

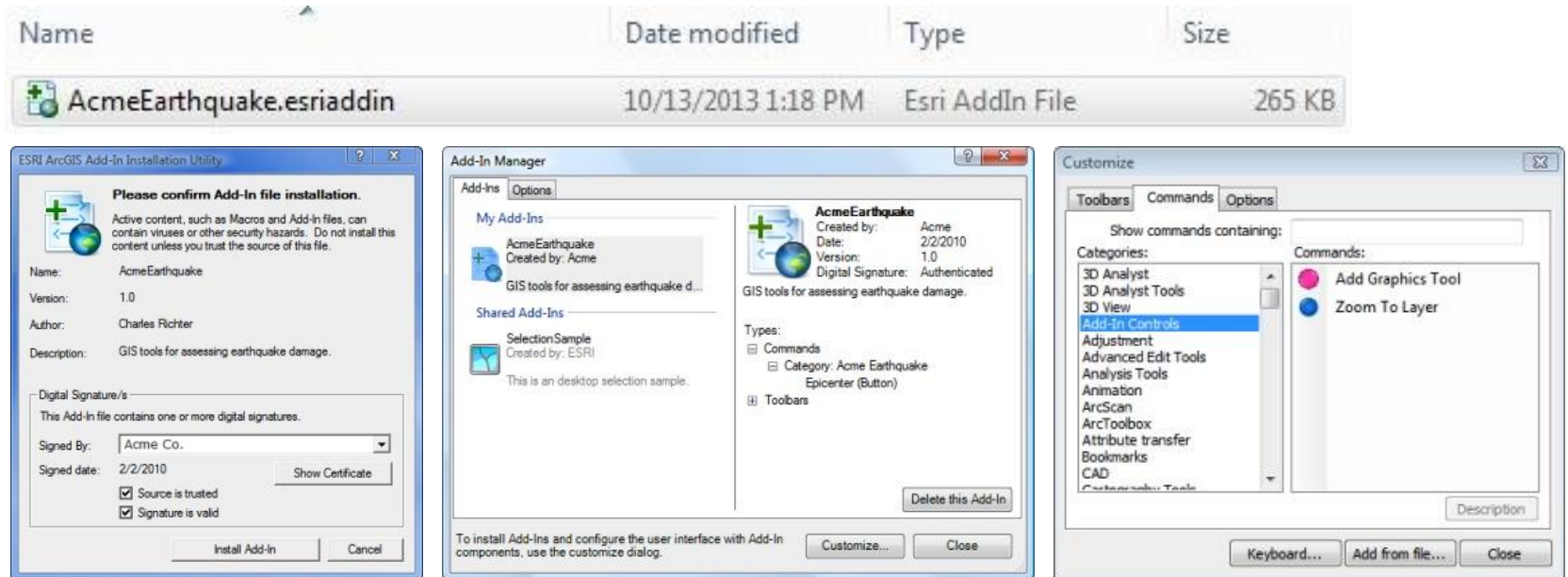
.NET Add-Ins for ArcGIS Map & Data Development

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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 ArcMap .NET add-ins using 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



*A Division of Hancock Timber Resource Group,
A Manulife Asset Management Company*

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

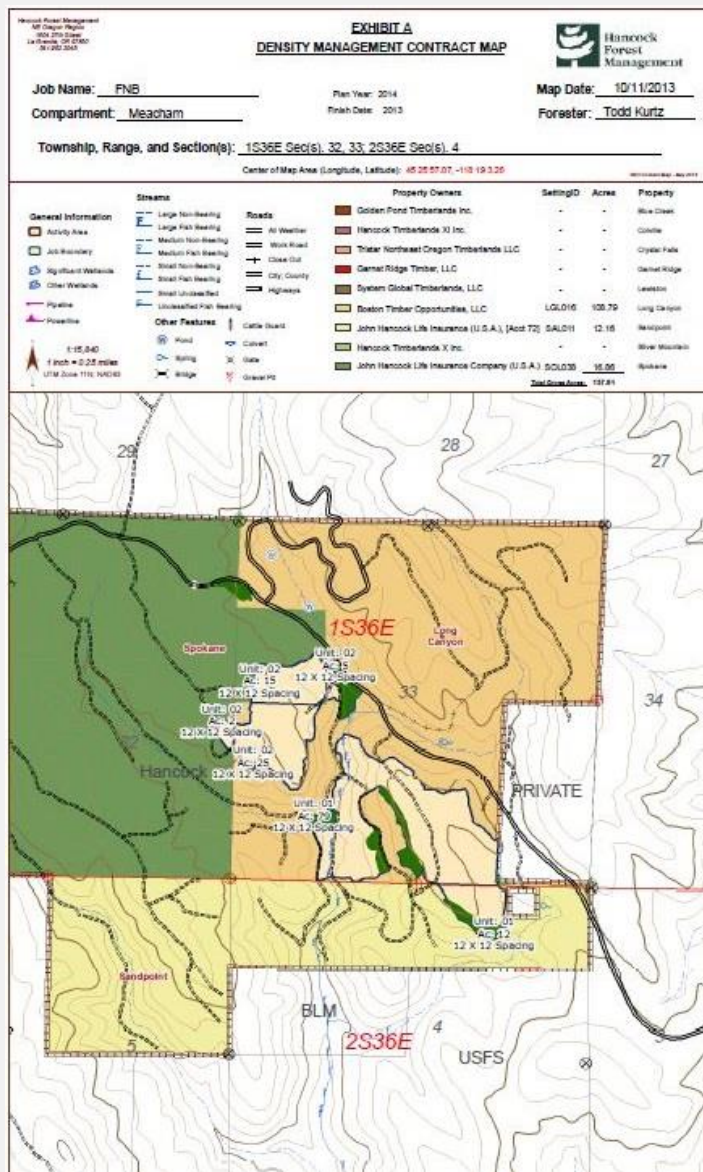


Mike McGuire at Ascent GIS, Inc., Spokane,
Washington for his role in securing the Hancock
project

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
 1804 27th Street
 La Grande, OR 97602
 541.282.2045

EXHIBIT A
FEE LOGGING CONTRACT MAP



**Hancock
Forest
Management**

Job Name: EBO

Compartment: Linton Mtn.

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

Plan Year: 2013

Start Date: 10/15/2014

Finish Date: ---

Map Date: 10/14/2013

Forester: Bob Smith

Center of Map Area (Latitude, Longitude): 45 48 51.88, -118 10 16.97

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
- Cable Guard
- Culvert
- Gate
- Gravel Pit
- Pipeline
- Powerline

