Forest Inventory

Documenting a geodatabase

—by Glen Jordan

Introduction

Problem

Forest inventories invariably contain abbreviated field names and coded data. Short field names and coded data save significant storage space, especially for inventories covering large geographic areas involving tens of thousands of forest features, and are more compact for computer screen display. For someone unfamiliar with the inventory, however, short field names and coded values are impossible to interpret without reference to a data dictionary. Often, the dictionary is maintained offline in a hard-copy document and not readily accessible.

One advantage of storing your data in a geodatabase is that you can define descriptive aliases for attribute fields, just as you can for entire feature classes, and further, you can add descriptions for the often-bewildering array of field data codes.

How does a geodatabase accomplish this?

Location

A small 1,400-hectare (ha) woodlot in the Acadian-New England forest region of North America

Time to complete the lab

Approximately three hours

Prerequisites

A basic working knowledge of GIS and ArcGIS® software in particular. Experience with the geodatabase will be helpful too. Familiarity with the Woodlot geodatabase inventory is essential.

Keywords: metadata; data types; range domain; code domain; alias

Data used in this lab

A personal geodatabase of several feature classes and rasters for a small (1,400 ha) woodlot in the Acadian-New England forest region of North America (All data is NAD83 datum with New Brunswick Double Stereographic projection, unless otherwise stated.)

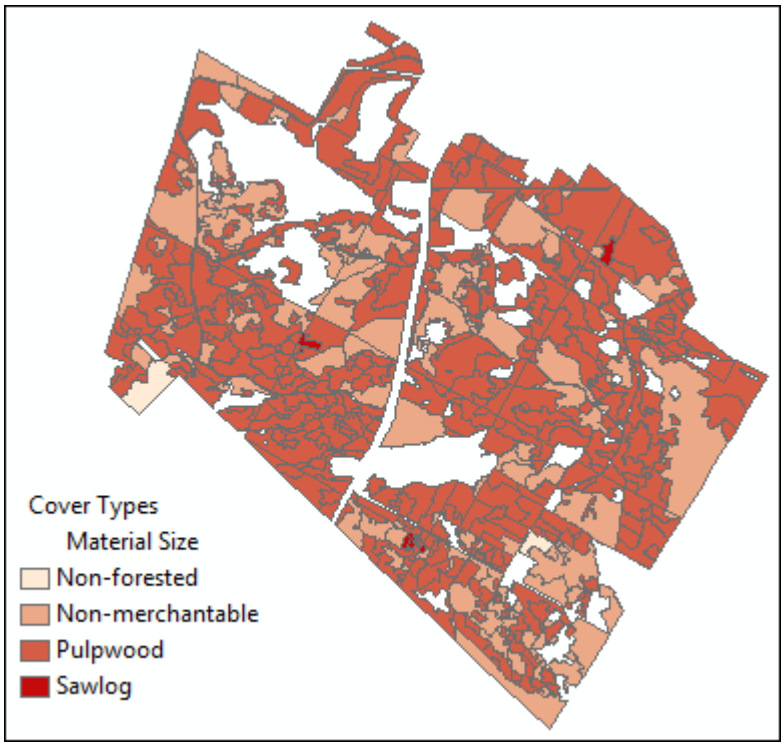
Student activity

The Woodlot forest inventory, like so many, is poorly documented. You'll fix that in this exercise.

You'll take advantage of the built-in capabilities that geodatabases provide for documenting the data they hold. Specifically, in the *Woodlot* geodatabase, you'll assign feature class aliases and numerous attribute field aliases and coding domains using ArcCatalog™.

Results expected

- Feature class aliases and domains for various attribute fields in the Woodlot geodatabase
- As an illustration of the value of documenting feature classes, a map of Woodlot stand material size using the material size attribute with alias and coded domain assigned



Data available

Woodlot geodatabase of feature classes

Solution steps

1. Examine attribute coding in the cover types feature class.
2. Define a coded domain for the TYPE attribute.
3. Define a range domain for the HC attribute.
4. Define a coded domain for the MS attribute.
5. Define a domain for the CLASS attribute.
6. Define and assign domains for the CC, AGE, TV, and VH attributes.
7. Define and assign a domain for the management compartments attribute.
8. Assign attribute aliases to cover types feature class fields.
9. Map a coded domain attribute in the cover types feature class.

