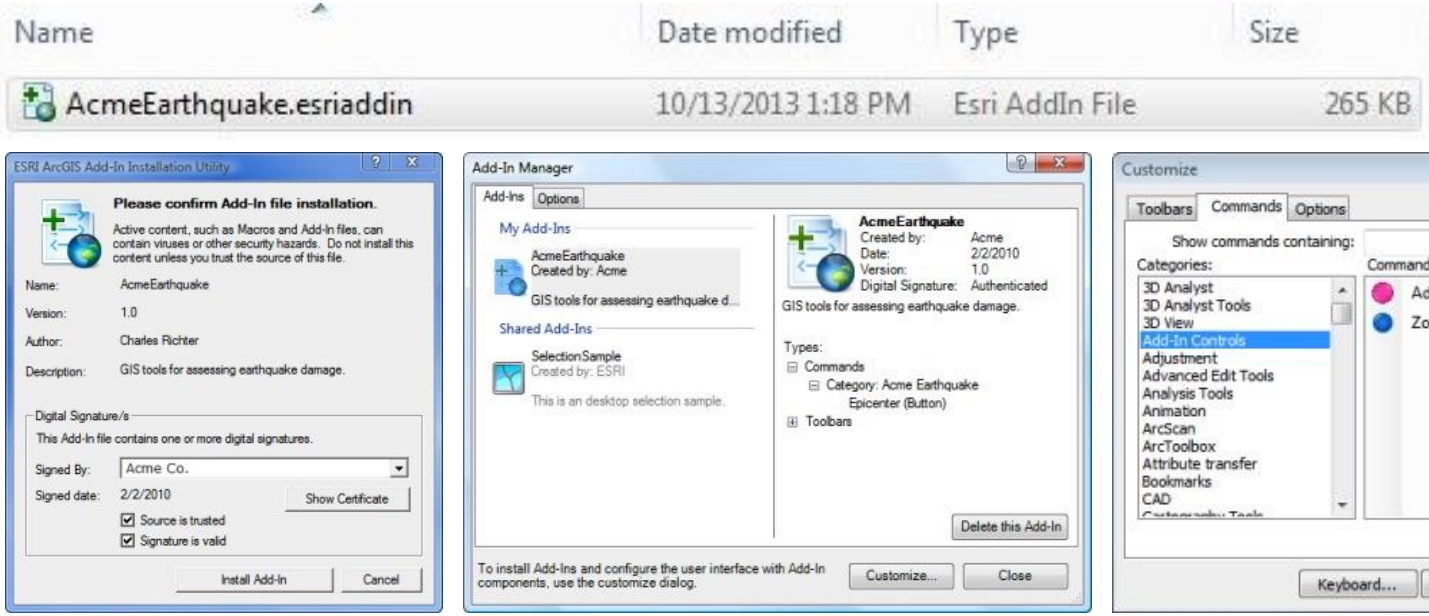
November 20, 2013

What Are Add-Ins?

- Add-ins provide a means of extending ArcGIS functionality
- Available as a development option beginning with ArcGIS 10.0
- Small .esriaddin file is easily distributed and installed



- Can be built using .NET (C# & VB.NET), Java or Python

Quite often, add-ins can pay for themselves many times over

Presentation Goal

- Demonstrate the value of using .NET with ArcMap via examples from four different projects:

Forester Mapping Tools – upgraded VB.NET custom tools to support forest management

Bookmark Tools – C# upgrade of tools originally built using VBA to allow exporting of maps en masse

Map Series Development Tools – new C# tools to support custom map creation and export

Species Protection Area Tools – new C# tools to support data development

- Discuss development considerations

Acknowledgements

Luke Boggess, Charlie Riddle & Pete Hardcastle at R&M Consultants, Inc., Anchorage, Alaska, for permission to present their map series development tool

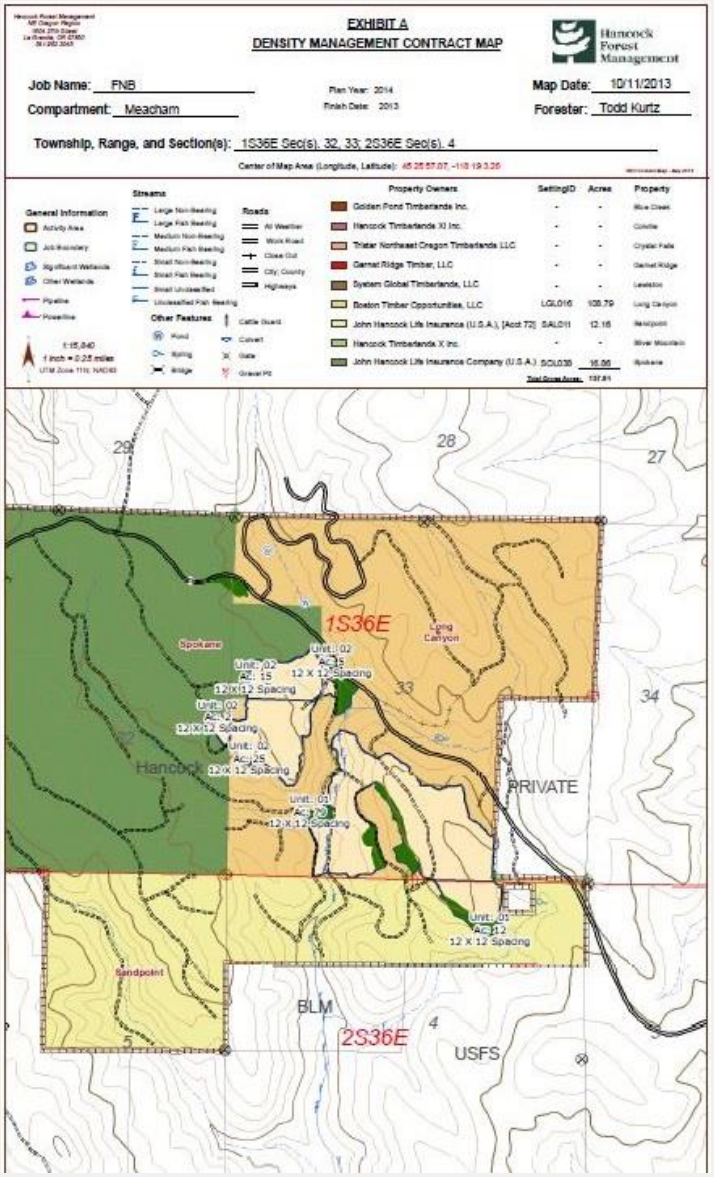
Steve Dodson at Hancock Forest Management, La Grande, Oregon for permission to present their Forester Mapping Tools

Mike McGuire at Ascent GIS, Inc., Spokane, Washington for his role in securing the Hancock project

Example 1

Forester Mapping Tools

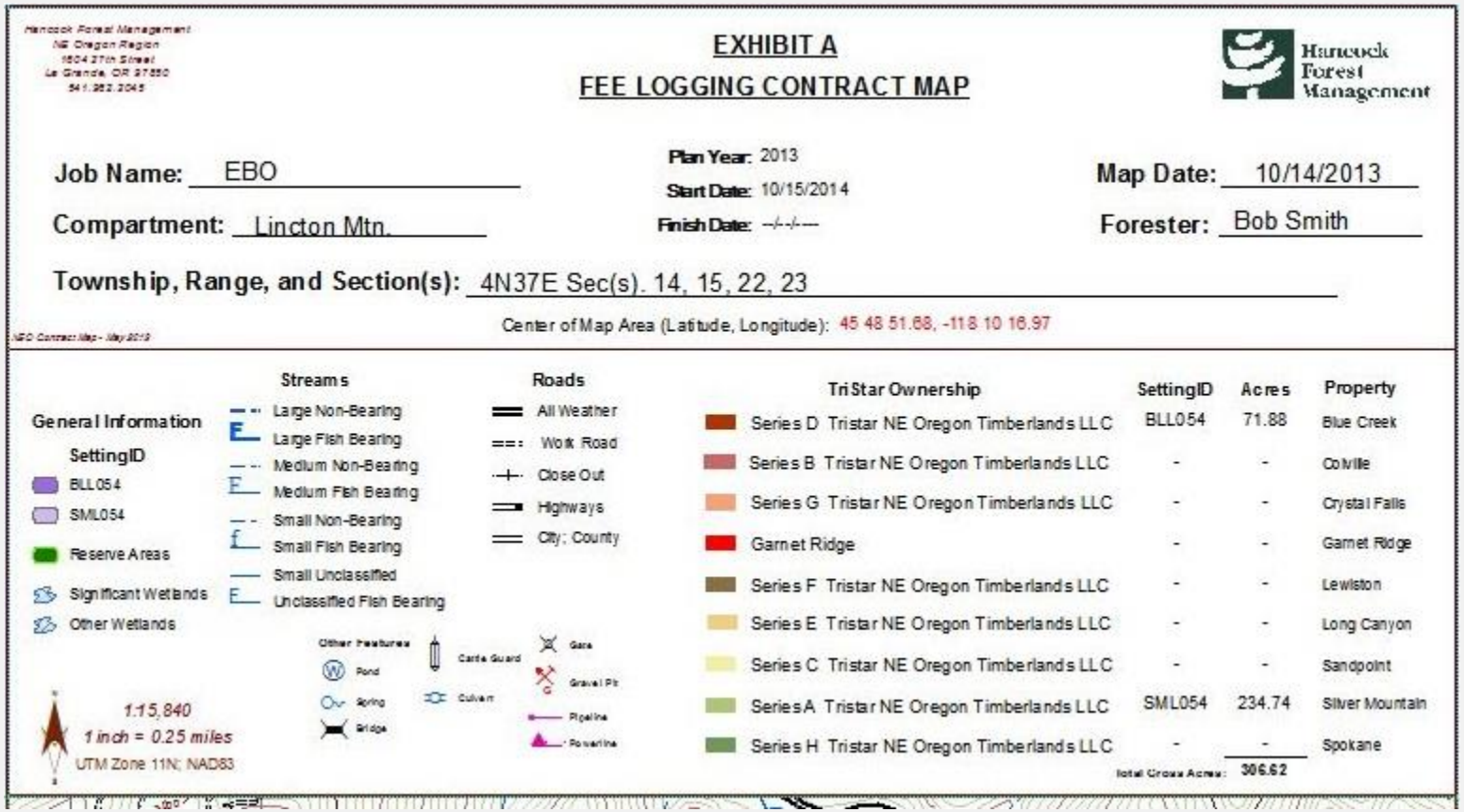
Forester Mapping Tools – Example Map Template



Forester Mapping Tools

Forester Mapping Tools

Filter: FEE LOGGING CONTRACT MAP | Query: <Show all Items> | Job: EBO | Criteria: <None> | AreaCalc | Scale: 1:15,840 | Print | Color | Set Config File



Hancock Forest Management
NE Oregon Region
1604 27th Street
La Grande, OR 97850
541.962.2045

EXHIBIT A

FEE LOGGING CONTRACT MAP

Hancock Forest Management

Job Name: EBO

Plan Year: 2013
Start Date: 10/15/2014
Finish Date: --/--/----

Map Date: 10/14/2013

Compartment: Lincton Mtn.

Forester: Bob Smith

Township, Range, and Section(s): 4N37E Sec(s). 14, 15, 22, 23

Center of Map Area (Latitude, Longitude): 45 48 51.68, -118 10 16.97

NFO Contract Map - May 2013

General Information

SettingID
- BLL054
- SML054
- Reserve Areas
- Significant Wetlands
- Other Wetlands

Streams
- Large Non-Bearing
- Large Fish Bearing
- Medium Non-Bearing
- Medium Fish Bearing
- Small Non-Bearing
- Small Fish Bearing
- Small Unclassified
- Unclassified Fish Bearing

Roads
- All Weather
- Work Road
- Close Out
- Highways
- City; County

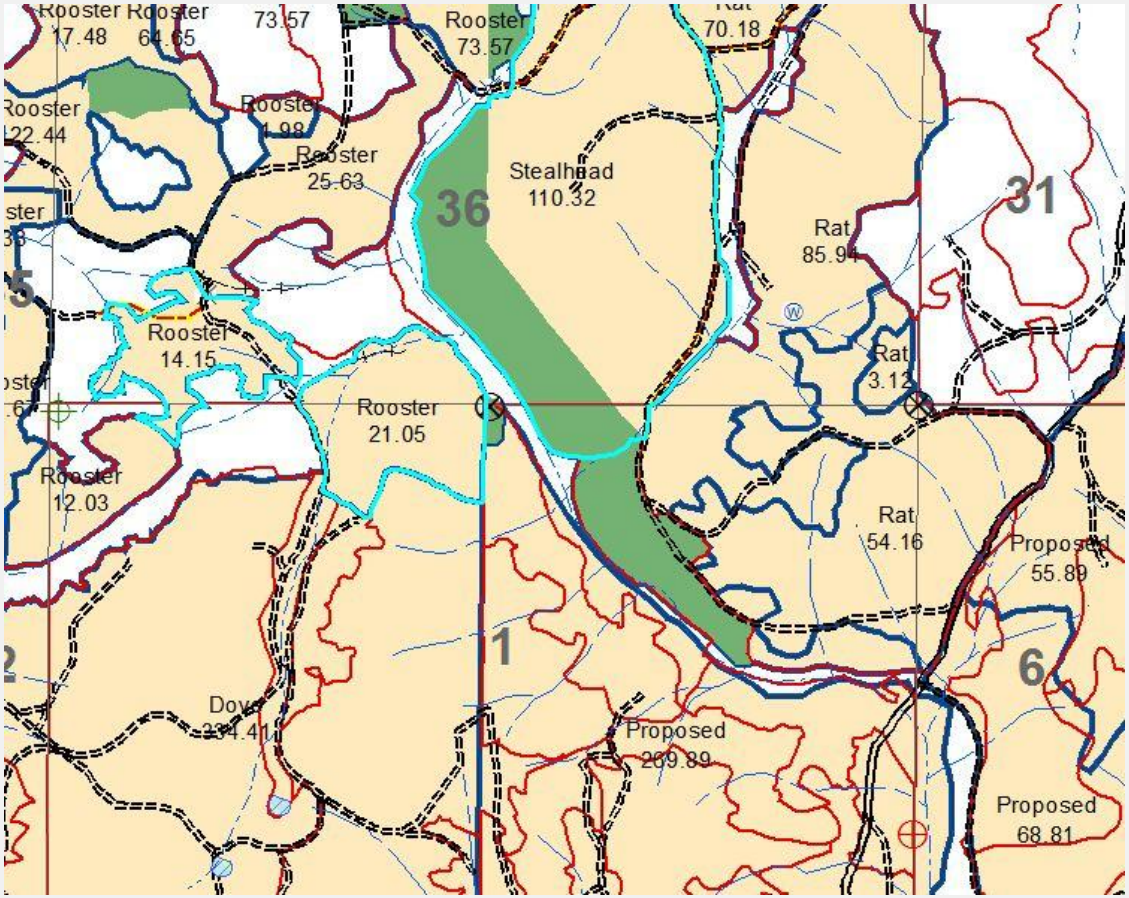
Other Features: Pond, Spring, Bridge, Cattle Guard, Culvert, Gate, Gravel Pit, Pipeline, Powerline