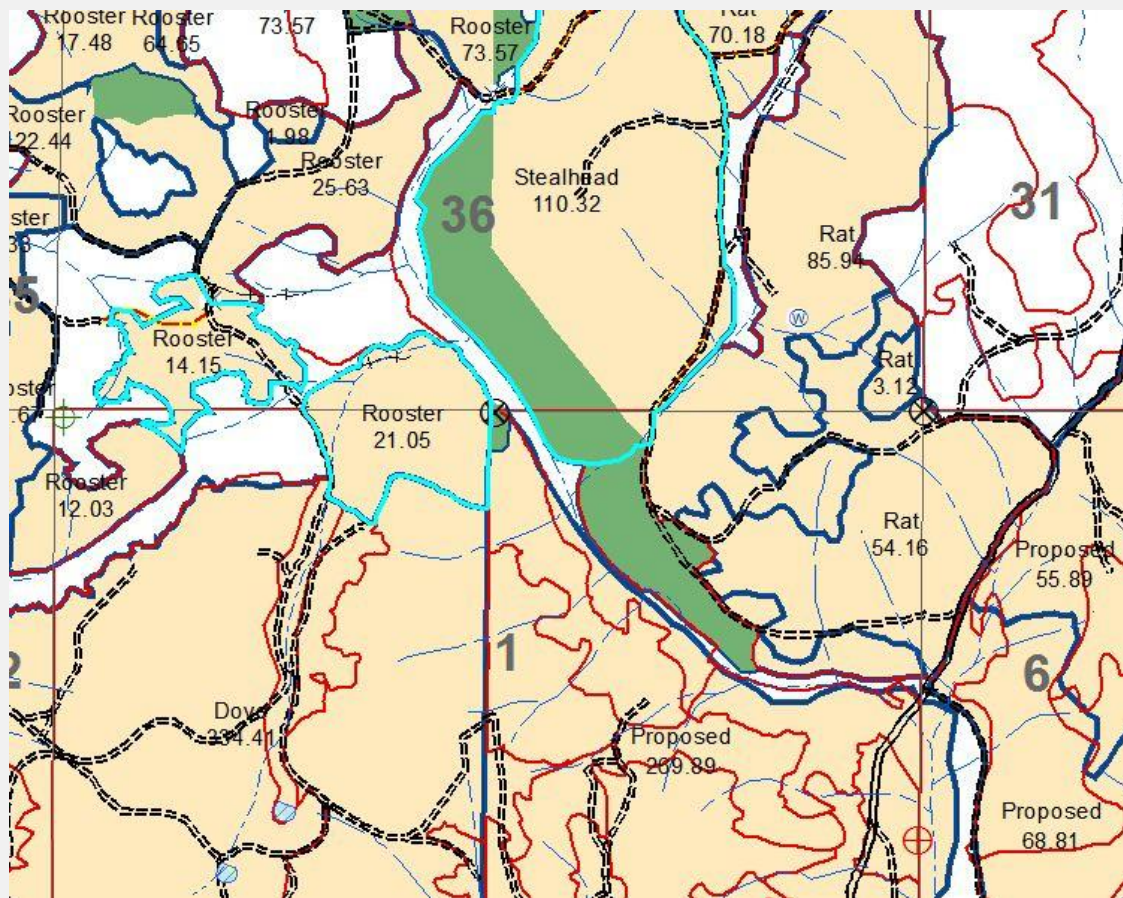
TriStar Ownership

- Series D Tristar NE Oregon Timberlands LLC
- Series B Tristar NE Oregon Timberlands LLC
- Series G Tristar NE Oregon Timberlands LLC
- Garnet Ridge
- Series F Tristar NE Oregon Timberlands LLC
- Series E Tristar NE Oregon Timberlands LLC
- Series C Tristar NE Oregon Timberlands LLC
- Series A Tristar NE Oregon Timberlands LLC
- Series H Tristar NE Oregon Timberlands LLC

SettingID	Acres	Property
BLL054	71.88	Blue Creek
-	-	Colville
-	-	Crystal Falls
-	-	Garnet Ridge
-	-	Lewiston
-	-	Long Canyon
-	-	Sandpoint
SML054	234.74	Silver Mountain
-	-	Spokane
Total Gross Acres:		306.62