EXAMINE ATTRIBUTE CODING IN THE COVER TYPES FEATURE CLASS

The cover types feature class (*cover*) is a key one in the Woodlot inventory. It's a polygon feature class that delineates and describes the various conditions, forested and otherwise, that occur in the woodlot property. It stores a cover types attribute (TYPE field) that labels forest conditions using 13 two-letter codes.

What conditions do these 13 codes describe, exactly?

RELATED CONCEPT: FOREST INVENTORY—FEATURES AND ATTRIBUTES

1 Using ArcCatalog, preview the attribute table of the cover types feature class (*cover*) in the *Woodlot* geodatabase.

COVER_ID	BLK	TYPE	HC	CC	MS	AGE	SI	TV
101	1	FR	9	C	2	36	0	
105	1	BG	0	G	0	49	0	
102	1	BG	0	G	0	100	0	
103	1	FR	12	B	2	41	0	
106	1	FR	9	B	2	64	0	
601	6	FR	9	B	3	25	0	
199	1	RD	0	Z	0	-99	0	
104	1	FR	9	B	2	30	0	
190	1	PE	0	Z	0	-99	0	
109	1	FR	12	B	2	70	0	
199	1	RD	0	Z	0	-99	0	
108	1	FR	12	B	2	63	0	
602	6	FR	3	C	3	2	0	
107	1	FR	12	C	2	91	0	
699	6	RD	0	Z	0	-99	0	
611	6	FR	15	B	2	46	0	
110	1	BG	0	G	0	100	0	

Figure 1. Preview the cover types feature class attribute table.

You'll see that the TYPE field contains values such as BG, CC, FR, PC, and so forth. What do these codes, or the codes used in other fields for that matter, mean?

The Woodlot inventory includes some coding tables that provide descriptions for codes used in at least some of the attribute fields in Woodlot feature classes. These tables are stored as worksheets in an Excel document. Fortunately, ArcCatalog can access Excel files.

2 In ArcCatalog, expand the *Woodlot_Codes* Excel file located in the *Codes* folder.

You'll see three worksheets listed, one for each of the CC, MS, and TYPE fields in *cover*.

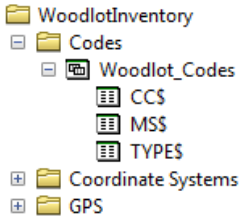


Figure 2. Three Excel worksheets describe coding schemes for three inventory attribute fields in the cover types feature class

3 Preview the *TYPE$* worksheet.

TYPE	Description
BG	Treed Bog
CC	Recent Clear Cut
DU	Duck Marsh
FR	Forersted
PB	Prescribed Burn
PC	Partial Cut
PD	Pond
PE	Powerline Easement
PS	Planted Softwood
PT	Gravel Pit
RD	Main Road
SE	Sewerline Easement
YD	Wood Yard

Figure 3. Codes and their descriptions for the TYPE field in the cover types feature class.

This table provides descriptions for the 13 codes used to describe the cover type of polygons in the *cover* feature class. Similar tables can be found for the crown class (CC) and material size (MS) fields.

In the past, these coding tables were joined in a many-to-one fashion to the *cover* feature class, providing ready access to code descriptions when needed for mapping or presenting analysis results.

ArcGIS offers something better.

4 Click the *cover* shapefile in the *Shapes* folder and select the *Description* tab.

That accesses some detailed information about the cover types shapefile, including details of the coding schemes used in its attributes fields.

Similar information is available for the other files in the Shapes folder, but unfortunately, when you imported them into your Woodlot geodatabase, the information did not follow.

That's not a big issue, since the geodatabase provides an even more informed way of documenting its contents.

The remainder of this exercise explores the possibilities.

DEFINE A CODED DOMAIN FOR THE *TYPE* ATTRIBUTE

The TYPE attribute field, like any other in a feature class or shapefile, has a data type and a domain of valid values.

The following table lists the range of data types found in ArcGIS feature classes. What data type is TYPE?

Data type	Description
Short integer	Whole numbers ranging from -32,768 to 32,767
Long integer	As above, but with a range of -2,147,483,648 to 2,147,486,647
Float	Fractional, single-precision numbers with 7 significant digits
Double	Fractional, double-precision numbers with 15 significant digits
Text	Alphanumeric string
Date	Specifically formatted number that represents date or time

Table 1. The array of attribute field data types in ArcGIS.