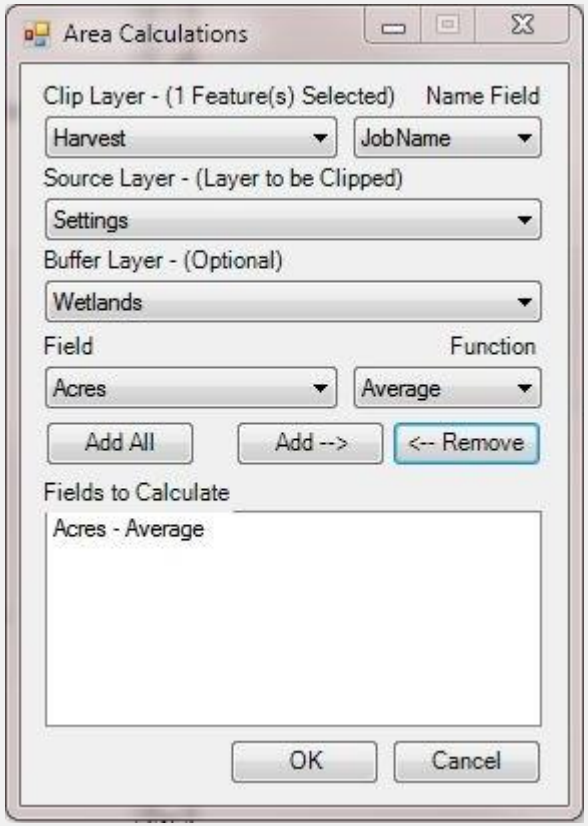
1:15,840
1 inch = 0.25 miles
UTM Zone 11N; NAD83

TriStar Ownership	SettingID	Acres	Property
Series D Tristar NE Oregon Timberlands LLC	BLL054	71.88	Blue Creek
Series B Tristar NE Oregon Timberlands LLC	-	-	Colville
Series G Tristar NE Oregon Timberlands LLC	-	-	Crystal Falls
Garnet Ridge	-	-	Garnet Ridge
Series F Tristar NE Oregon Timberlands LLC	-	-	Lewiston
Series E Tristar NE Oregon Timberlands LLC	-	-	Long Canyon
Series C Tristar NE Oregon Timberlands LLC	-	-	Sandpoint
Series A Tristar NE Oregon Timberlands LLC	SML054	234.74	Silver Mountain
Series H Tristar NE Oregon Timberlands LLC	-	-	Spokane
		306.62	

Total Gross Acres:

Forester Mapping Tools – Area Calculations

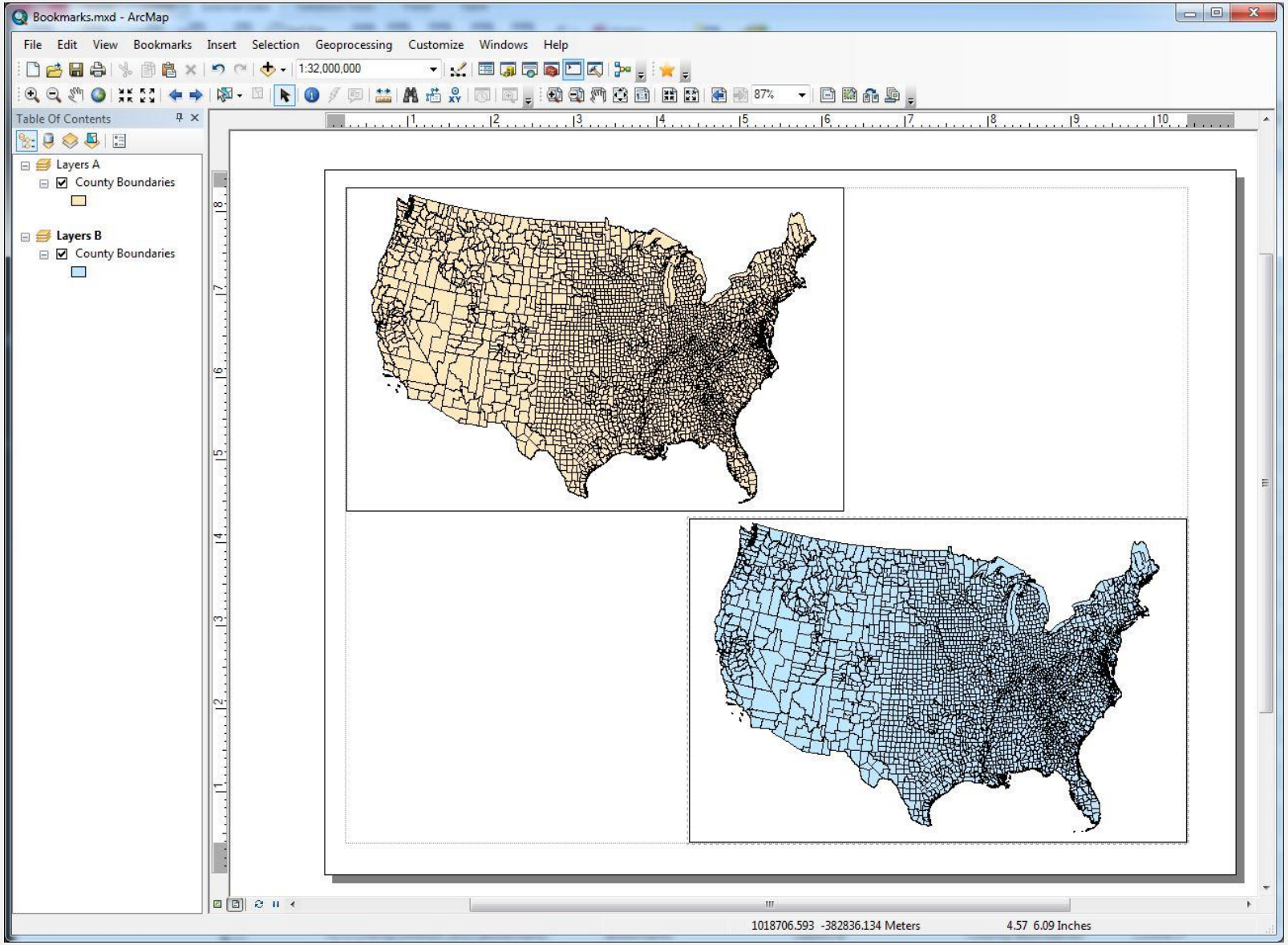




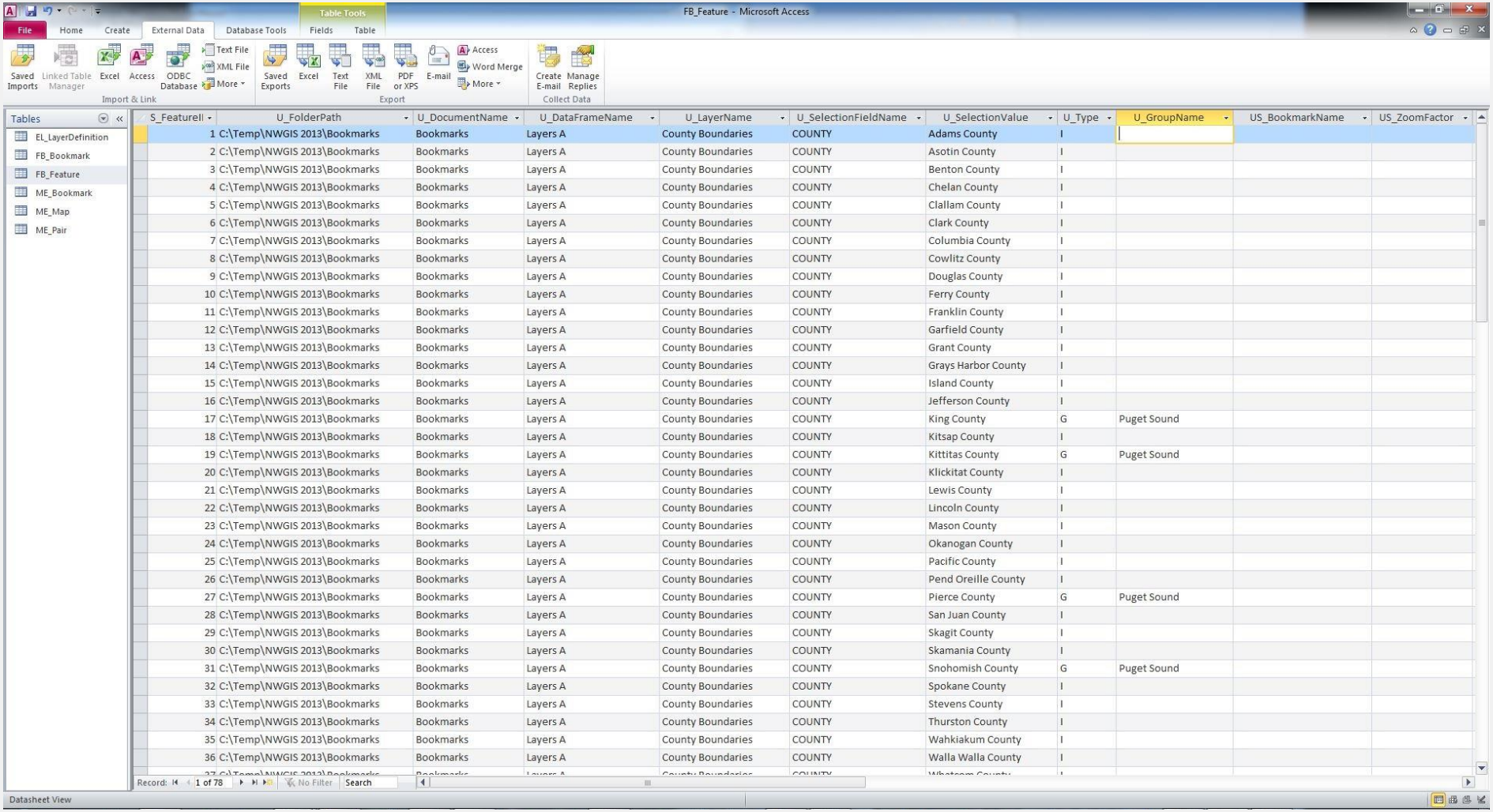
Example 2

Bookmark Tools

Bookmark Tools



Bookmark Tools – Input Feature Records



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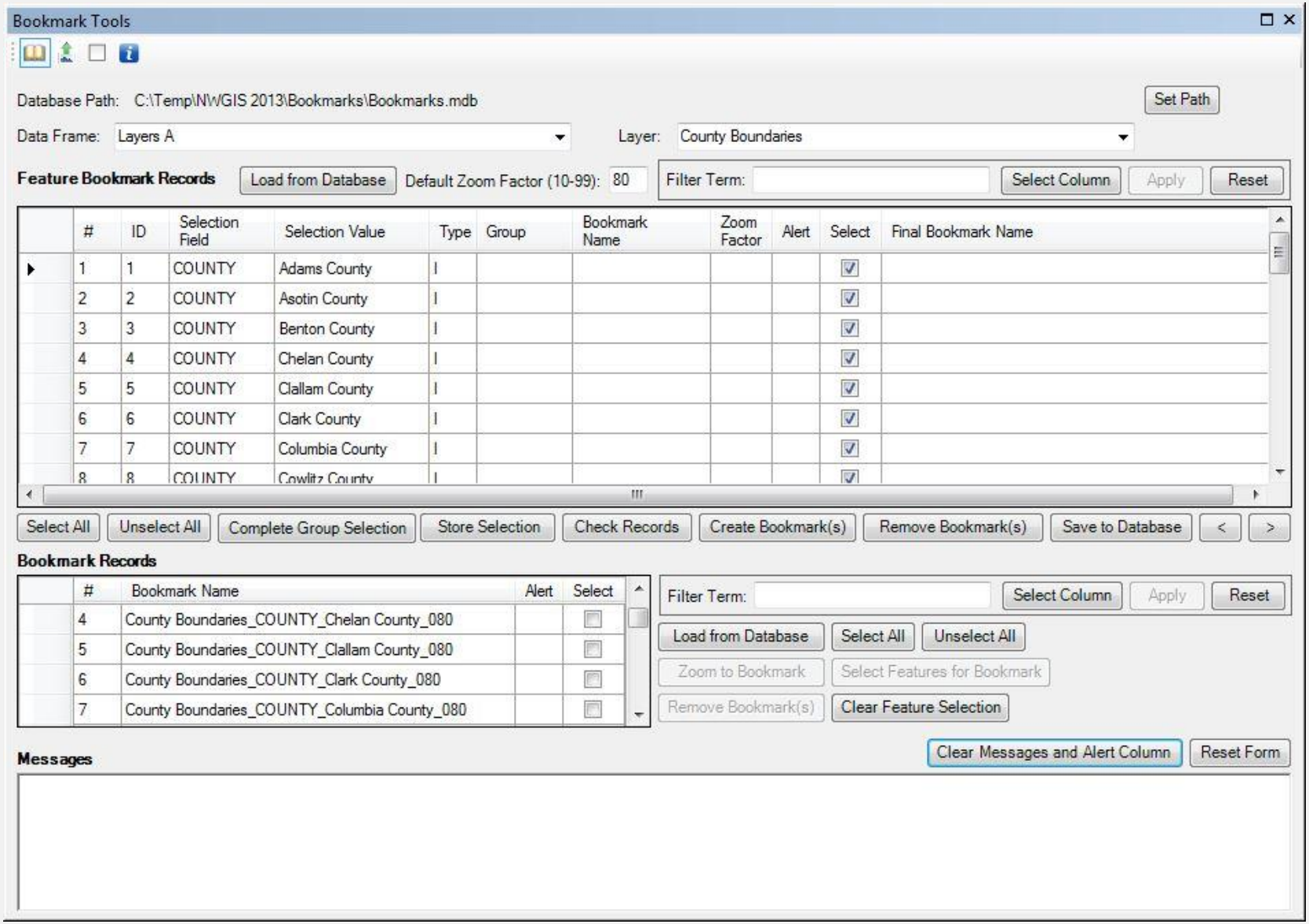
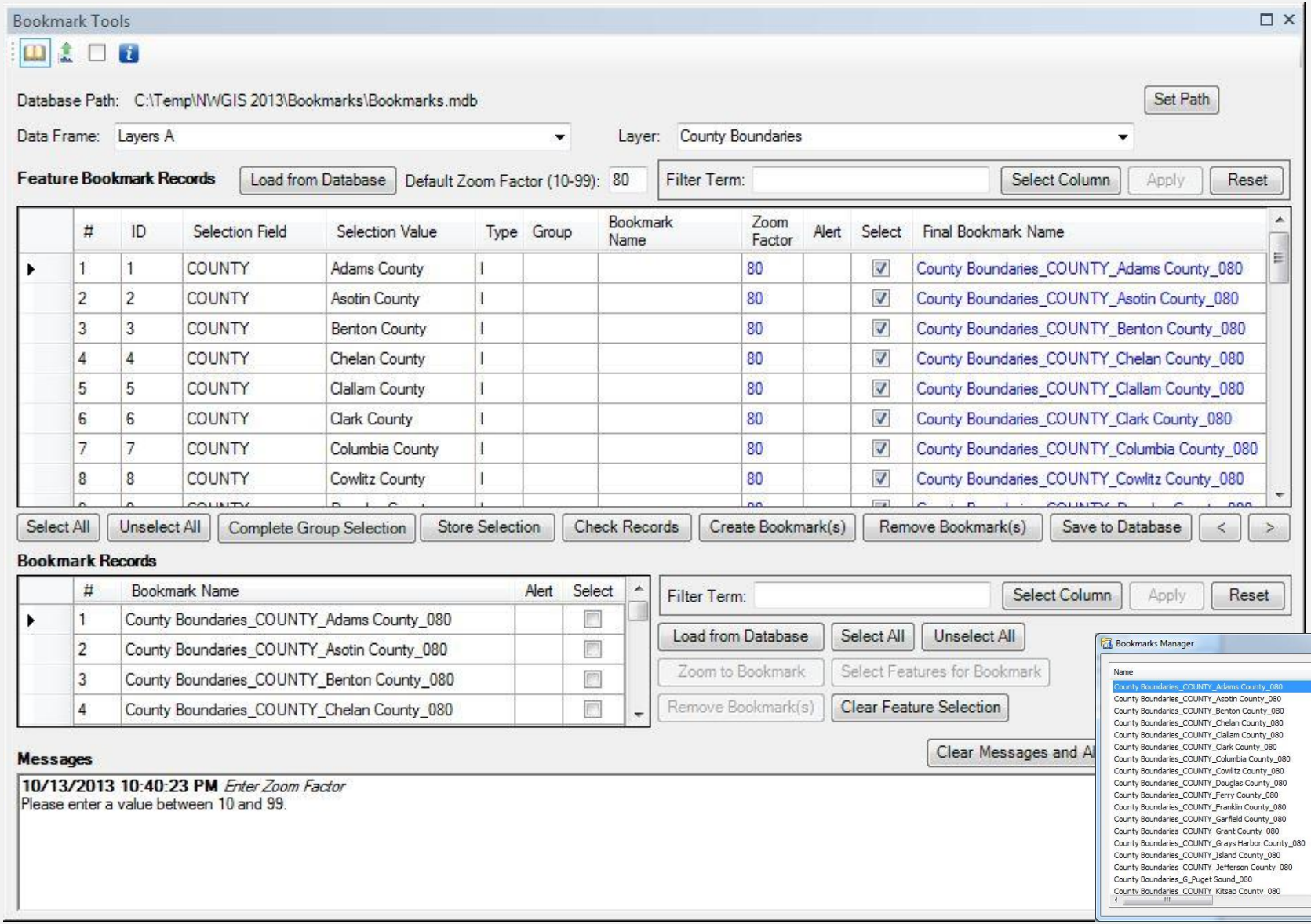
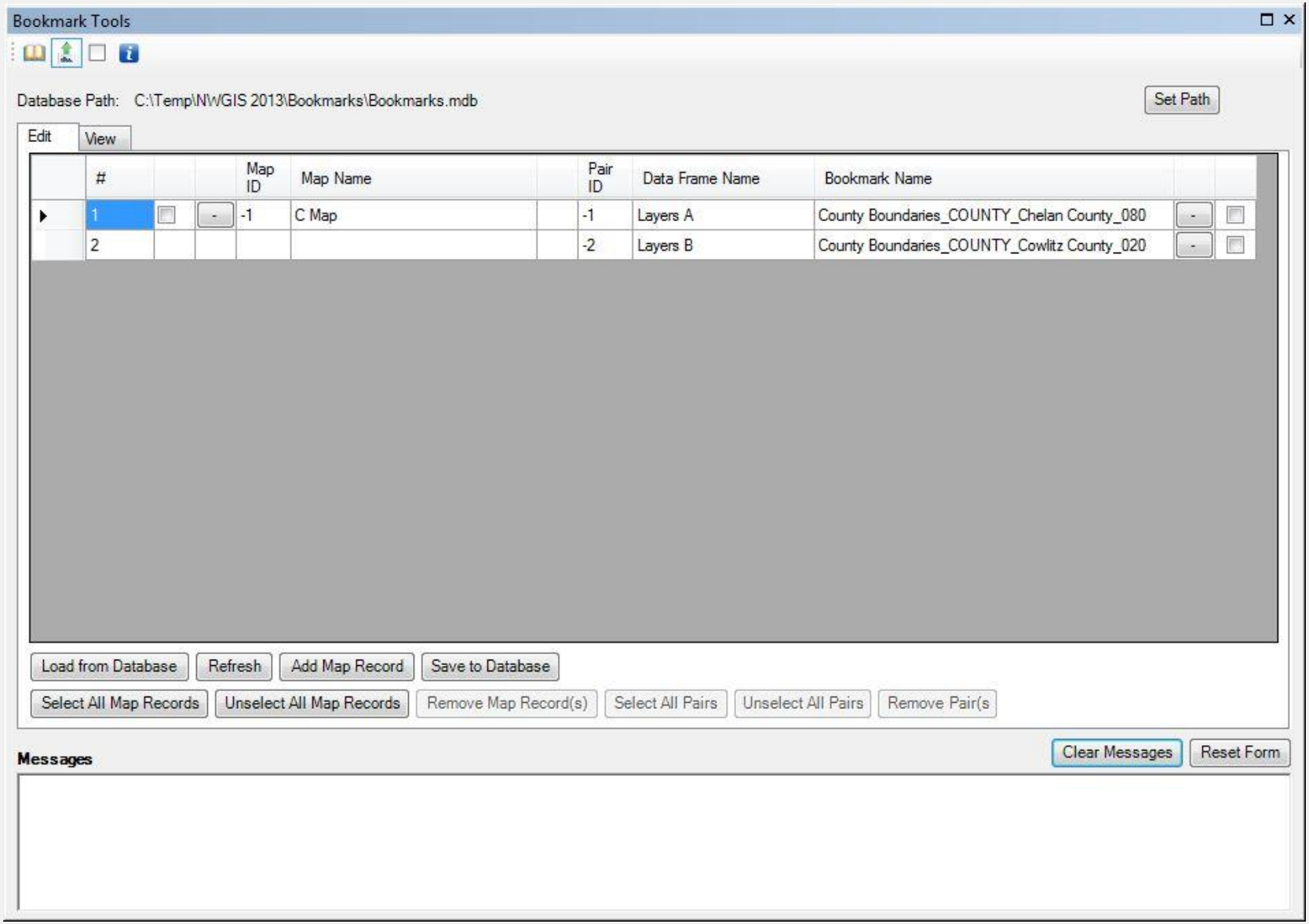
Bookmark Tools – Initial Feature Record Load



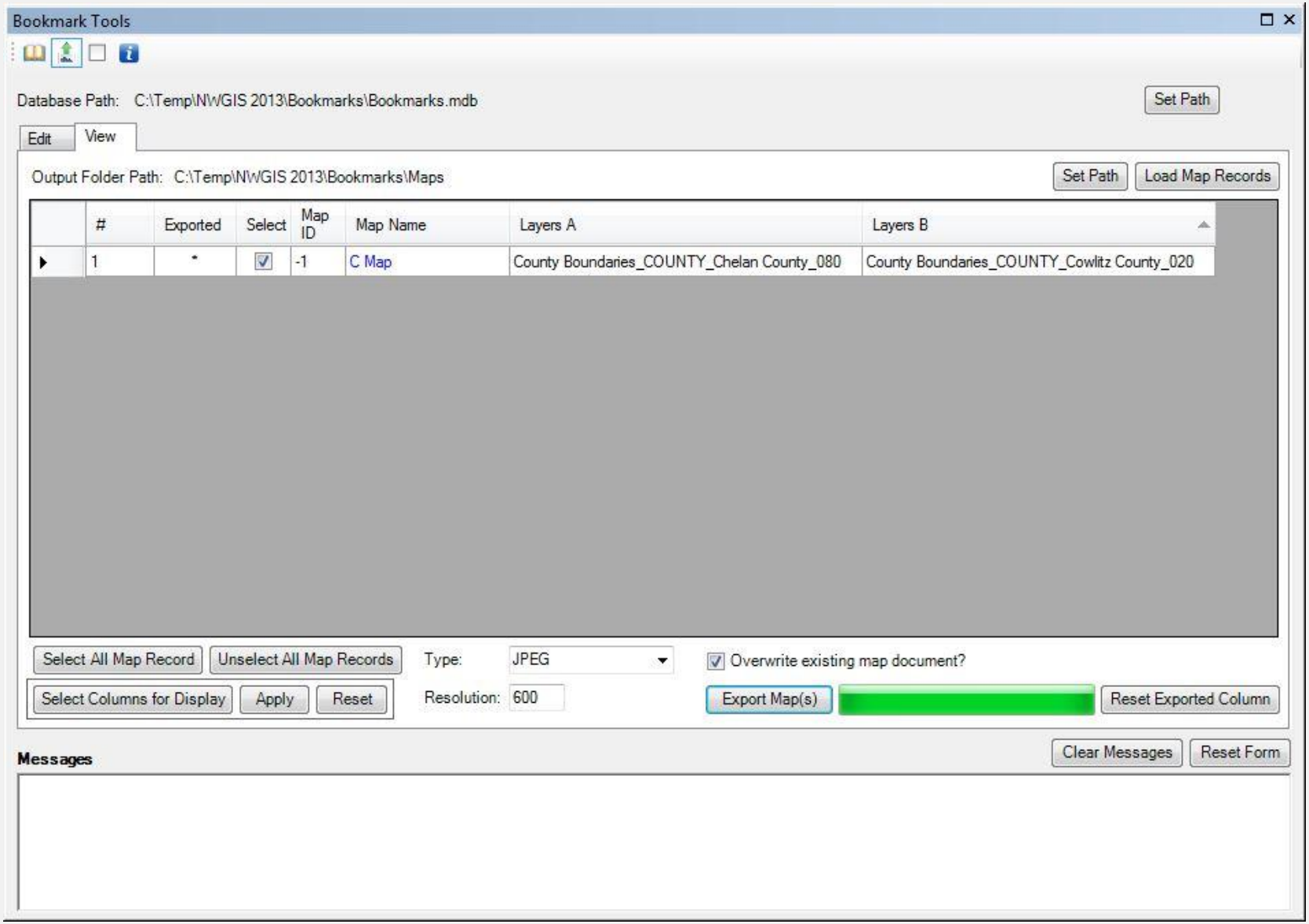
Bookmark Tools – Bookmark Creation



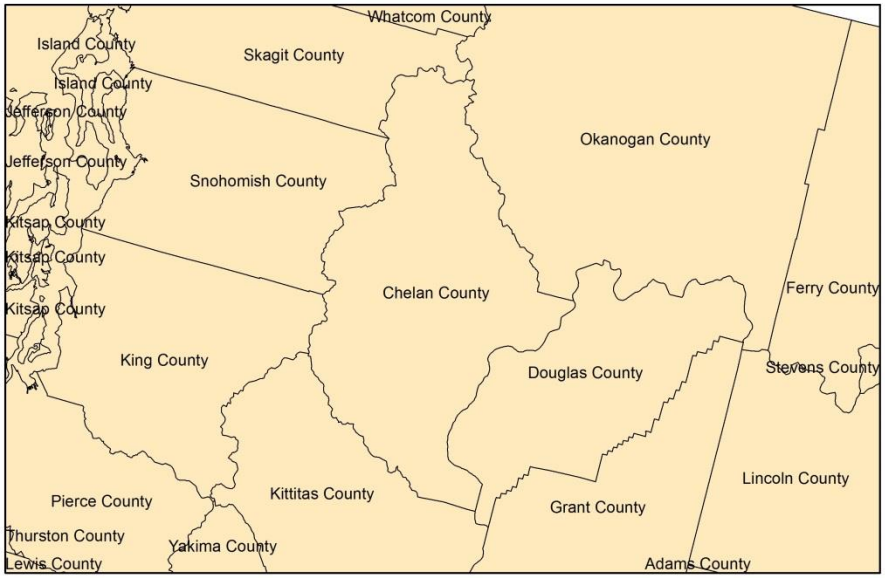
Bookmark Tools – Map Export Record Creation