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

Forester Mapping Tools – Area Calculations



Area Calculations

Clip Layer - (1 Feature(s) Selected) Name Field
Harvest JobName

Source Layer - (Layer to be Clipped)
Settings

Buffer Layer - (Optional)
Wetlands

Field Function
Acres Average

Add All Add --> <-- Remove

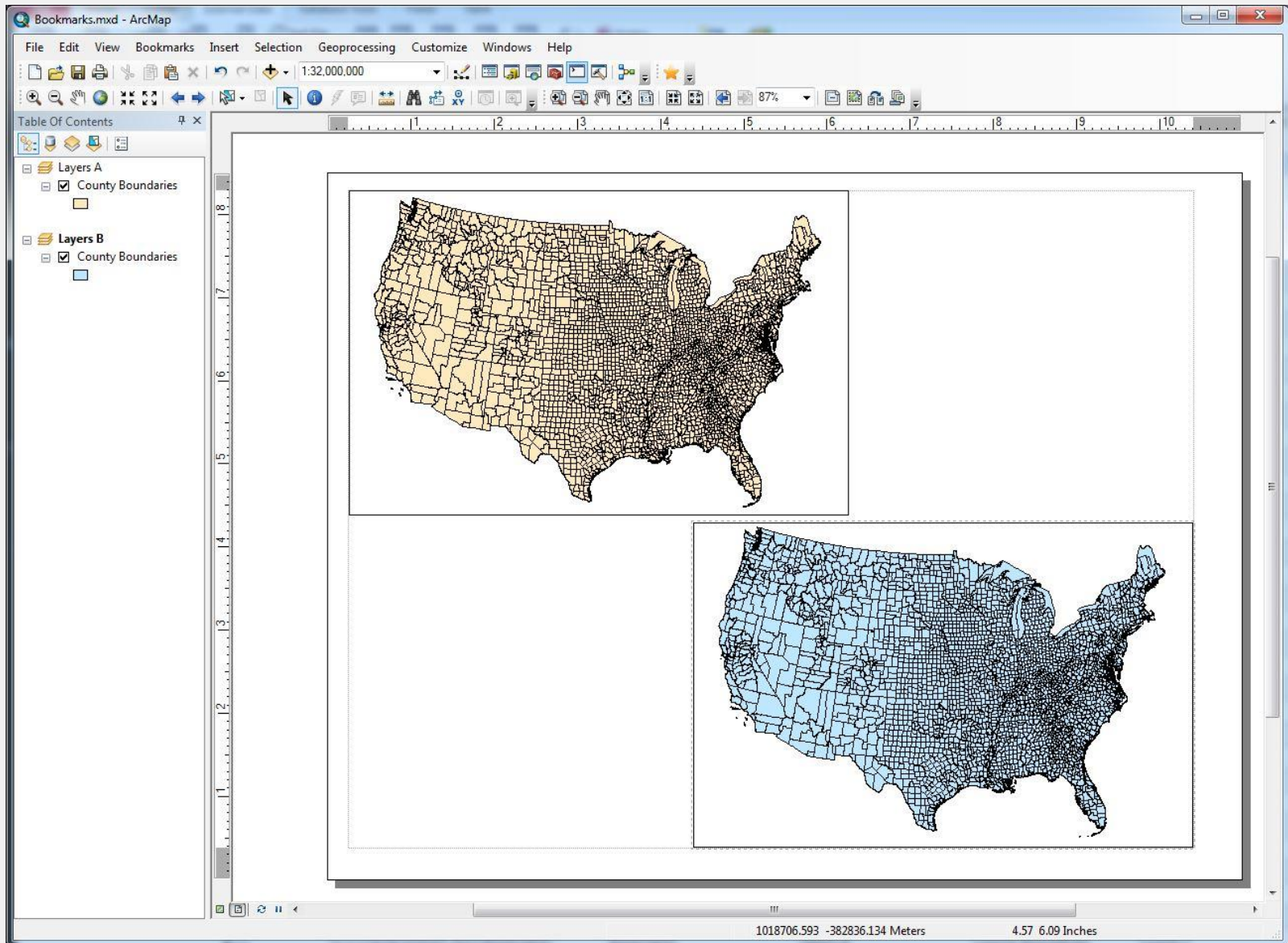
Fields to Calculate
Acres - Average

OK Cancel

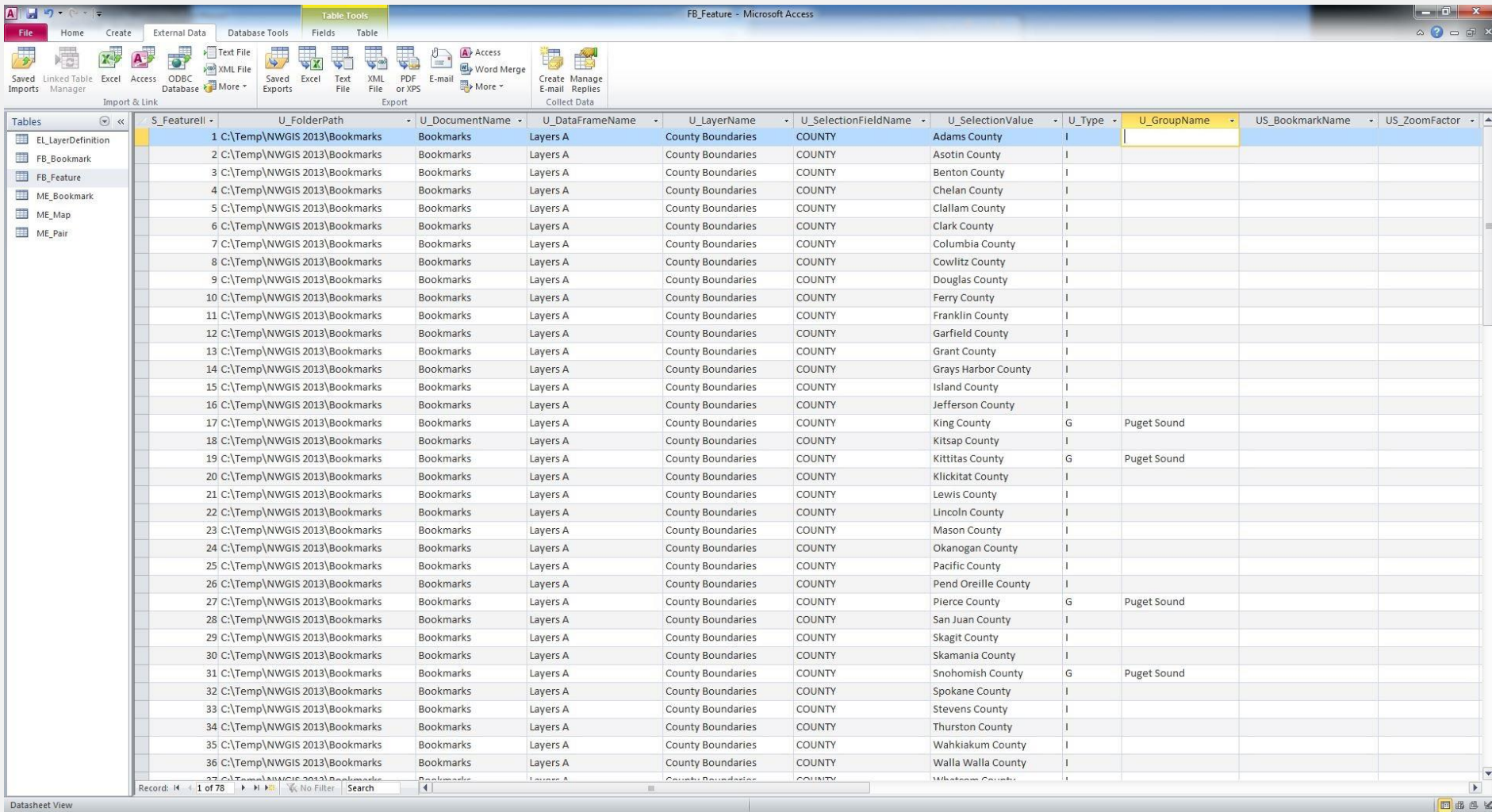
Example 2

Bookmark Tools

Bookmark Tools



Bookmark Tools – Input Feature Records



The screenshot shows the Microsoft Access application window titled "FB_Feature - Microsoft Access". The ribbon includes "File", "Home", "Create", "External Data", "Database Tools", "Fields", and "Table". The "Table" ribbon is active, showing options for "Import & Link", "Export", and "Access". The "Tables" list on the left includes "EL_LayerDefinition", "FB_Bookmark", "FB_Feature", "ME_Bookmark", "ME_Map", and "ME_Pair". The main area displays a table with the following columns: S_FeatureID, U_FolderPath, U_DocumentName, U_DataFrameName, U_LayerName, U_SelectionFieldName, U_SelectionValue, U_Type, U_GroupName, US_BookmarkName, and US_ZoomFactor. The table contains 36 rows of data, with the first row highlighted in blue. The status bar at the bottom indicates "Record: 1 of 36" and "No Filter".

S_FeatureID	U_FolderPath	U_DocumentName	U_DataFrameName	U_LayerName	U_SelectionFieldName	U_SelectionValue	U_Type	U_GroupName	US_BookmarkName	US_ZoomFactor
1	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Adams County	I			
2	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Asotin County	I			
3	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Benton County	I			
4	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Chelan County	I			
5	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Clallam County	I			
6	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Clark County	I			
7	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Columbia County	I			
8	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Cowlitz County	I			
9	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Douglas County	I			
10	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Ferry County	I			
11	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Franklin County	I			
12	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Garfield County	I			
13	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Grant County	I			
14	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Grays Harbor County	I			
15	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Island County	I			
16	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Jefferson County	I			
17	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	King County	G	Puget Sound		
18	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Kitsap County	I			
19	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Kittitas County	G	Puget Sound		
20	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Klickitat County	I			
21	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Lewis County	I			
22	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Lincoln County	I			
23	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Mason County	I			
24	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Okanogan County	I			
25	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Pacific County	I			
26	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Pend Oreille County	I			
27	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Pierce County	G	Puget Sound		
28	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	San Juan County	I			
29	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Skagit County	I			
30	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Skamania County	I			
31	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Snohomish County	G	Puget Sound		
32	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Spokane County	I			
33	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Stevens County	I			
34	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Thurston County	I			
35	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Wahkiakum County	I			
36	C:\Temp\NWGIS 2013\Bookmarks	Bookmarks	Layers A	County Boundaries	COUNTY	Walla Walla County	I			

Bookmark Tools – Initial Feature Record Load

Bookmark Tools

Database Path: C:\Temp\NW\GIS 2013\Bookmarks\Bookmarks.mdb Set Path

Data Frame: Layers A Layer: County Boundaries

Feature Bookmark Records Load from Database Default Zoom Factor (10-99): 80 Filter Term: Select Column Apply Reset

	#	ID	Selection Field	Selection Value	Type	Group	Bookmark Name	Zoom Factor	Alert	Select	Final Bookmark Name
▶	1	1	COUNTY	Adams County	I					<input checked="" type="checkbox"/>	
	2	2	COUNTY	Asotin County	I					<input checked="" type="checkbox"/>	
	3	3	COUNTY	Benton County	I					<input checked="" type="checkbox"/>	
	4	4	COUNTY	Chelan County	I					<input checked="" type="checkbox"/>	
	5	5	COUNTY	Clallam County	I					<input checked="" type="checkbox"/>	
	6	6	COUNTY	Clark County	I					<input checked="" type="checkbox"/>	
	7	7	COUNTY	Columbia County	I					<input checked="" type="checkbox"/>	
	8	8	COUNTY	Cowlitz County	I					<input checked="" type="checkbox"/>	

Select All Unselect All Complete Group Selection Store Selection Check Records Create Bookmark(s) Remove Bookmark(s) Save to Database < >

Bookmark Records

	#	Bookmark Name	Alert	Select
	4	County Boundaries_COUNTY_Chelan County_080		<input type="checkbox"/>
	5	County Boundaries_COUNTY_Clallam County_080		<input type="checkbox"/>
	6	County Boundaries_COUNTY_Clark County_080		<input type="checkbox"/>
	7	County Boundaries_COUNTY_Columbia County_080		<input type="checkbox"/>

Filter Term: Select Column Apply Reset

Load from Database Select All Unselect All

Zoom to Bookmark Select Features for Bookmark

Remove Bookmark(s) Clear Feature Selection

Messages Clear Messages and Alert Column Reset Form

Bookmark Tools – Bookmark Creation

The screenshot displays the 'Bookmark Tools' application window. At the top, the 'Database Path' is set to 'C:\Temp\NW\GIS 2013\Bookmarks\Bookmarks.mdb'. The 'Data Frame' is 'Layers A' and the 'Layer' is 'County Boundaries'. Below this, the 'Feature Bookmark Records' section includes a 'Load from Database' button, a 'Default Zoom Factor (10-99)' of 80, a 'Filter Term' field, and 'Select Column', 'Apply', and 'Reset' buttons.

#	ID	Selection Field	Selection Value	Type	Group	Bookmark Name	Zoom Factor	Alert	Select	Final Bookmark Name
1	1	COUNTY	Adams County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Adams County_080
2	2	COUNTY	Asotin County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Asotin County_080
3	3	COUNTY	Benton County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Benton County_080
4	4	COUNTY	Chelan County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Chelan County_080
5	5	COUNTY	Clallam County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Clallam County_080
6	6	COUNTY	Clark County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Clark County_080
7	7	COUNTY	Columbia County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Columbia County_080
8	8	COUNTY	Cowlitz County	I			80		<input checked="" type="checkbox"/>	County Boundaries_COUNTY_Cowlitz County_080

Below the table are buttons: 'Select All', 'Unselect All', 'Complete Group Selection', 'Store Selection', 'Check Records', 'Create Bookmark(s)', 'Remove Bookmark(s)', 'Save to Database', and navigation arrows.

The 'Bookmark Records' section shows a filtered list of 4 records with columns for '#', 'Bookmark Name', 'Alert', and 'Select'.

The 'Messages' section displays a message: '10/13/2013 10:40:23 PM Enter Zoom Factor Please enter a value between 10 and 99.'

A floating 'Bookmarks Manager' dialog is open on the right, showing a list of bookmark names. The first item, 'County Boundaries_COUNTY_Adams County_080', is selected. The dialog includes buttons for 'Zoom To', 'Pan To', 'Create...', 'Remove', 'Remove All', 'Load...', 'Save', and 'Close'.