The TYPE field in the *cover* feature class is a text field. Like all text fields, TYPE has a domain defined by a specific list of coded values; in this case, 13 two-character labels.

Question 1: *If you hadn't been told, how would you determine the data type of TYPE, or any feature class field?*

But TYPE is also used in the public roads rights-of-way feature class (*publicrow*). There, two additional two-letter codes occur. The following table summarizes the TYPE field and provides descriptions for all its 15 coded values:

Attribute (data type)	Description	Feature class	Coding domain	Description
TYPE (text)	Cover types	*cover*	CC	Recent clearcut
			PC	Partial cut
			PB	Prescribed burn
			FR	Forested (untreated)
			PS	Planted softwood
			BG	Treed bog
			PD	Pond
			DU	Duck marsh
			RD	Main road right-of-way
			PT	Gravel pit
			YD	Wood yard
			PE	Power line easement
			SE	Sewer line easement
	Public roads rights-of-way	*publicrow*	DT	Dept. of Highways depot
			HW	Highway
			RD	Main road right-of-way
			MP	RCMP HQ

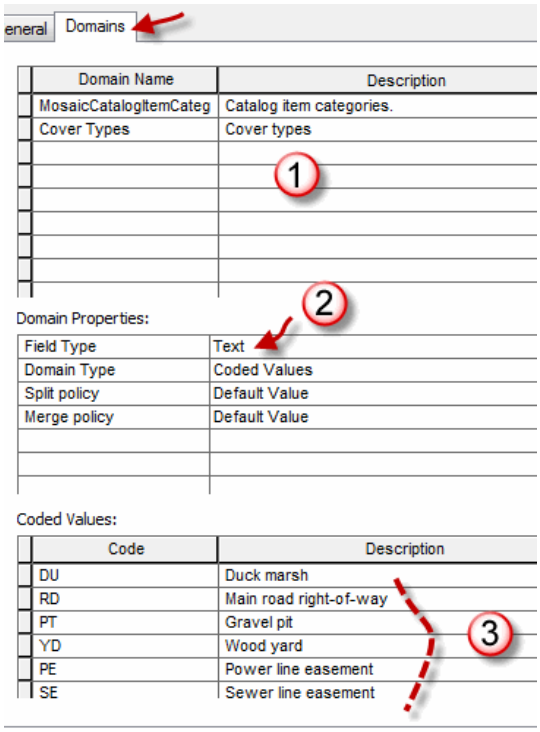
Table 2. Coded values and their descriptions for the TYPE field in the *cover* and *publicrow* feature classes.

How do you store the TYPE field's details, or its metadata, in the Woodlot geodatabase?

RELATED CONCEPT: DIGITAL MAPPING—METADATA (CODED DOMAIN)

Use ArcCatalog to embed the TYPE field's coded domain within the Woodlot geodatabase. Here's how.

1 Right-click the *Woodlot* geodatabase and select *Properties*. Click the *Domains* tab and define the coded domain for TYPE.



There is no need to enter the RD code detail twice.

Figure 4. Create a coded domain for the TYPE field.

Question 2: *If, after creating and saving a domain, you notice a mistake, such as a spelling mistake, how do you go about correcting the problem?*

Now, you can assign this *Cover Type* domain to the TYPE field in both *cover* and *publicrow*.

2 Double-click the *cover* feature class to access its properties. Then, with the *Fields* tab selected, assign the *Cover Types* domain to TYPE.

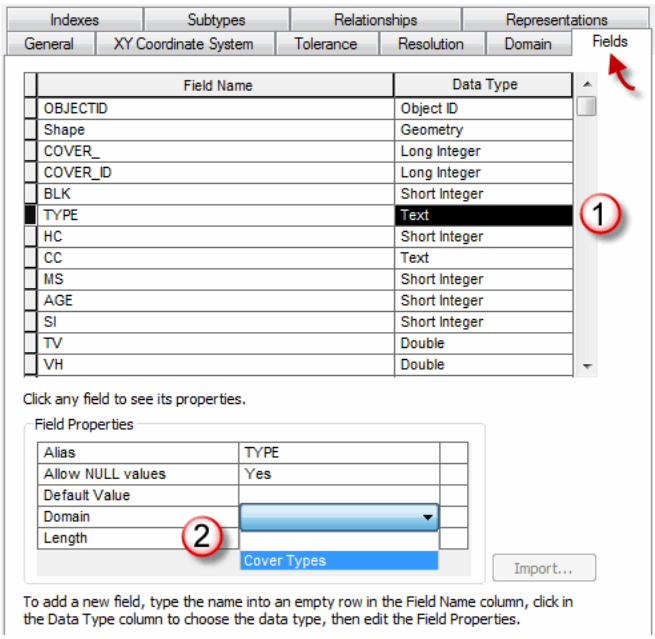


Figure 5. Assign the *Cover Types* domain to the TYPE field in *cover*.