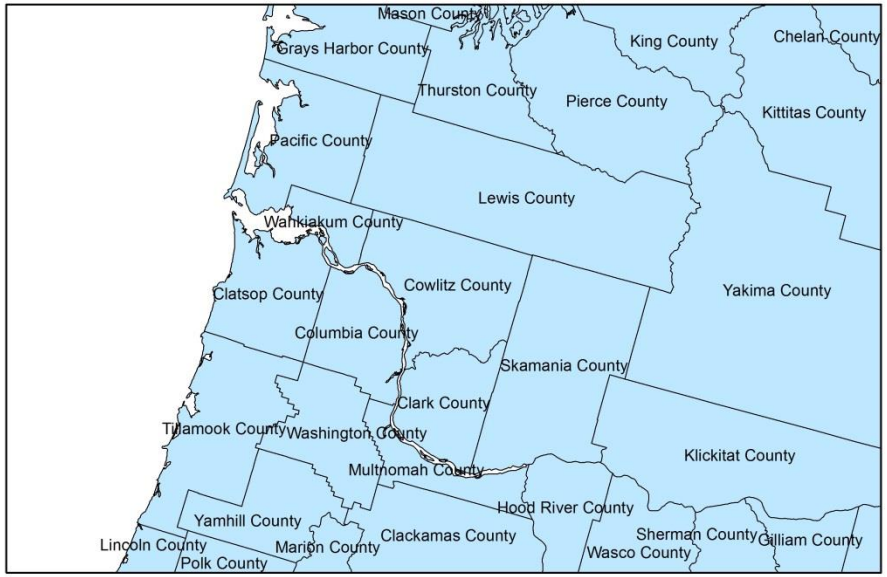


Bookmark Tools – Map Export



Bookmark Tools – Output

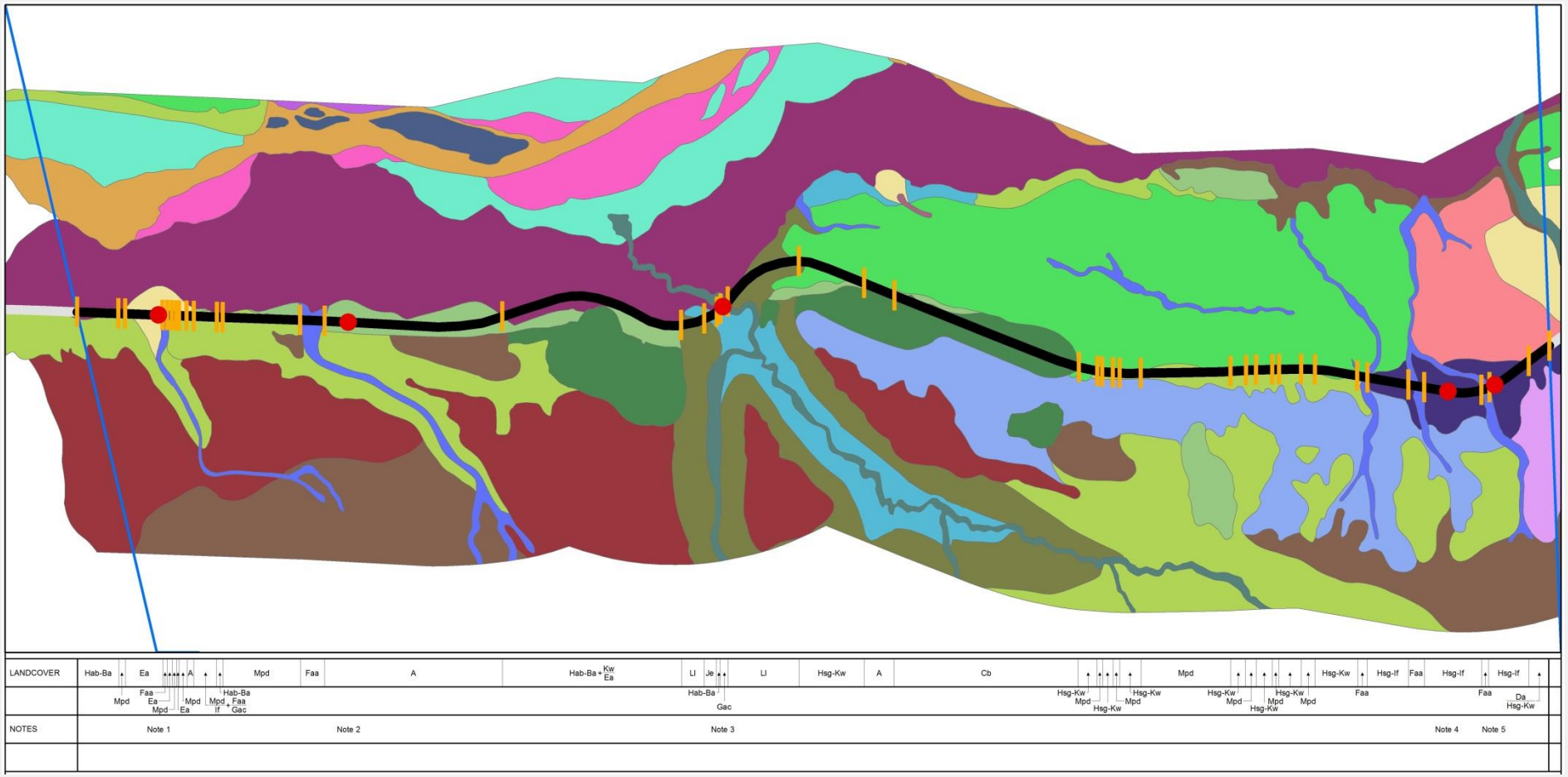




Example 3

Map Series Development Tools

Map Series Development Tools – Goal

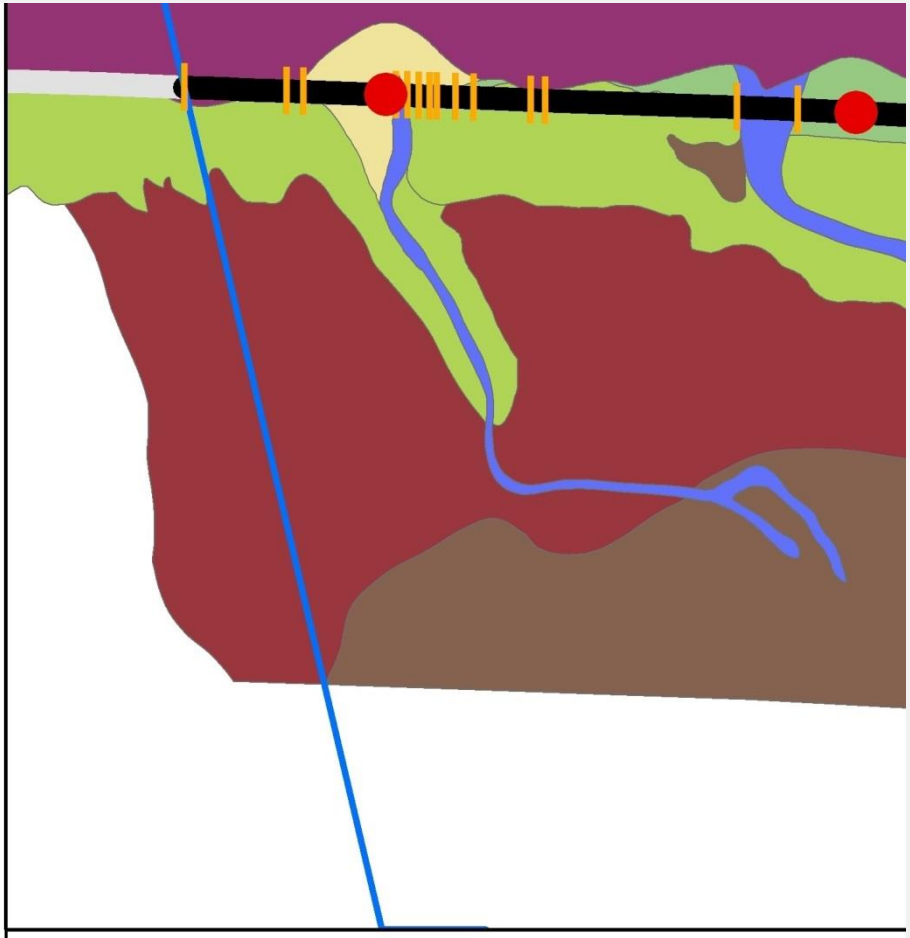


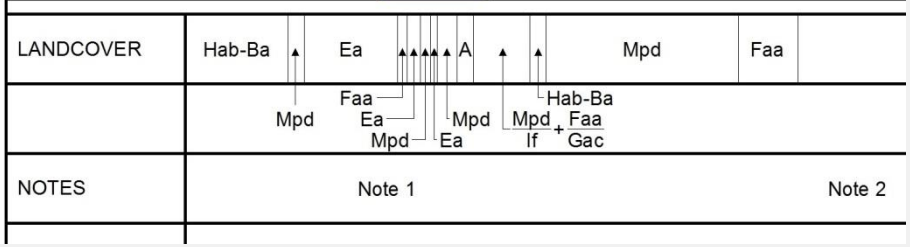
Generate a series of maps for the full length of a route

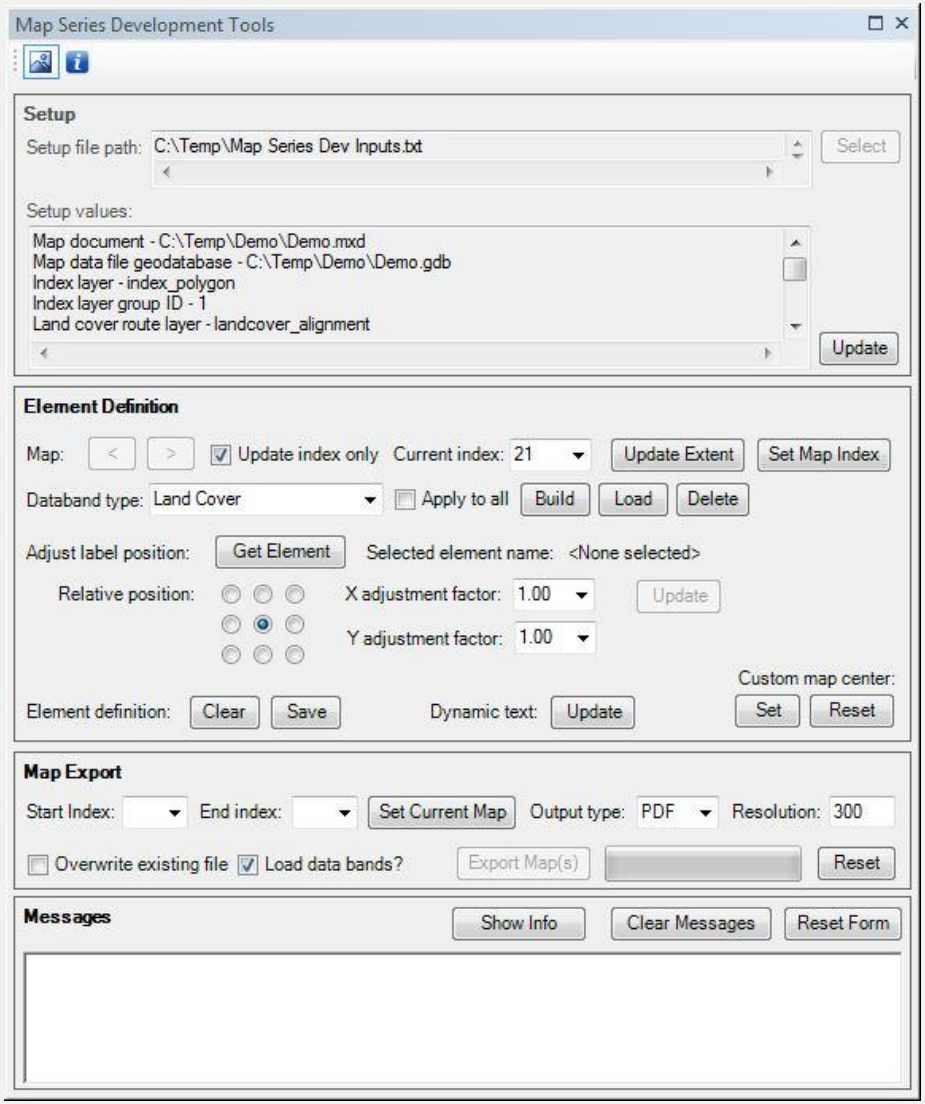
For each map

- Build the required data bands
- Adjust the label positions
- Save the map configuration (analogous to having multiple layouts)