Bookmark Tools – Map Export Record Creation

Bookmark Tools

Database Path: C:\Temp\NWGIS 2013\Bookmarks\Bookmarks.mdb Set Path

Edit View

	#		Map ID	Map Name	Pair ID	Data Frame Name	Bookmark Name		
▶	1	<input type="checkbox"/>	-	C Map	-1	Layers A	County Boundaries_COUNTY_Chelan County_080	-	<input type="checkbox"/>
	2	<input type="checkbox"/>			-2	Layers B	County Boundaries_COUNTY_Cowlitz County_020	-	<input type="checkbox"/>

Load from Database Refresh Add Map Record Save to Database

Select All Map Records Unselect All Map Records Remove Map Record(s) Select All Pairs Unselect All Pairs Remove Pair(s)

Messages

Clear Messages Reset Form

Bookmark Tools – Map Export

Bookmark Tools

Database Path: C:\Temp\NW\GIS 2013\Bookmarks\Bookmarks.mdb Set Path

Edit View

Output Folder Path: C:\Temp\NW\GIS 2013\Bookmarks\Maps Set Path Load Map Records

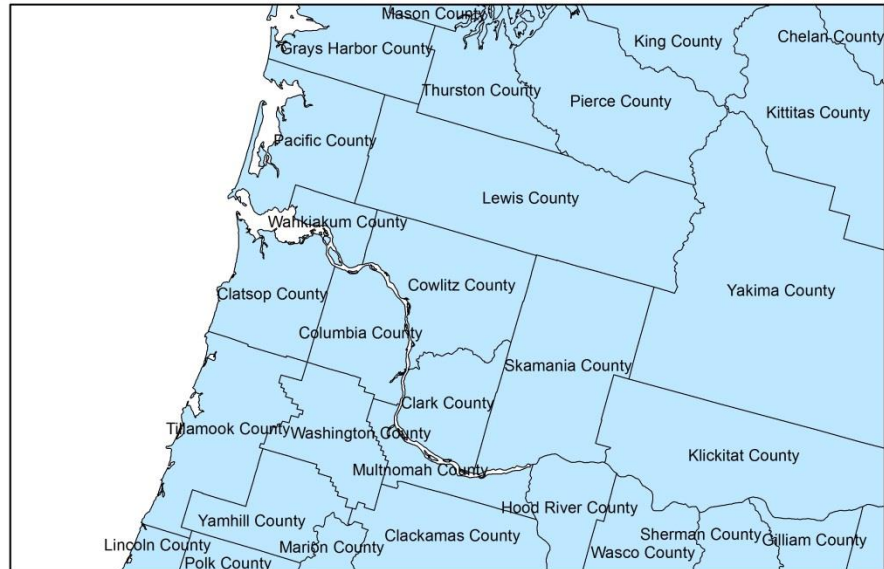
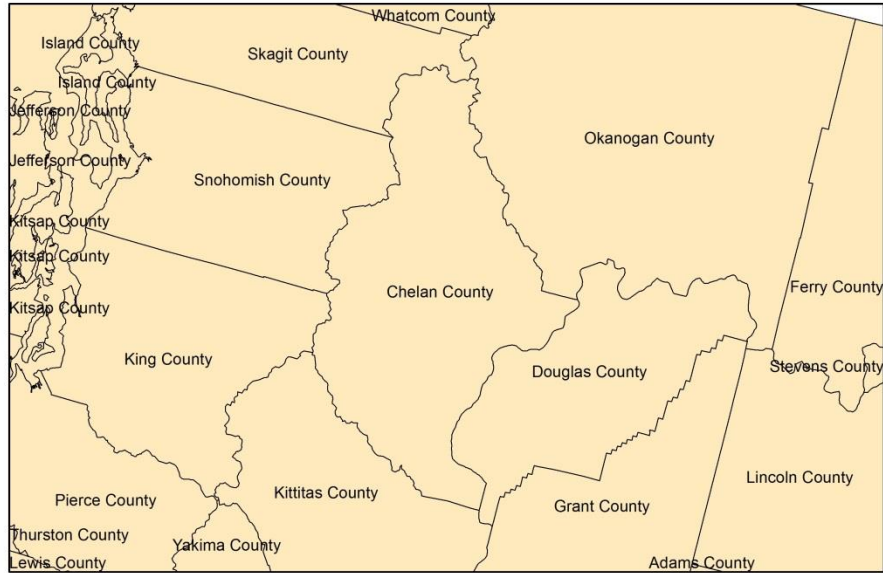
	#	Exported	Select	Map ID	Map Name	Layers A	Layers B
▶	1	*	<input checked="" type="checkbox"/>	-1	C Map	County Boundaries_COUNTY_Chelan County_080	County Boundaries_COUNTY_Cowlitz County_020

Select All Map Record Unselect All Map Records Type: JPEG ☒ Overwrite existing map document?

Select Columns for Display Apply Reset Resolution: 600 Export Map(s) Reset Exported Column