Note: Once a domain has been assigned to a field or fields, you will not be able to delete it from the domains collection unless you first unassign it. You can still edit the domain, though.

3 Repeat the process for the *publicrow* feature class.

What has all that accomplished?

If you preview the *cover* attribute table in ArcCatalog, you'll see that the two-letter codes have been replaced with the code descriptions; the same is true in *publicrow*.

That's progress, but the real payoff only becomes apparent when you start to work with the *cover* or *publicrow* feature classes in ArcMap™ or with ArcToolbox™ tools.

4 Start ArcMap and add both *cover* and *publicrow* feature classes as layers.

If you open either of the attribute tables, you'll see how your *Cover Types* coded domain has done its job.

Cover Types

OBJECTID *	Shape *	COVER_	COVER_ID	BLK	TYPE	HC	CC	MS	AGE	SI	TV	VH
1	Polygon	2	101	1	Forested (untreated)	9	C	2	36	0	182.6	8(
2	Polygon	3	105	1	Treed bog	0	G	0	49	0	88.3	24.4
3	Polygon	4	102	1	Treed bog	0	G	0	100	0	0	(
4	Polygon	5	103	1	Forested (untreated)	12	B	2	41	0	177.9	9(
5	Polygon	6	106	1	Forested (untreated)	9	B	2	64	0	139.9	6(
6	Polygon	7	601	6	Forested (untreated)	9	B	3	25	0	30.1	5.(
7	Polygon	8	199	1	Main road right-of-way	0	Z	0	-99	0	0	(
8	Polygon	9	104	1	Forested (untreated)	9	B	2	30	0	214.4	74.9
9	Polygon	10	190	1	Power line easement	0	Z	0	-99	0	0	(
10	Polygon	11	109	1	Forested (untreated)	12	B	2	70	0	66.2	78.4
11	Polygon	12	199	1	Main road right-of-way	0	Z	0	-99	0	0	(
12	Polygon	13	108	1	Forested (untreated)	12	B	2	63	0	4240.1	61(
13	Polygon	14	602	6	Forested (untreated)	3	C	3	2	0	0	(
14	Polygon	15	107	1	Forested (untreated)	12	C	2	91	0	4171.5	380
15	Polygon	16	699	6	Main road right-of-way	0	Z	0	-99	0	0	(
16	Polygon	17	611	6	Forested (untreated)	15	B	2	46	0	961.1	96.2

Figure 6. The *Cover Types* coded domain descriptions appear in place of TYPE field codes.

The code descriptions will also appear in other operations where the TYPE field might be referenced, for example, when using Select By Attributes or the Identify tool.

One *Woodlot* domain has been defined and assigned. There are several more that you need to deal with.

Define a range domain for the *HC* attribute

The height class (HC) field is a numeric attribute in the *cover* feature class containing values that range from 0 to 30.

That means that the domain will be a range domain, specifying minimum and maximum values. Unlike the TYPE field, HC occurs in only the *cover* feature class.

RELATED CONCEPT: DIGITAL MAPPING—METADATA (RANGE DOMAIN)

1 Close ArcMap for now, then in ArcCatalog, right-click the *Woodlot* geodatabase, select *Properties*, and add a height class range domain as follows:

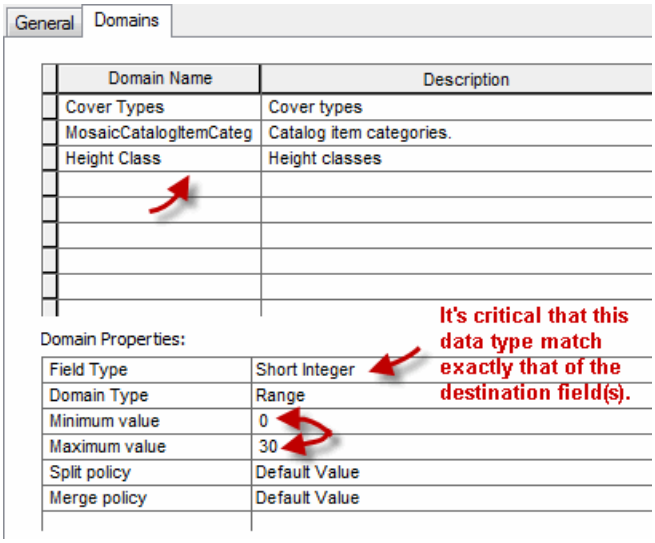


Figure 7. Create the *Height Class* range domain for the HC field.