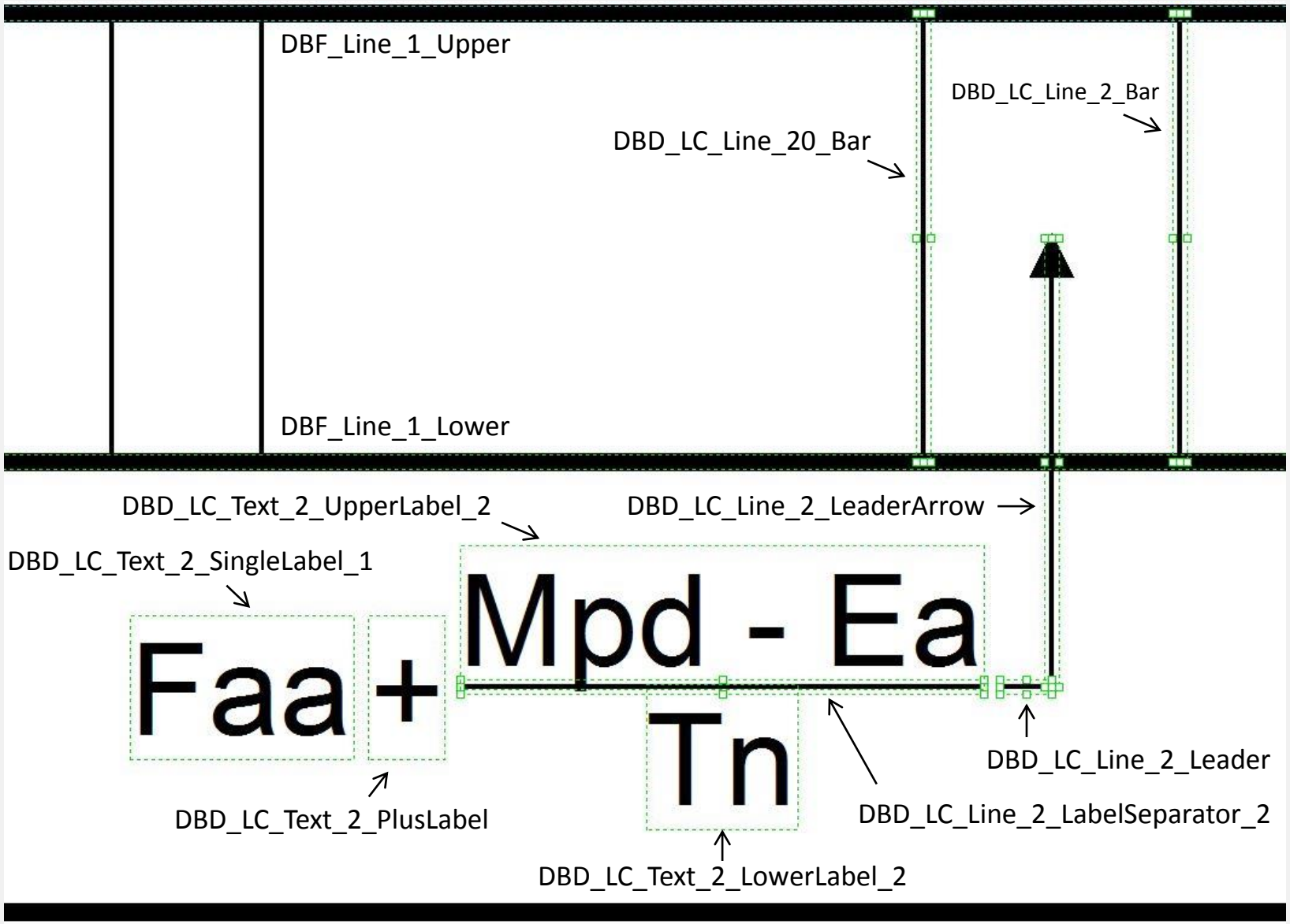
Map Series Development Tools – Data Band Creation







Map Series Development Tools – Element Name as Storage Unit



Map Series Development Tools – Element Definition Storage

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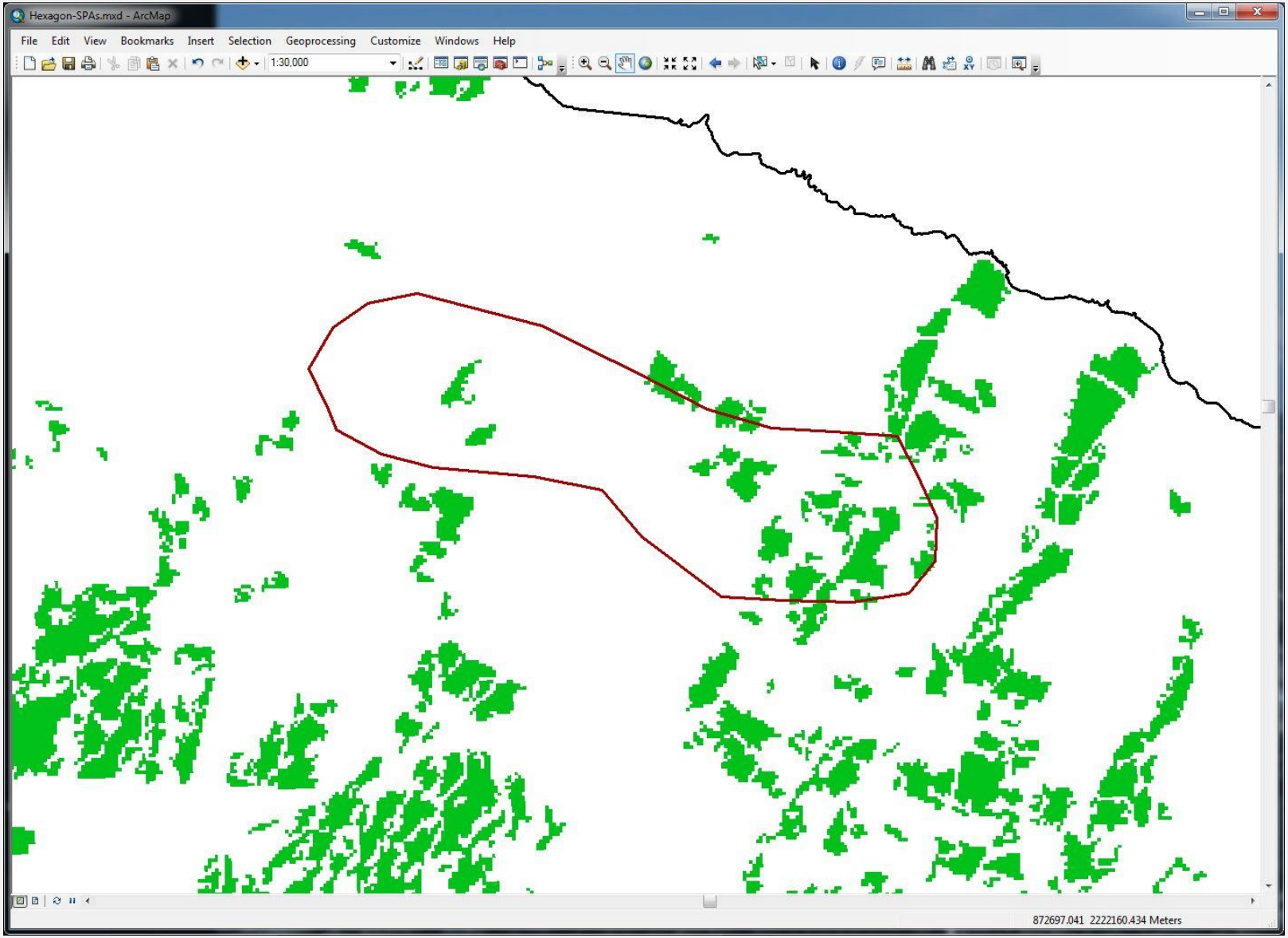
1 (0 out of 1095 Selected)