Messages Clear Messages Reset Form

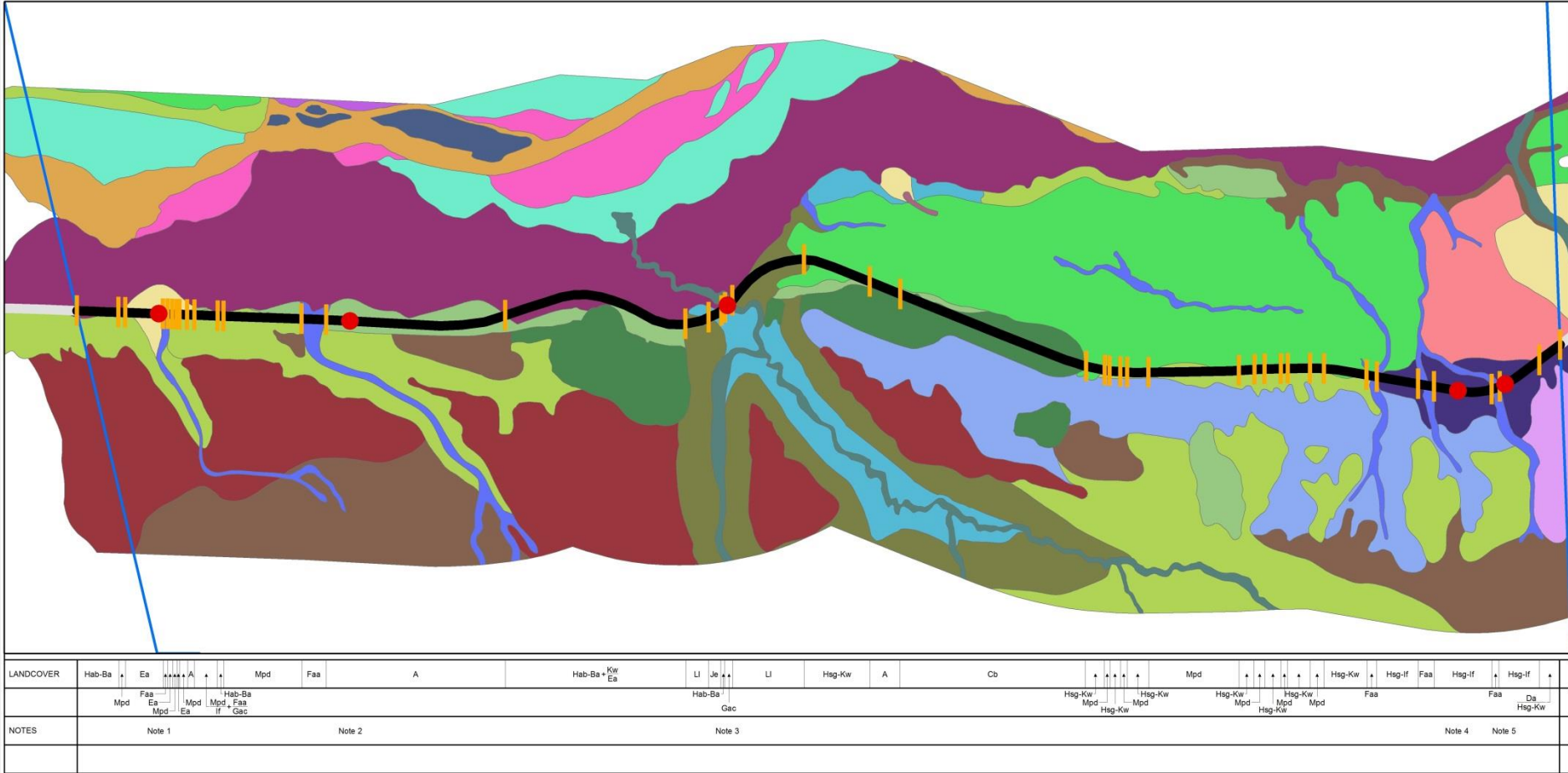
Bookmark Tools – Output



Example 3

Map Series Development Tools

Map Series Development Tools – Goal

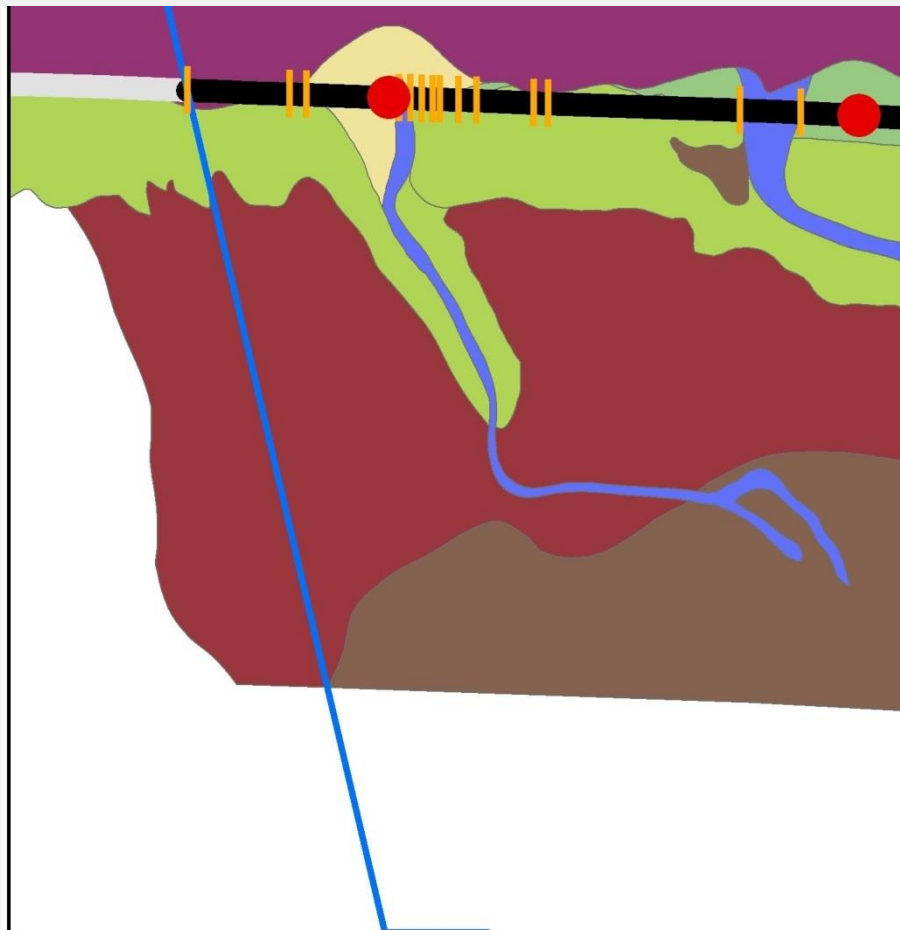


Generate a series of maps for the full length of a route

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



LANDCOVER	Hab-Ba	Ea	A	Mpd	Faa
	Mpd	Faa Ea Mpd	Mpd Ea	Mpd If	Hab-Ba Faa Gac
NOTES	Note 1				Note 2

Map Series Development Tools

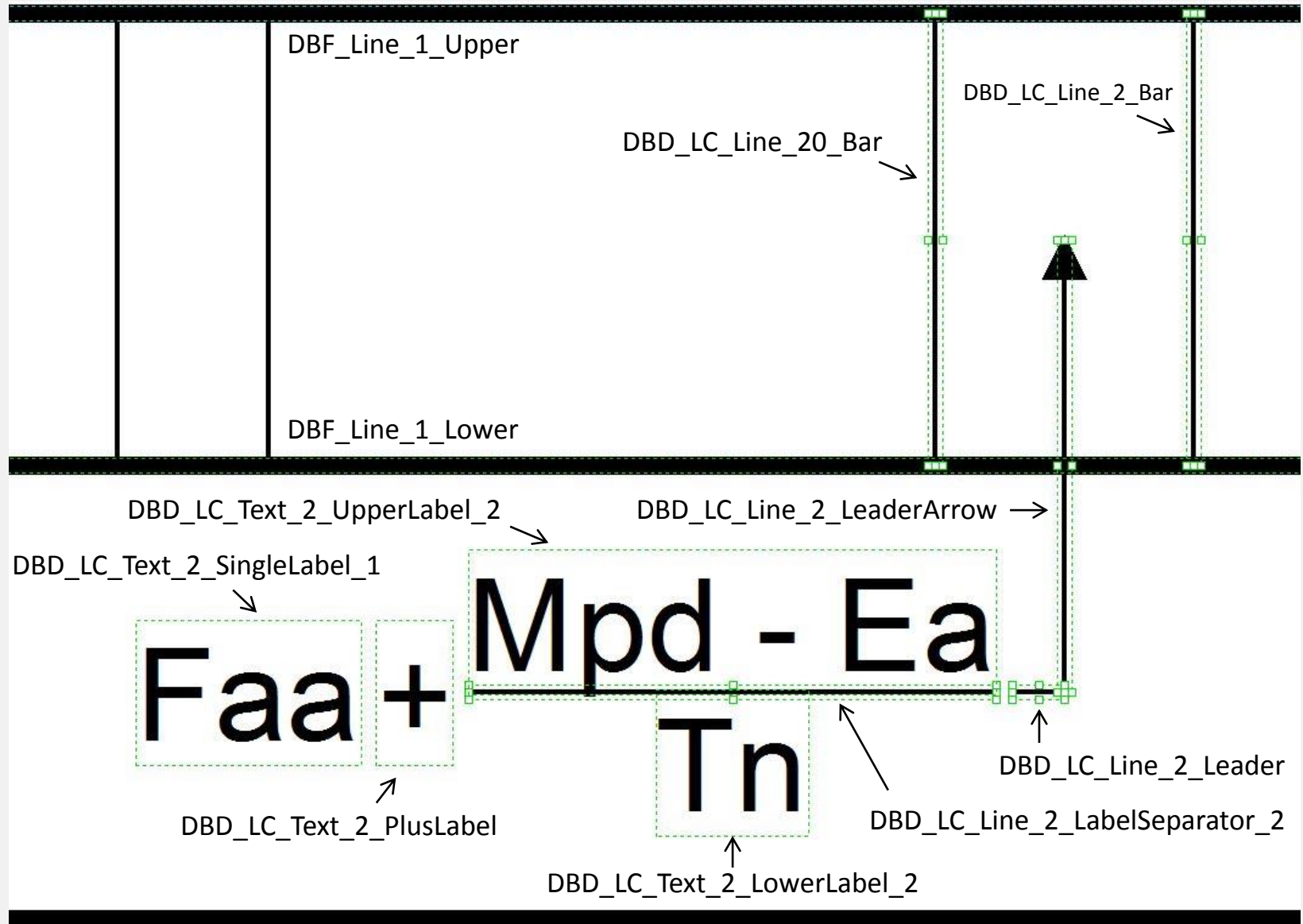
Setup
Setup file path: C:\Temp\Map Series Dev Inputs.bdt Select
Setup values:
Map document - C:\Temp\Demo\Demo.mxd
Map data file geodatabase - C:\Temp\Demo\Demo.gdb
Index layer - index_polygon
Index layer group ID - 1
Land cover route layer - landcover_alignment Update

Element Definition
Map: < > ☒ Update index only Current index: 21 Update Extent Set Map Index
Databand type: Land Cover ☐ Apply to all Build Load Delete
Adjust label position: Get Element Selected element name: <None selected>
Relative position: ☐ ☐ ☐ X adjustment factor: 1.00 Update
☐ ☒ ☐ Y adjustment factor: 1.00 Update
☐ ☐ ☐
Element definition: Clear Save Dynamic text: Update Custom map center: Set Reset

Map Export
Start Index: End Index: Set Current Map Output type: PDF Resolution: 300
☐ Overwrite existing file ☒ Load data bands? Export Map(s) Reset

Messages Show Info Clear Messages Reset Form

Map Series Development Tools – Element Name as Storage Unit



Map Series Development Tools – Element Definition Storage

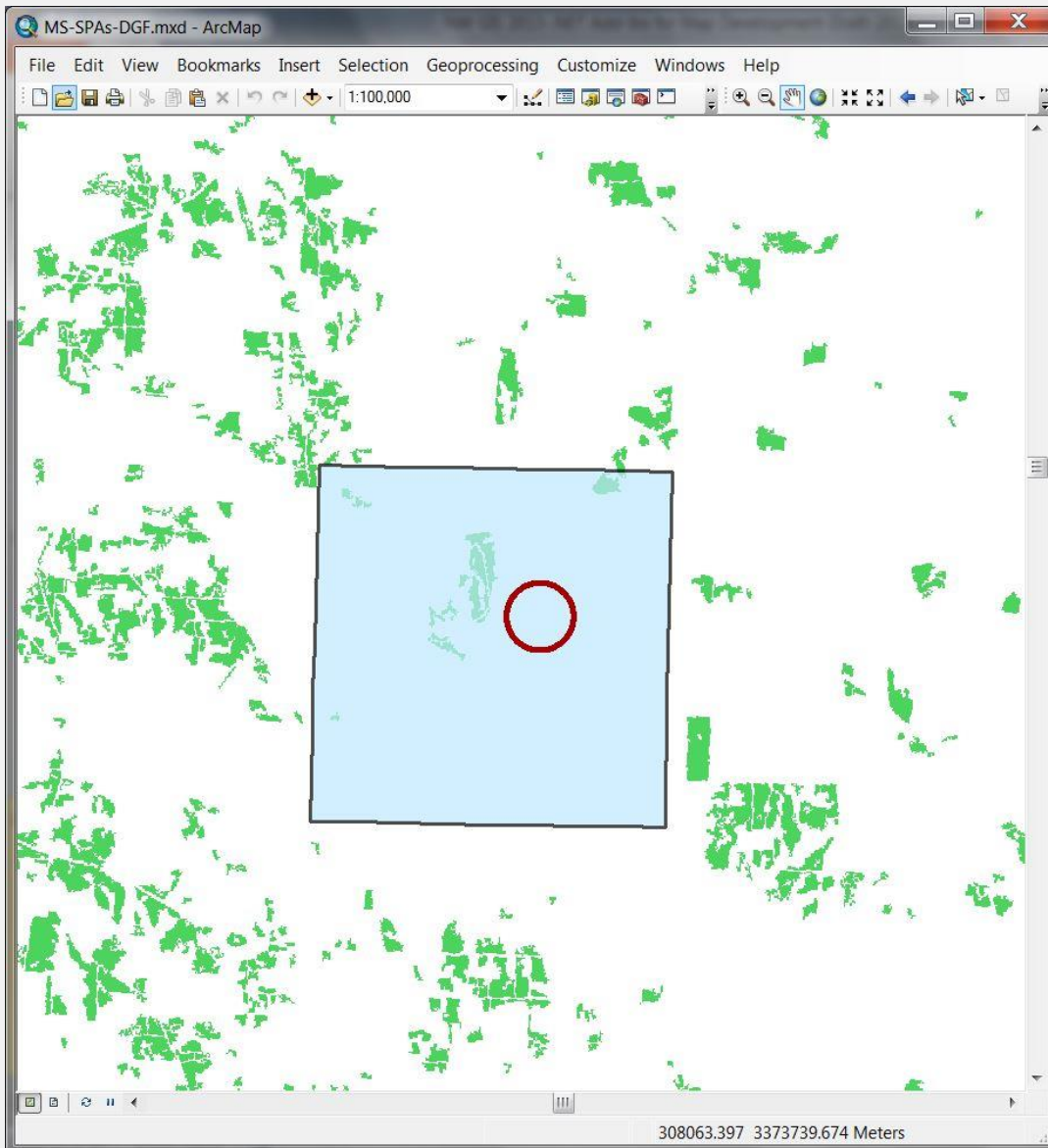
OBJECTID *	MapDocumentPath	IndexGroupID	IndexSeqID	ElementType	ElementName	PropertyName	PropertyValue	CreationDate
21313	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	Text	Tn	5/2/2013 10:09:34 PM
21314	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21315	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	Size	6	5/2/2013 10:09:34 PM
21316	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	PtX	14.9635999999991	5/2/2013 10:09:34 PM
21317	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	PtY	3.5581000000002	5/2/2013 10:09:34 PM
21318	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21319	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21320	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	AnchorPoint	esriTopMidPoint	5/2/2013 10:09:34 PM
21321	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21322	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	Width	0.25	5/2/2013 10:09:34 PM
21323	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	FromPtX	14.7945999999993	5/2/2013 10:09:34 PM
21324	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	FromPtY	3.60310000000027	5/2/2013 10:09:34 PM
21325	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ToPtX	15.1327000000001	5/2/2013 10:09:34 PM
21326	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ToPtY	3.60310000000027	5/2/2013 10:09:34 PM
21327	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	AnchorPoint	esriCenterPoint	5/2/2013 10:09:34 PM
21328	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	Text	Mpd - Ea	5/2/2013 10:09:34 PM
21329	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21330	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	Size	6	5/2/2013 10:09:34 PM
21331	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	PtX	14.9635999999991	5/2/2013 10:09:34 PM
21332	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	PtY	3.64810000000034	5/2/2013 10:09:34 PM
21333	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21334	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21335	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	AnchorPoint	esriBottomMidPoint	5/2/2013 10:09:34 PM
21336	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	Text	Faa	5/2/2013 10:09:34 PM
21337	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	ColorRGB	33554432	5/2/2013 10:09:34 PM
21338	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	Size	6	5/2/2013 10:09:34 PM
21339	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	PtX	14.6540999999997	5/2/2013 10:09:34 PM
21340	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	PtY	3.60310000000027	5/2/2013 10:09:34 PM
21341	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21342	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21343	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	AnchorPoint	esriCenterPoint	5/2/2013 10:09:34 PM
21344	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_PlusLabel	Text	+	5/2/2013 10:09:34 PM

1 (0 out of 1095 Selected)

Example 4

Species Protection Area Tools

Species Protection Area Tools – Primary Area



SPA Tools

State: MS

Units: < > Load Filter: None Use Selection

Current: 1 Count: 13 w/SPAs: 9 Zoom To UTM Info

SPAs: Create Set Attributes Identify Primary Apply to all

Reset Data Checks Create Buffered Unit

QC Status: 0 Assign Create ZS Tables Create NLCD tables

Start Point: Get Use point

Sel. pt at X: 8 Y: 8 Use Outside %:

Shift Limit X: Y: Use Allowable spill %: 0.001

Sel. pt adj. factor X: 1.00 Y: 1.00 Use

Sel. pts rotation angle: 0 Use

Sections: Buffer Distance: Create Secs. Get Position: SW Set Corner

Reset Create Q. Secs Create SPA-Sec. Sel

#	ID	Manual Primary	Auto Primary	Unit Count	C81 Area	C82 Area	C81 + C82 Area	Rejected	Rejection Reasons
5	5	0	0	2	1095300	67500	1162800	False	
6	6	1	1	2	827100	67500	894600	False	
7	101	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - Y
8	102	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - X
9	103	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - X