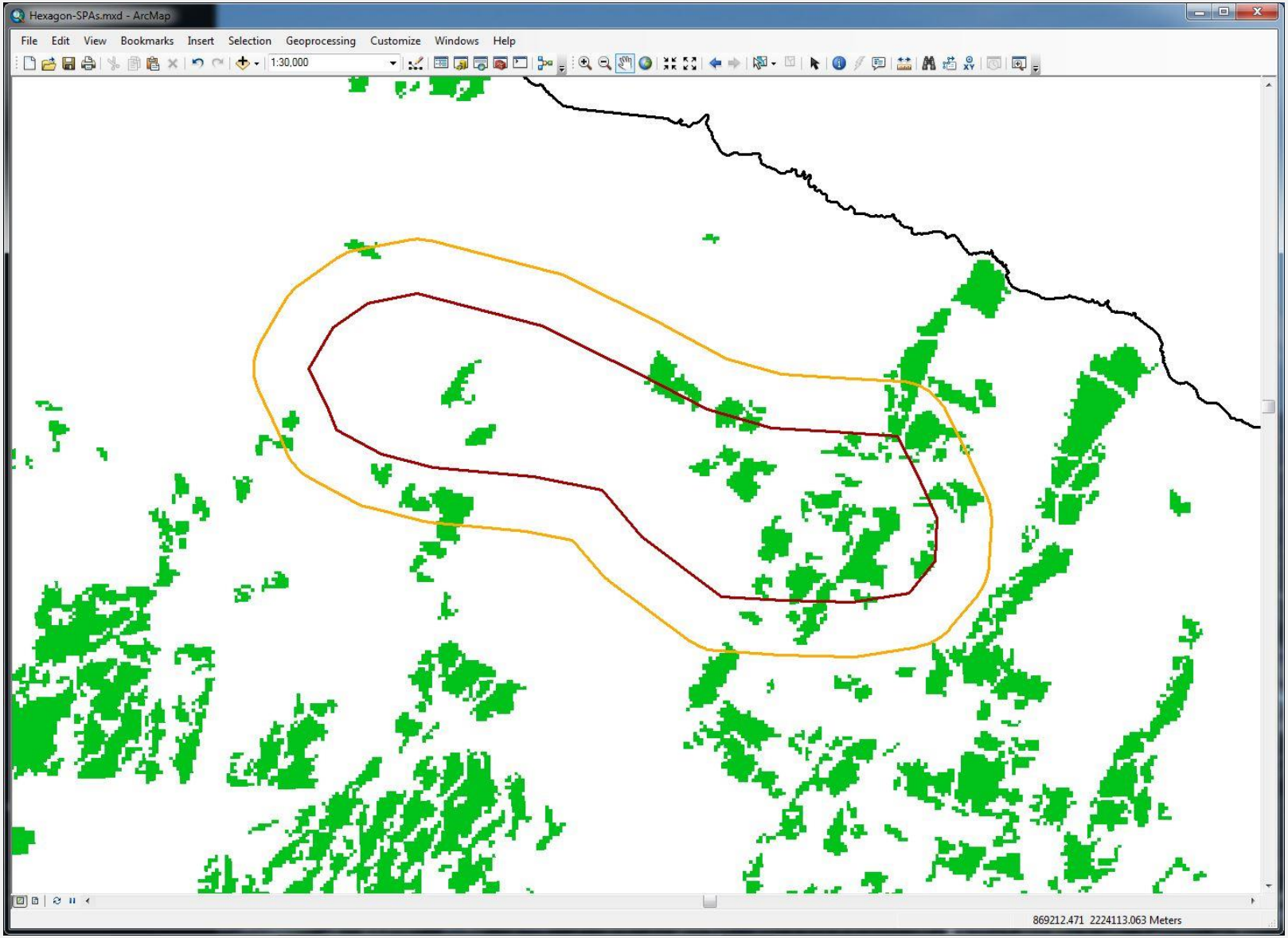
Example 4

Species Protection Area Tools

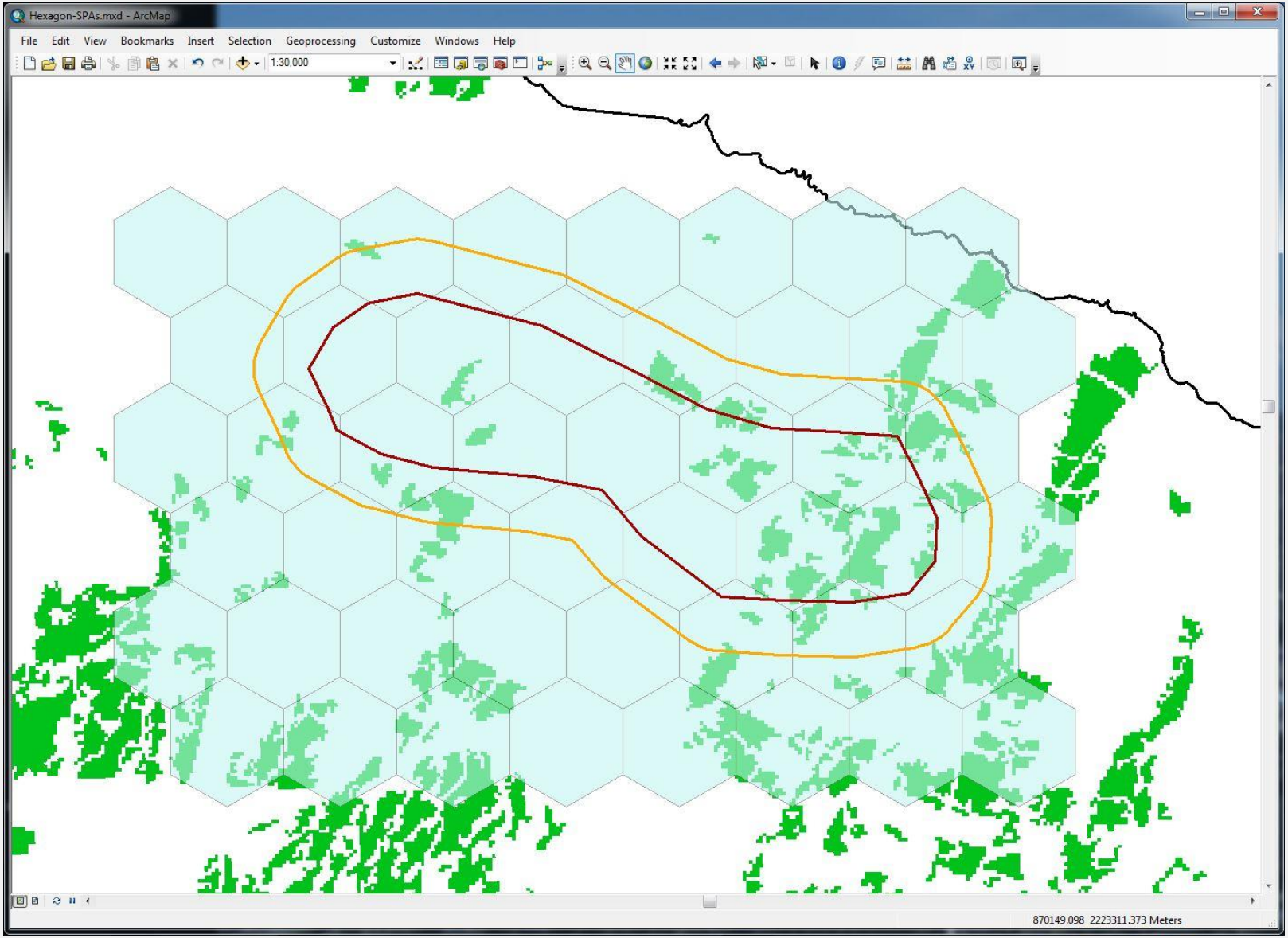
Species Protection Area Example



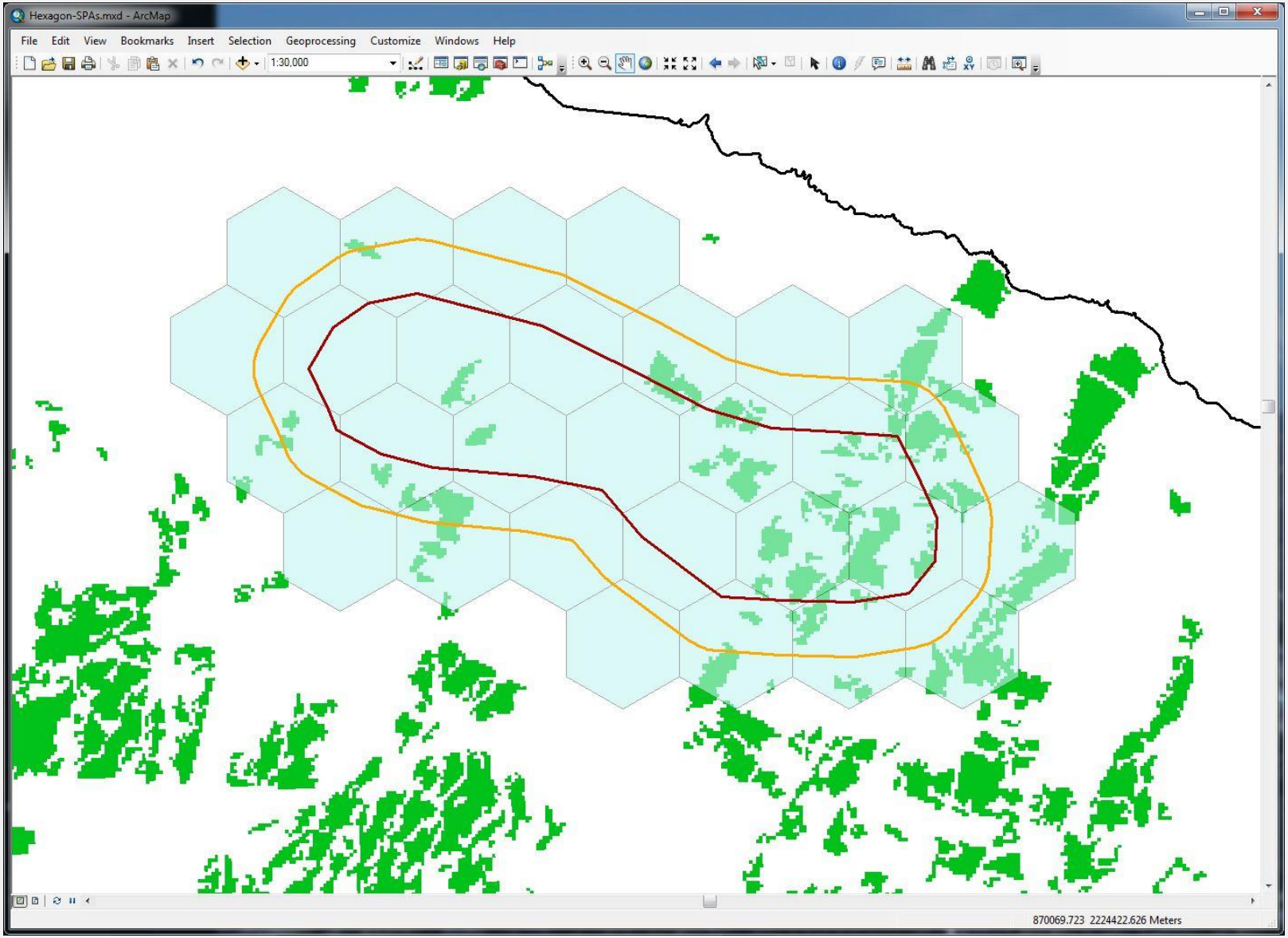
Species Protection Area Example



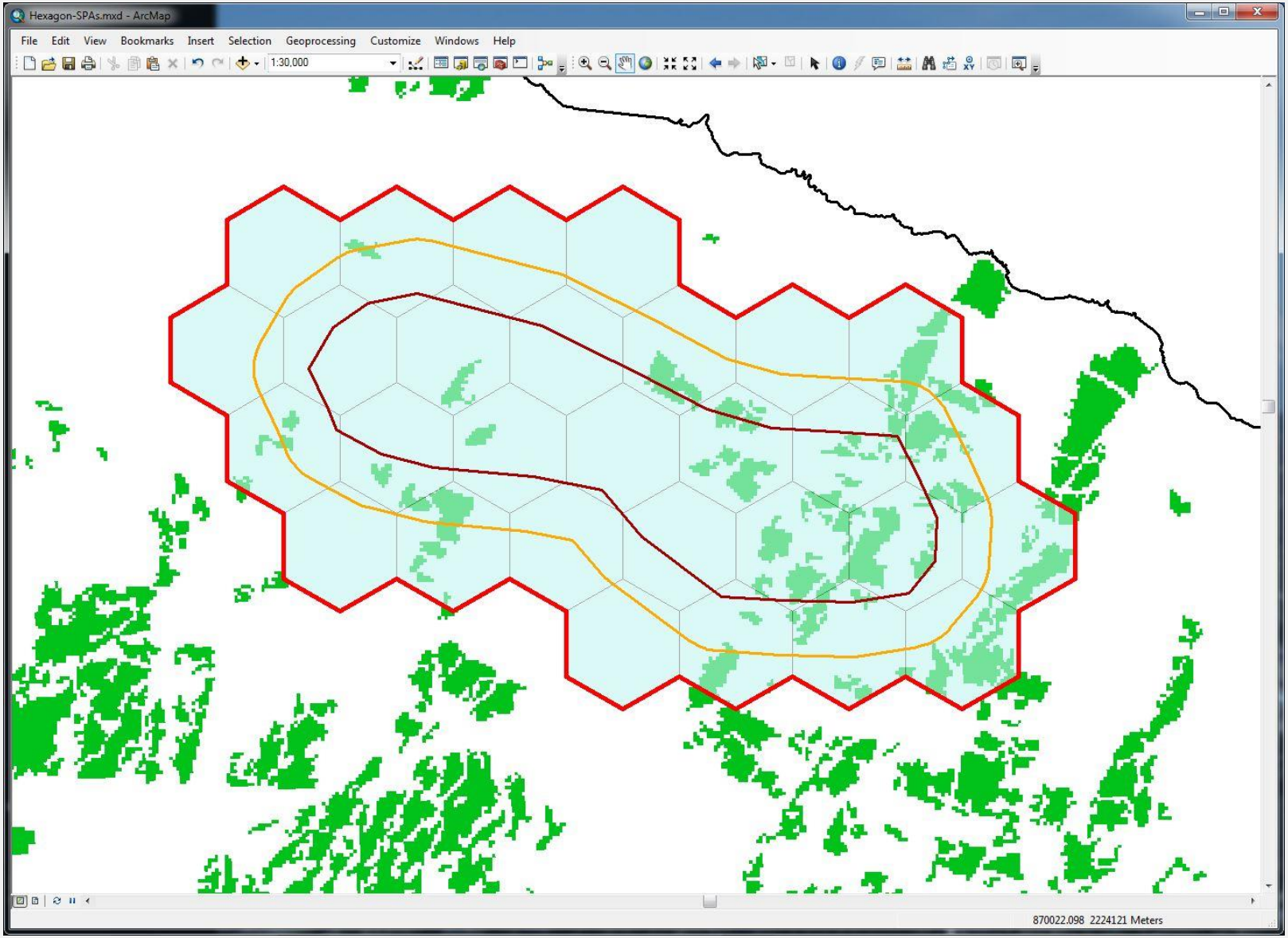
Species Protection Area Example



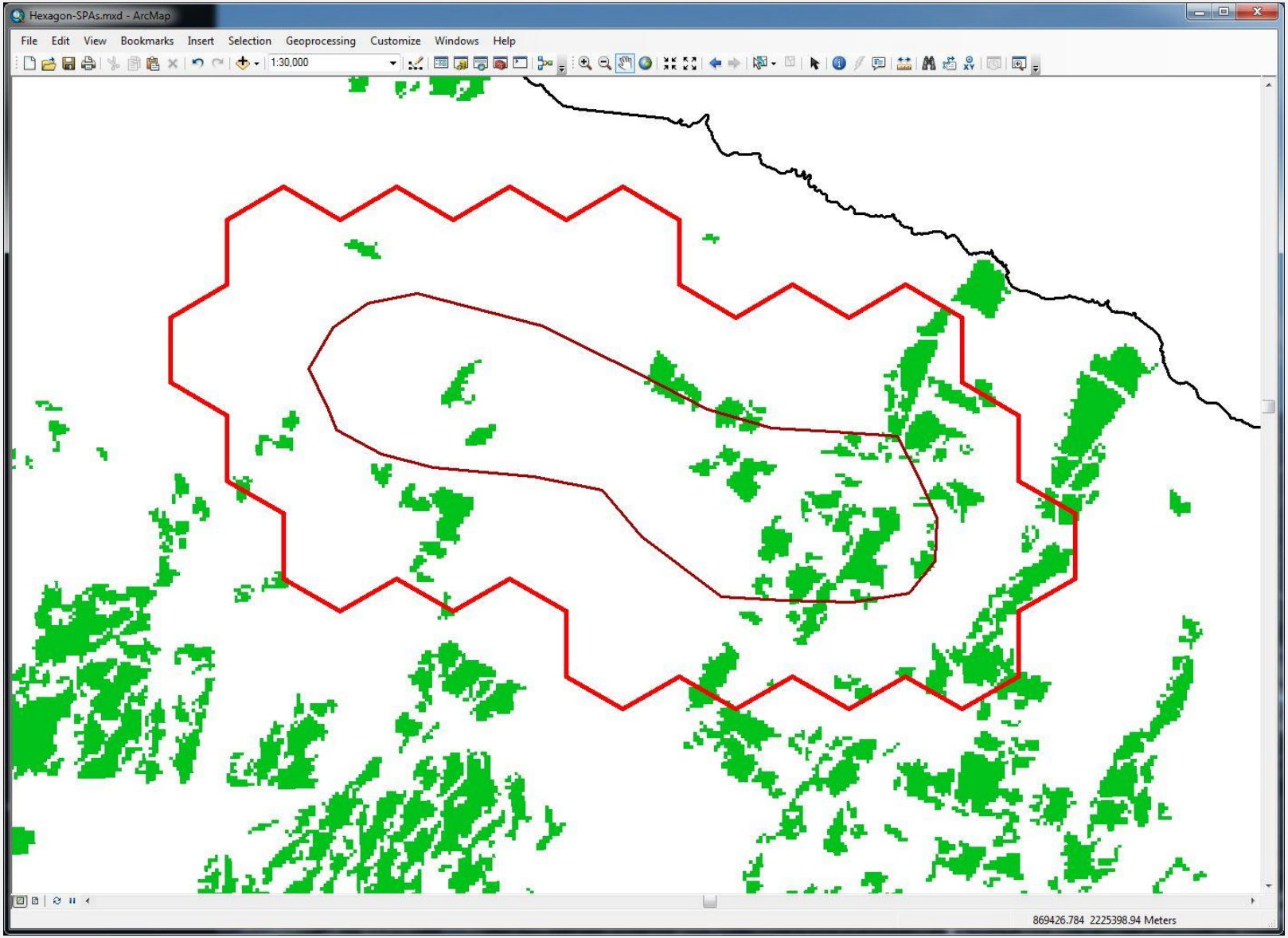
Species Protection Area Example



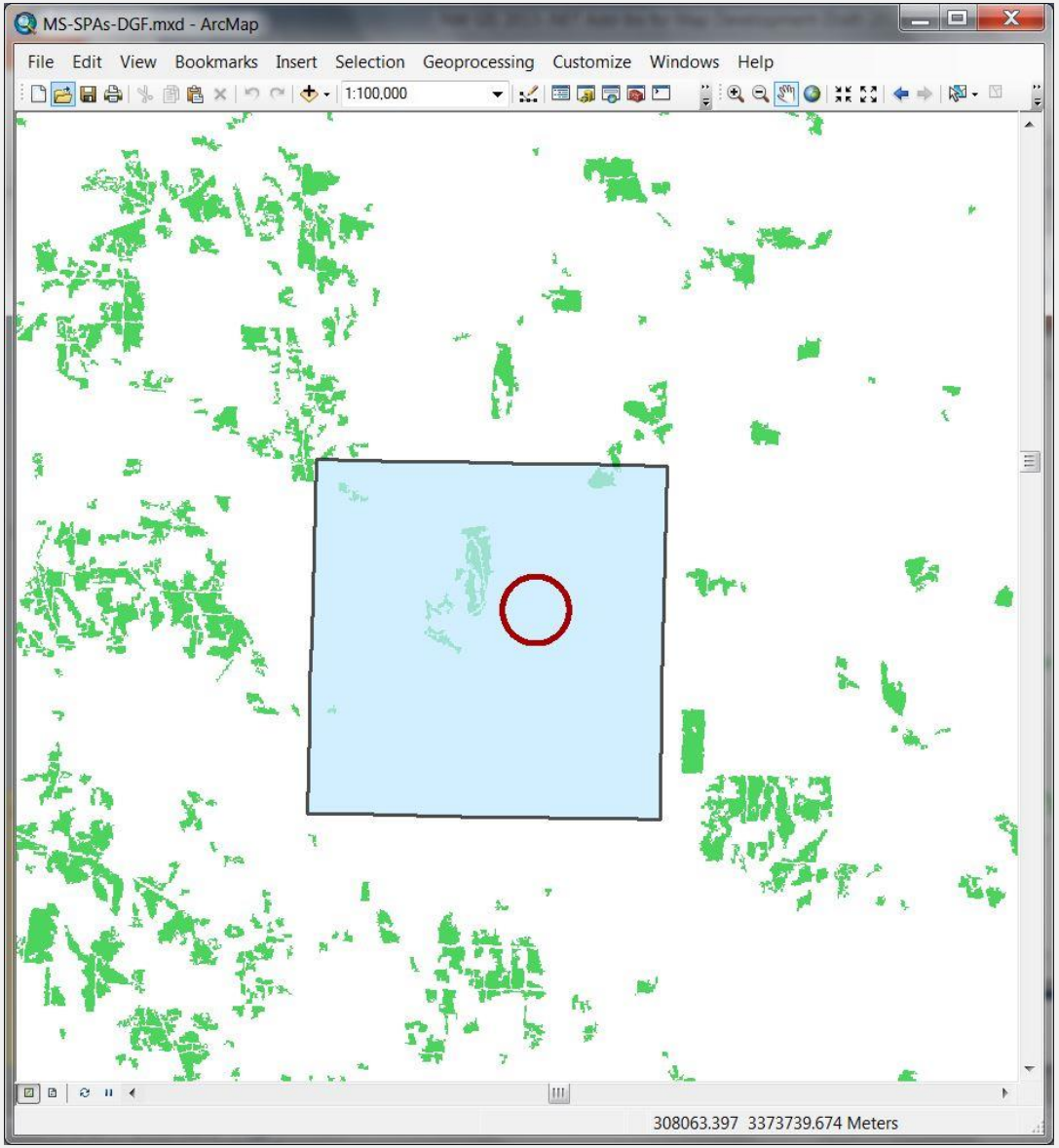
Species Protection Area Example

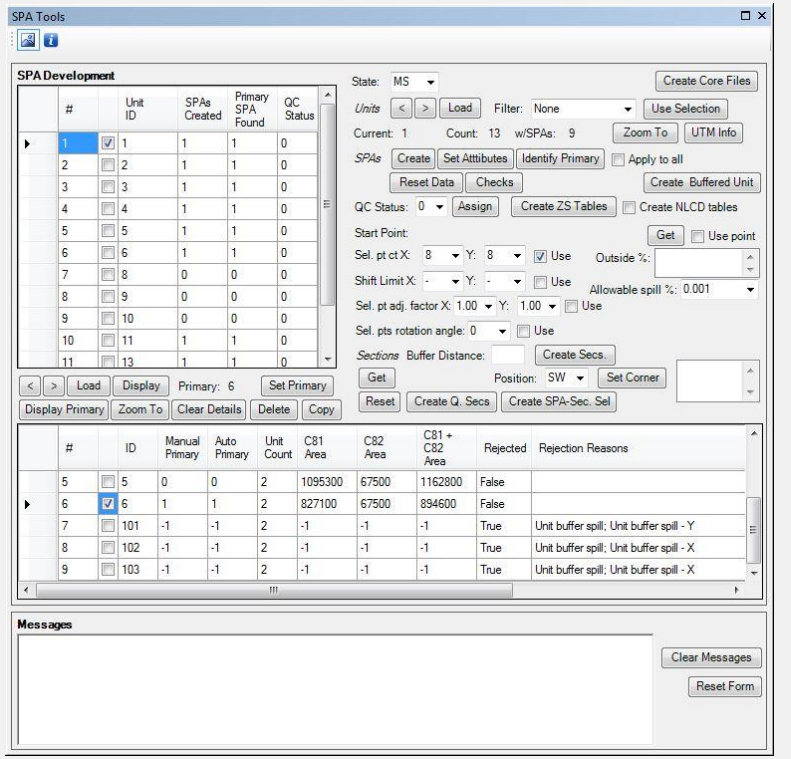


Species Protection Area Example



Species Protection Area Tools – Primary Area