Messages

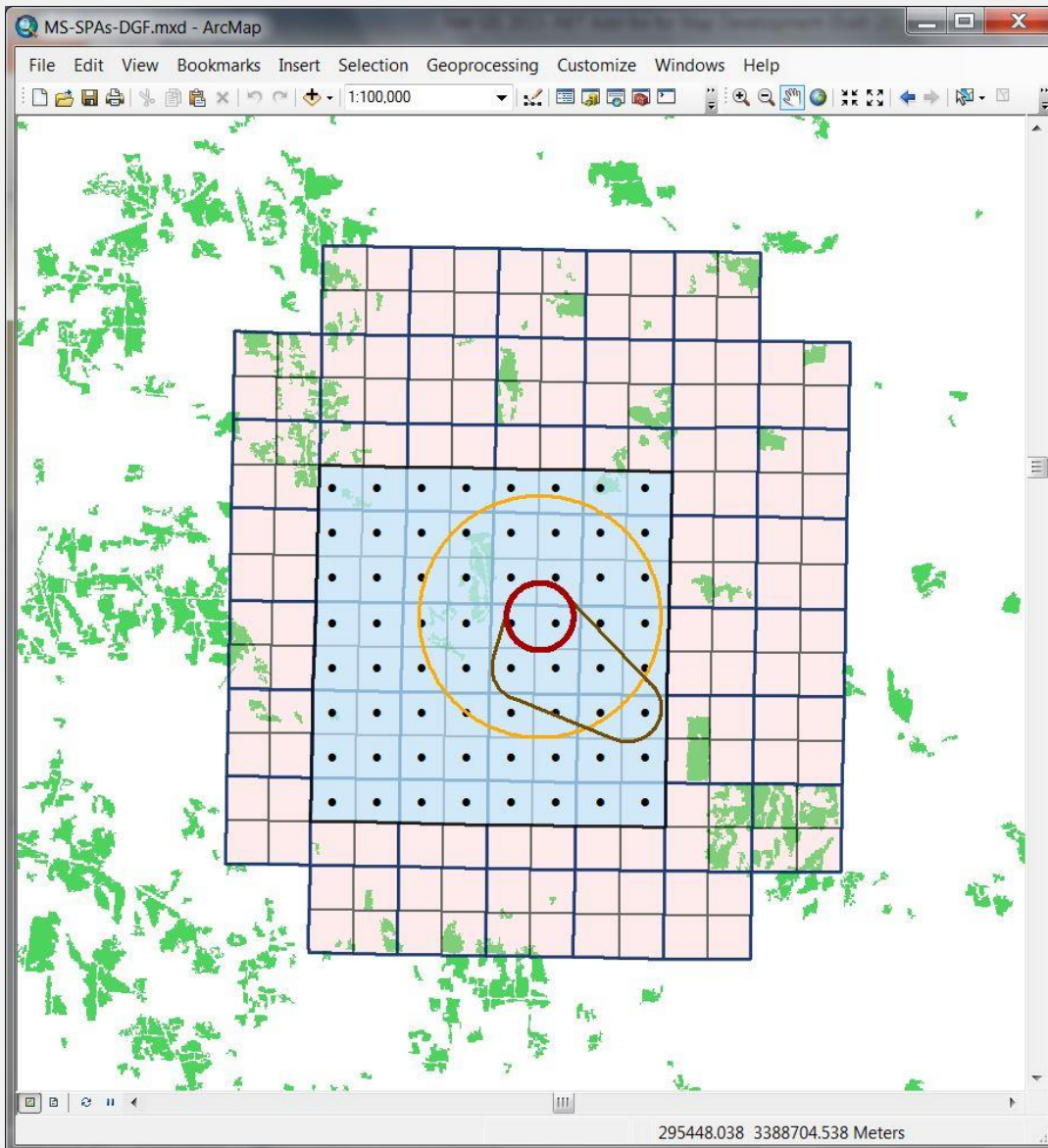
Clear Messages

Reset Form

Goal: define protection areas for species habitat locations according to rules that vary from state to state. 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



SPA Tools

SPA Development

#	Unit ID	SPAs Created	Primary SPA Found	QC Status
1	1	1	1	0
2	2	1	1	0
3	3	1	1	0
4	4	1	1	0
5	5	1	1	0
6	6	1	1	0
7	8	0	0	0
8	9	0	0	0
9	10	0	0	0
10	11	1	1	0
11	13	1	1	0

State: MS

Units: < > Load Filter: None Use Selection

Current: 1 Count: 13 w/SPAs: 9 Zoom To UTM Info

SPAs: Create Set Attributes Identify Primary Apply to all

Reset Data Checks Create Buffered Unit

QC Status: 0 Assign Create ZS Tables Create NLCD tables

Start Point: Get Use point

Sel. pt at X: 8 Y: 8 Use Outside %:

Shift Limit X: Y: Use Allowable spill %: 0.001

Sel. pt adj. factor X: 1.00 Y: 1.00 Use

Sel. pts rotation angle: 0 Use

Sections Buffer Distance: Create Secs.

Get Position: SW Set Corner

Reset Create Q. Secs Create SPA-Sec. Sel

#	ID	Manual Primary	Auto Primary	Unit Count	C81 Area	C82 Area	C81 + C82 Area	Rejected	Rejection Reasons
5	5	0	0	2	1095300	67500	1162800	False	
6	6	1	1	2	827100	67500	894600	False	
7	101	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - Y
8	102	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - X
9	103	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - X

Messages

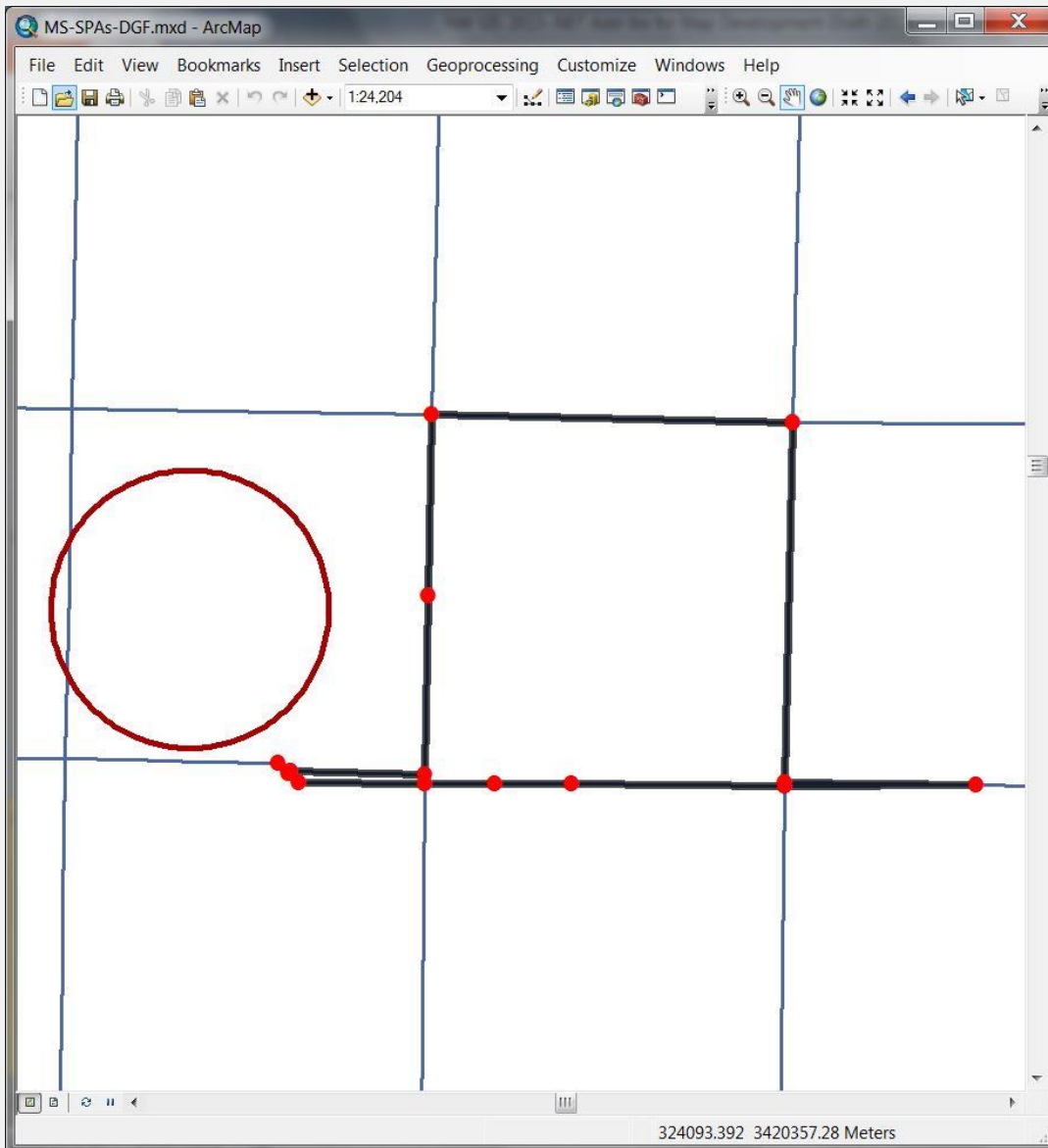
Clear Messages

Reset Form

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



The SPA Tools window displays the 'SPA Development' table and various configuration options. The table has columns for #, Unit ID, SPAs Created, Primary SPA Found, and QC Status. The configuration options include State, Units, Current, Count, w/SPAs, Filter, and various buttons for creating and managing SPAs.

#	Unit ID	SPAs Created	Primary SPA Found	QC Status
4	4	1	1	0
5	5	1	1	0
6	6	1	1	0
7	8	0	0	0
8	9	0	0	0
9	10	0	0	0
10	11	1	1	0
11	13	1	1	0
12	14	0	0	0
13	15	1	1	0

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

Species Protection Area Tools – Operation

SPA Development

State: MS Create Core Files

Units: < > Load Filter: None Use Selection

Current: 1 Count: 13 w/SPAs: 9 Zoom To UTM Info

SPAs Create Set Attributes Identify Primary Apply to all

Reset Data Checks Create Buffered Unit

QC Status: 0 Assign Create ZS Tables Create NLCD tables

Start Point: Get Use point

Sel. pt ct X: 8 Y: 8 Use Outside %:

Shift Limit X: Y: Use Allowable spill %: 0.001

Sel. pts rotation angle: 0 Use

Sections Buffer Distance: Create Secs.

Get Position: SW Set Corner

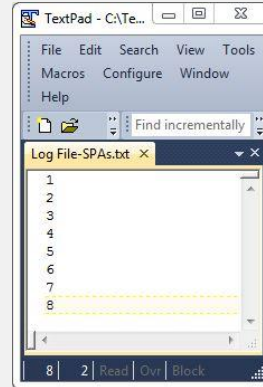
Reset Create Q. Secs Create SPA-Sec. Sel

#	ID	Manual Primary	Auto Primary	Unit Count	C81 Area	C82 Area	C81 + C82 Area	Rejected	Rejection Reasons
5	5	0	0	2	1095300	67500	1162800	False	
6	6	1	1	2	827100	67500	894600	False	
7	101	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill -Y
8	102	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill -X
9	103	-1	-1	2	-1	-1	-1	True	Unit buffer spill; Unit buffer spill -X

Messages

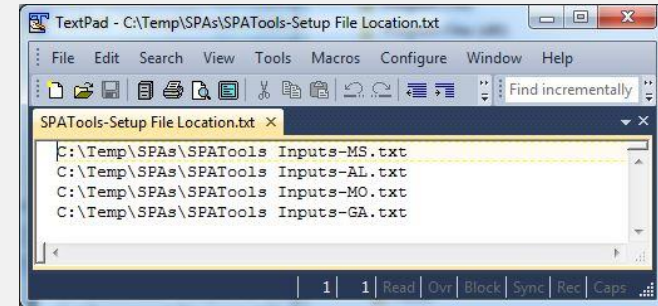
Clear Messages

Reset Form

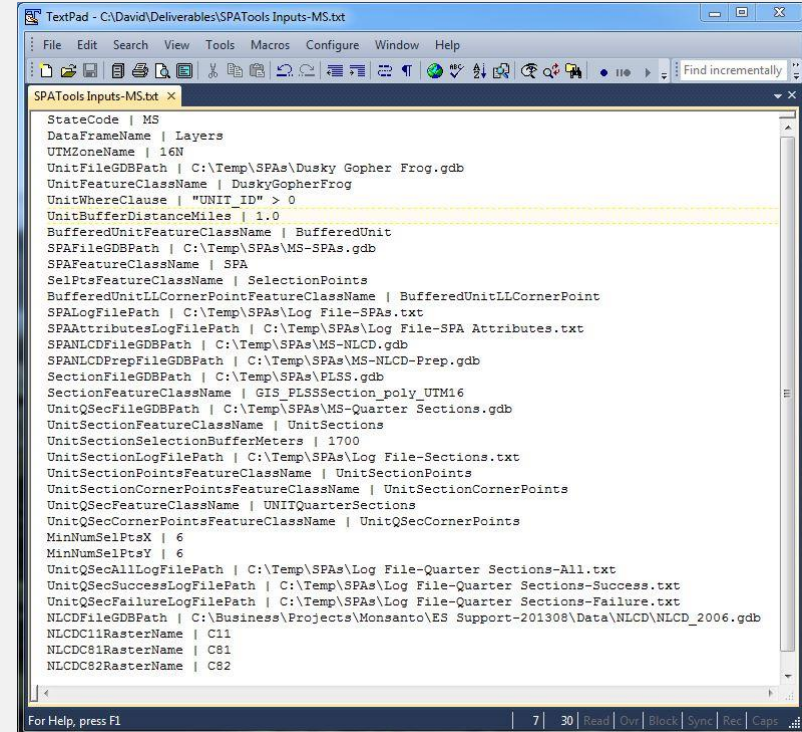


Log file

Setup file location file



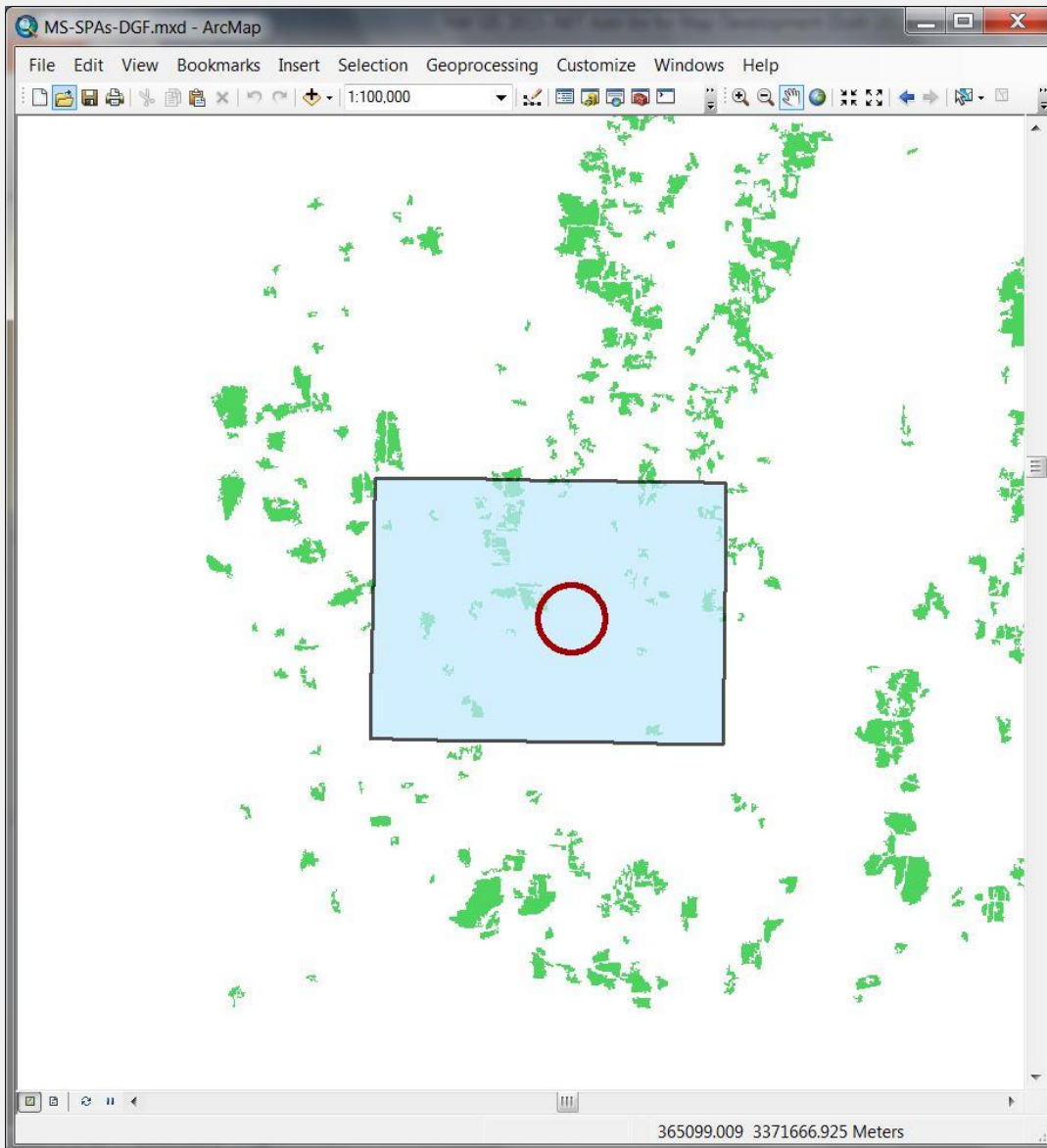
Setup file



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



SPA Tools

SPA Development

#	Unit ID	SPAs Created	Primary SPA Found	QC Status
4	4	1	1	0
5	5	1	1	0
6	6	1	1	0
7	8	0	0	0
8	9	0	0	0
9	10	0	0	0
10	11	1	1	0
11	13	1	1	0
12	14	0	0	0
13	15	1	1	0

State: MS

Units: < > Load Filter: None Use Selection

Current: 13 Count: 13 w/SPAs: 9 Zoom To

SPAs

Start Point: ☐ Use point

Sel. pt. at X: 8 Y: 6 ☒ Use

Shift Limit X: - Y: - ☐ Use

Sel. pt. adj. factor X: 1.00 Y: 1.00 ☐ Use

Sel. pts rotation angle: 0 ☐ Use

Allowable spill %: 0.001

< > Load Display Primary: 2 Set Primary

Display Primary Zoom To Clear Details

#	ID	Manual Primary	Auto Primary	Unit Count	C81 Area	C82 Area	C81 + C82 Area	Rejected	Rejection Reasons
1	1	0	0	1	1314900	179100	1494000	False	
2	2	1	1	1	1188900	179100	1368000	False	
3	101	-1	-1	1	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - Y
4	102	-1	-1	1	-1	-1	-1	True	Unit buffer spill; Unit buffer spill - X

Messages

Clear Messages

Reset Form

- 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
 - Strike a balance between generalizing for wider use and getting something working
 - Once you figure out how the process works, you can soon go back and refine it
 - Create re-usable code and share between add-in and standalone processes
 - Code neatly and descriptively and comment well
- Development considerations 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 such as those described here can often pay for themselves many times over