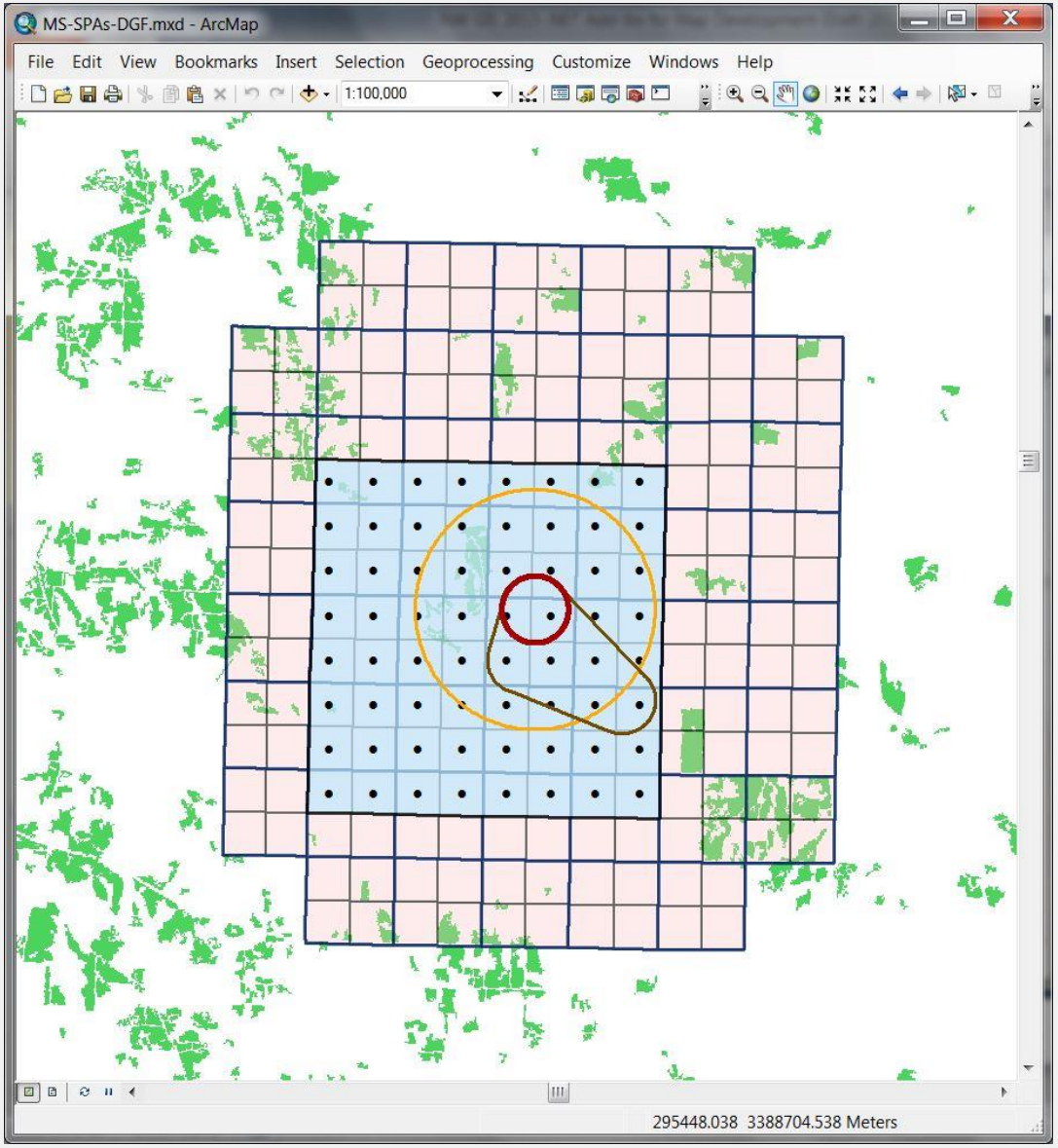


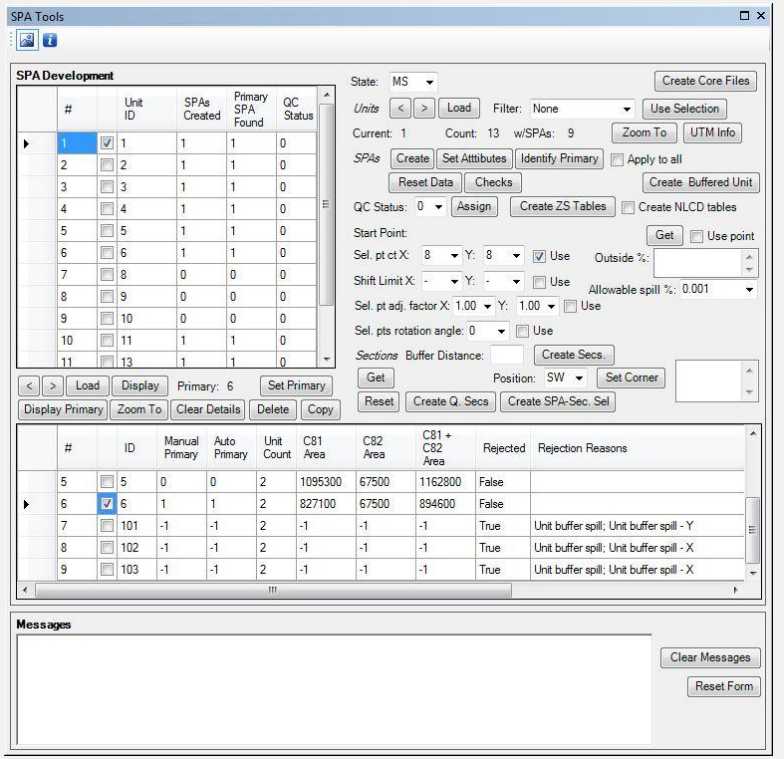


Quarter section example:

- U.S. Fish and Wildlife Service Critical Habitat (CH) locations for Dusky Gopher Frog in Mississippi
- Polygon of defined maximum size positioned such that
  - number of overlapping CH locations is maximized
  - area of agricultural land cover is minimized
- Polygons based on aggregation of selected quarter sections

Species Protection Area Tools – Area Construction

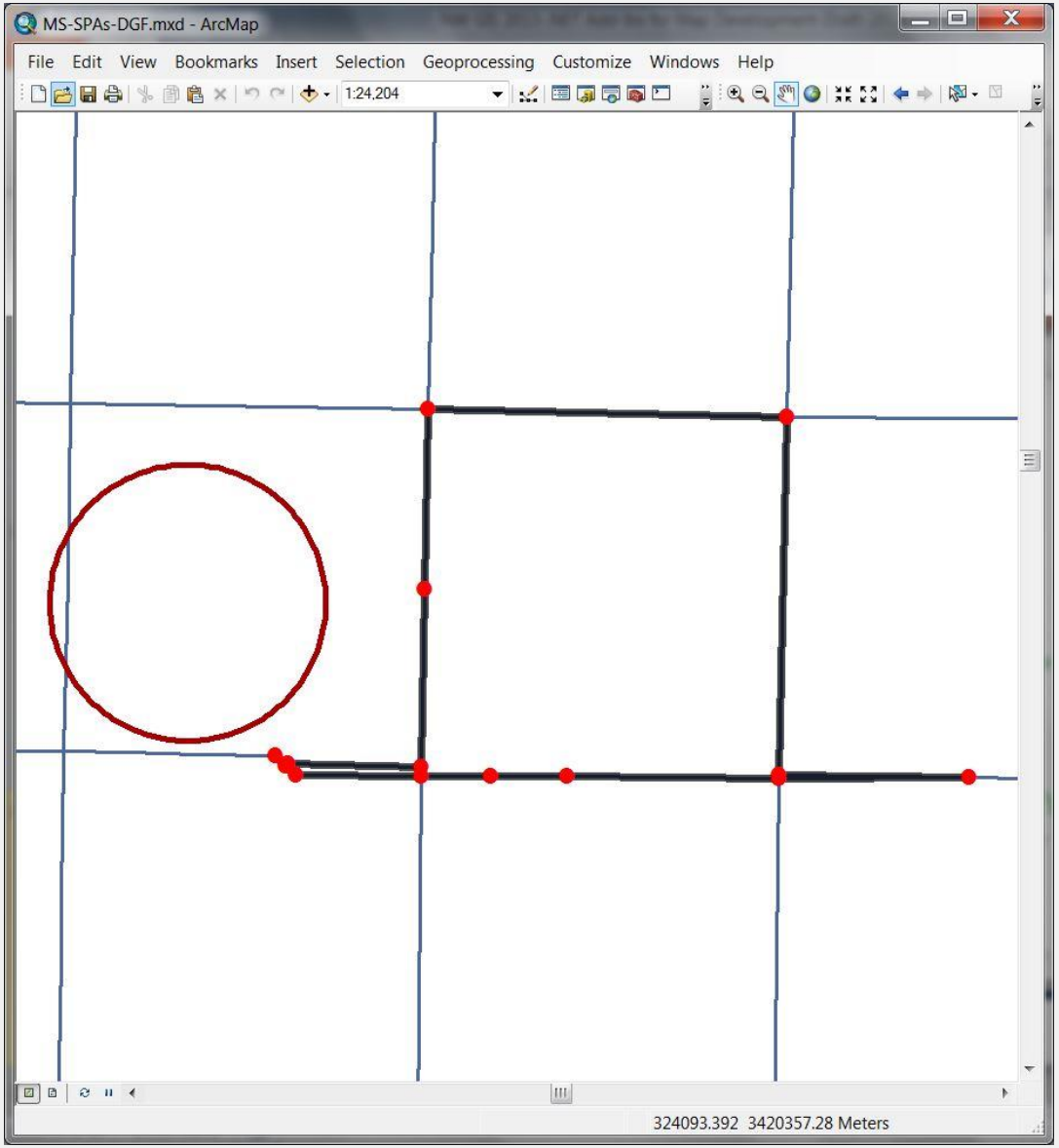


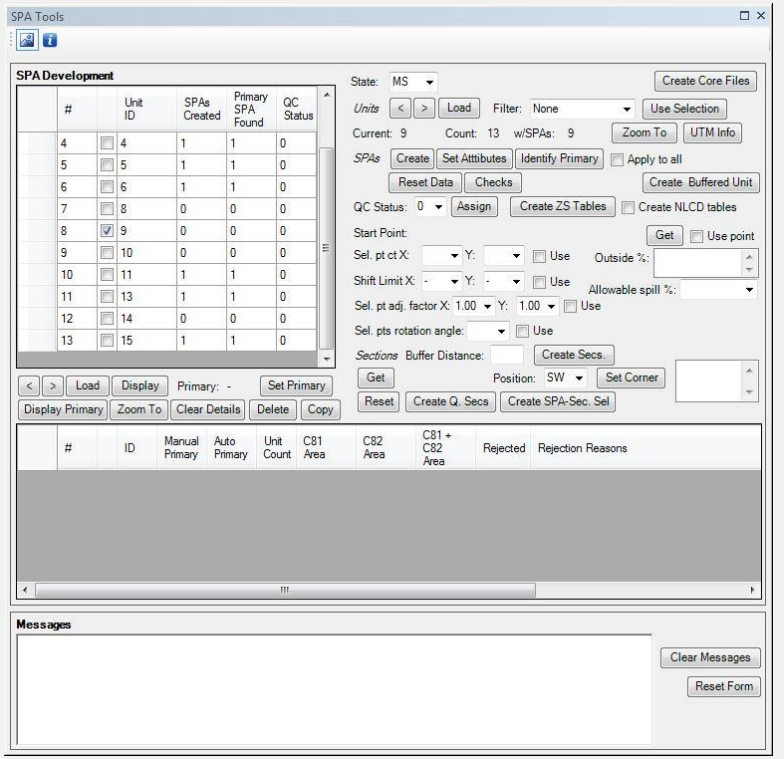


Key datasets:

- Public Land Survey Sections
- Derived quarter sections
- Critical Habitat locations
- Buffered Critical Habitat locations
- Selection points
- 2006 National Land Cover Data (NLCD)

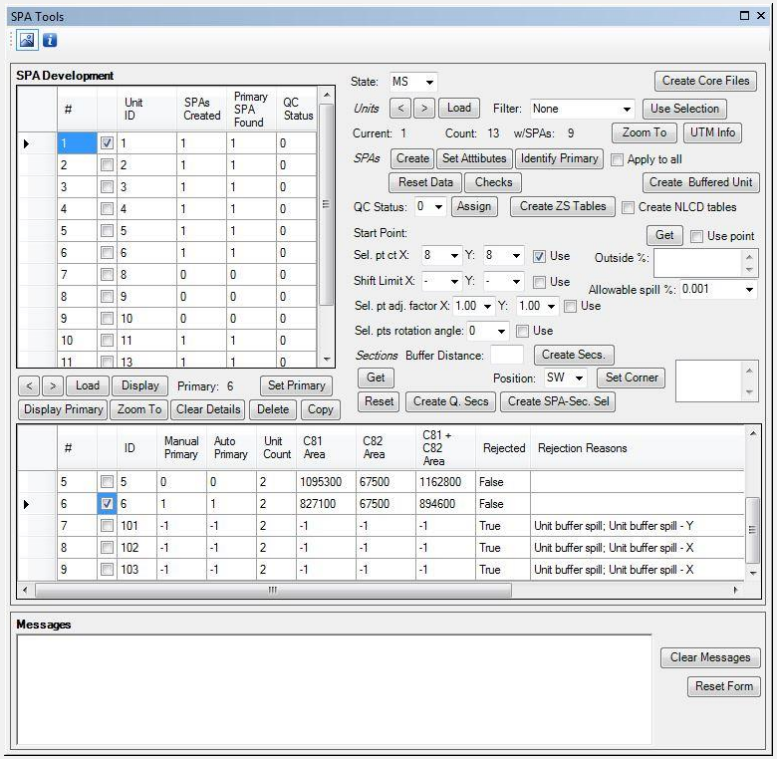
Species Protection Area Tools – Challenges



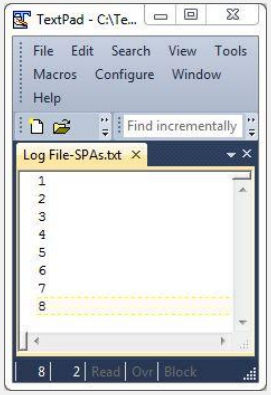


- Quarter section creation problem due to inability to automatically find corners
- Manually define corners and pass to procedure

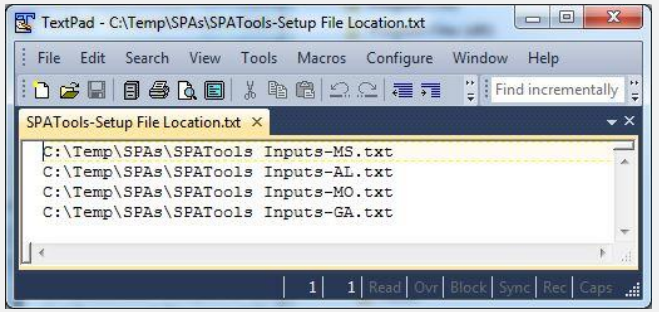
Species Protection Area Tools – Operation



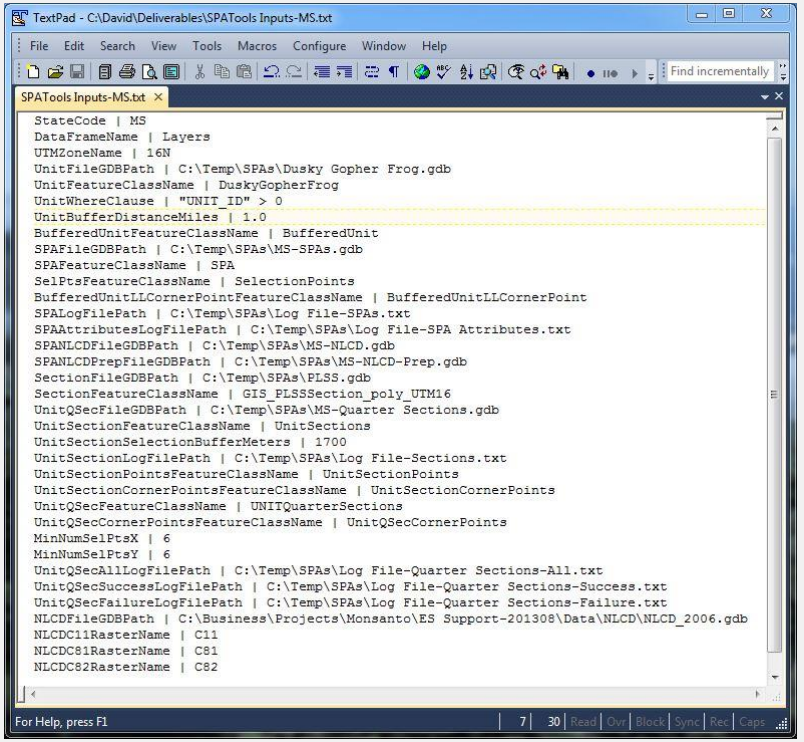
Log file



Setup file location file



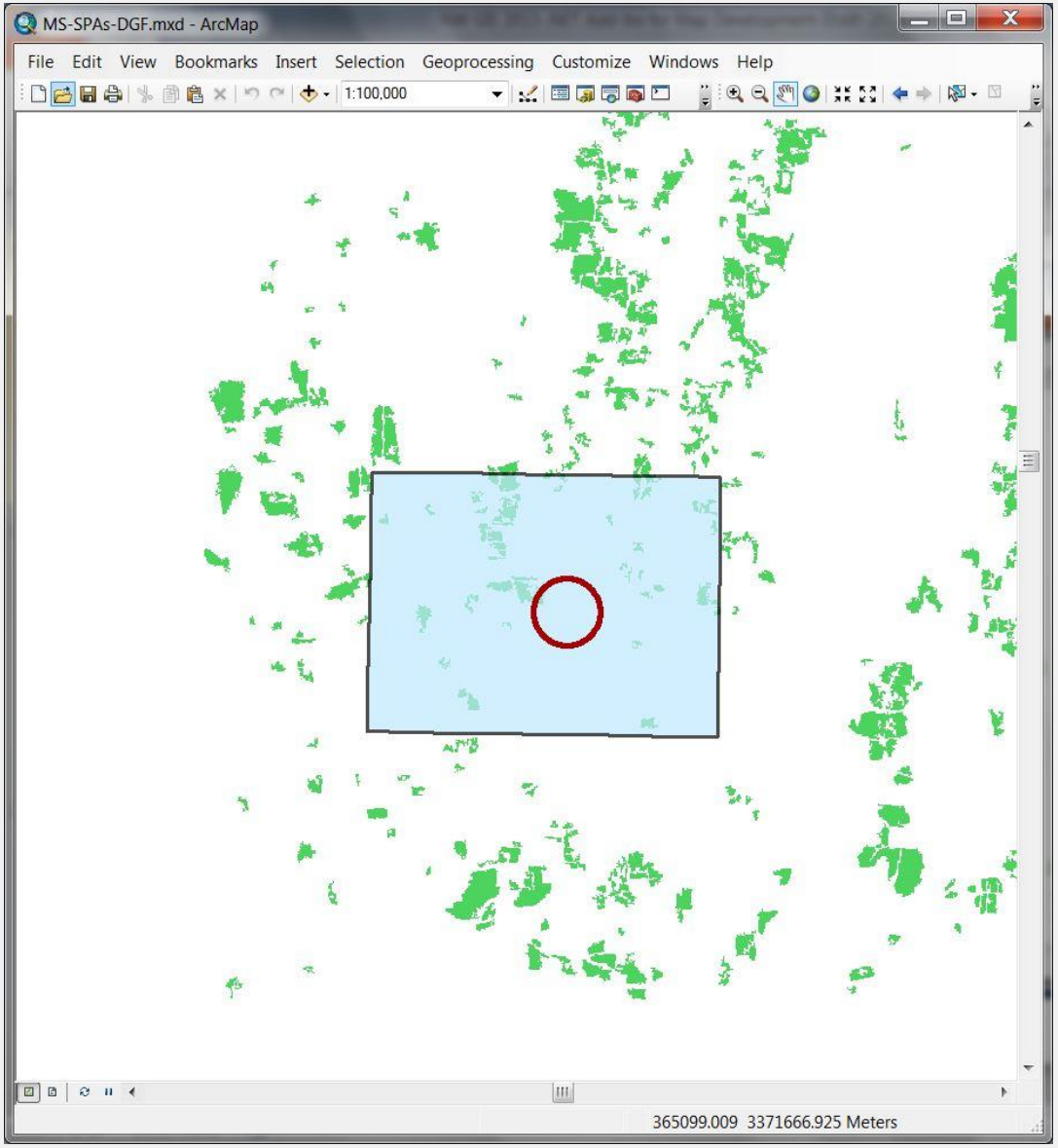
Setup file

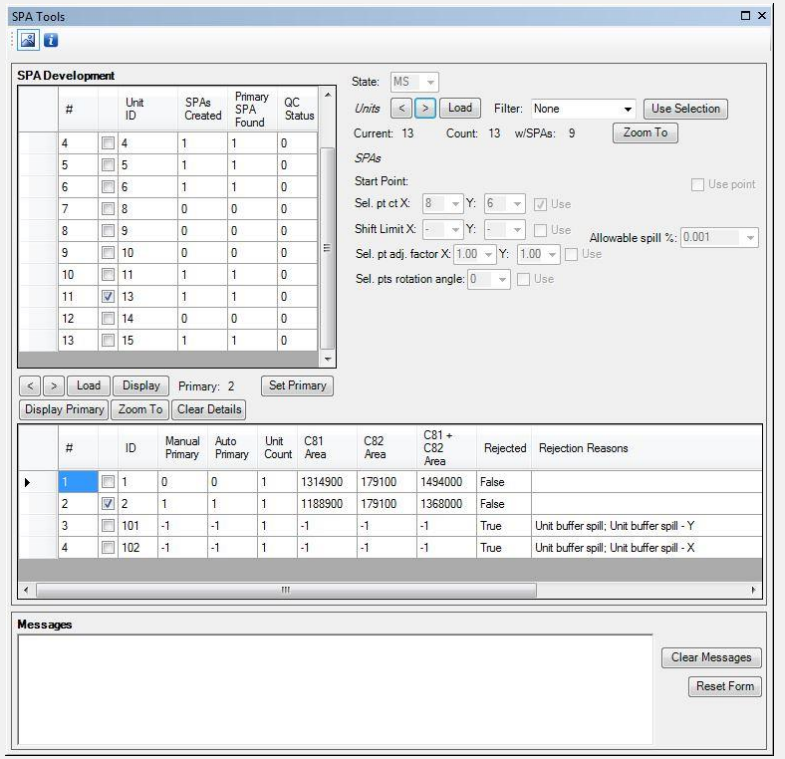


Deliverables

Name	Date modified	Type	Size
Code	10/13/2013 2:17 PM	File folder	
MS-Quarter Sections.gdb	10/13/2013 2:25 PM	File folder	
MS-SPAs.gdb	10/13/2013 2:25 PM	File folder	
MS-SPAs-DGF.mxd	10/13/2013 1:18 PM	ArcGIS ArcMap Document	2,439 KB
SPAs-MS-DGF-20131013-1420.zip	10/13/2013 2:20 PM	Compressed (zipped) Folder	1,078 KB
SPATools Inputs-MS.txt	10/13/2013 2:11 PM	TXT File	2 KB
SPATools-20131013-1415.esriaddin	10/13/2013 1:18 PM	Esri AddIn File	265 KB

Species Protection Area Tools – Deliverable





- Read-only version of tools (functionality hidden as required)
- Tools appearance is a low priority
- Main priority is output data

Development Considerations

- Core Construction
  - Allow for continual expansion
  - Create re-usable code and share between add-in and standalone processes
  - Code neatly and descriptively and comment well

- Approaches used here are generally applicable to a wider variety of automation procedures
  - Storing/accessing setup parameters
  - Log file usage
  - Process control

It's always in your interests to generate high quality products that are simple to maintain

Closing Remarks

- Developing customized procedures yourself or with assistance from someone else can allow you to reap tremendous returns on what can be a sizeable investment in a product such as ArcGIS for Desktop

- Despite the current heavy emphasis on cloud functionality, the benefits of desktop functionality are likely to remain strong for many years to come

  Streamlined approaches can often pay for themselves many times over

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