Now you can assign the *Height Class* range domain to the HC field in *cover*.

2 Use ArcCatalog to assign the *Height Class* domain to the HC field in the *cover* feature class.

Unlike coded domains, range domains don't have any immediate effect on the display of tabular data in attribute tables or elsewhere. They simply set limits on the values that may be recorded. This prevents entry of erroneous data should field values ever need changing—if a stand were clearcut, for example.

Next, you'll try another numeric field—the MS field.

DEFINE A CODED DOMAIN FOR THE *MS* ATTRIBUTE

The MS field, even though numeric, can be assigned a coded domain. How can that be?

RELATED CONCEPT: DIGITAL MAPPING—METADATA (CODED DOMAIN)

1 Preview the *MS$* worksheet in the *Woodlot_Codes* Excel file (*Codes* folder).

MS	Description
0	Non-forested
1	Sawlog
2	Pulpwood
3	Non-merchantable

Figure 8. Material size field codes and descriptions.

The numeric MS values are simply used as ordinal rankings and could just as easily have been recorded as A, B, C, D. So, indeed, MS can be described using a coded domain.

2 Add a Material Size coded domain as follows:

Domain Name	Descripti
Cover Types	Cover types
Height Class	Height classes
MosaicCatalogItemCateg	Catalog item categories.
Material Size	Material sizes

Domain Properties:

Field Type	Short Integer
Domain Type	Coded Values
Split policy	Default Value
Merge policy	Default Value

Coded Values:

Code	Descripti
0	Non-forested
1	Sawlog
2	Pulpwood
3	Non-merchantable

Figure 9. Create the Material Size coded domain for the MS field.

3 Assign the *Material Size* domain to the MS field in the *cover* feature class.

Now, if you were to open or preview the *cover* attribute table, you'd see the domain descriptions for MS displayed instead of its numeric values.

	TYPE	HC	CC	MS	AGE	SI
	Forested (un	9	C	Pulpwood	36	0
	Treed bog	0	G	Non-forested	49	0
	Treed bog	0	G	Non-forested	100	0
	Forested (un	12	B	Pulpwood	41	0
	Forested (un	9	B	Pulpwood	64	0
	Forested (un	9	B	Non-merchantable	25	0
	Main road rig	0	Z	Non-forested	-99	0
	Forested (un	9	B	Pulpwood	30	0
	Power line e	0	Z	Non-forested	-99	0
	Forested (un	12	B	Pulpwood	70	0
	Main road rig	0	Z	Non-forested	-99	0
	Forested (un	12	B	Pulpwood	63	0
	Forested (un	3	C	Non-merchantable	2	0
	Forested (un	12	C	Pulpwood	91	0
	Main road rig	0	Z	Non-forested	-99	0
	Forested (un	15	B	Pulpwood	46	0

Figure 10. MS field displayed with its coded domain descriptions.

You've probably got the hang of it by now and can deal with the remaining Woodlot attribute fields pretty much unaided.

Define a domain for the *CLASS* attribute

The CLASS attribute, like TYPE, occurs in multiple feature classes. These include the *clines*, *roads*, *proads*, and *streams* feature classes. Its coding scheme is detailed in the following table:

Attribute (data type)	Description	Feature class	Description	Codes	Description
CLASS (text)	Road and stream classes	*clines*	Main road centerlines	RG	Main road graveled
				RU	Main road ungraveled
				PE	Power line easement
				SE	Sewer line easement
		roads	Secondary roads	C2	Three season
				C3	Dry weather
				C4	Trail
		proads	Public roads	HW	Highway
				RG	Main road graveled
				CS	City street
		streams	Permanent streams	ST	Permanent stream

Table 3. Coding scheme for the CLASS attribute in the Woodlot inventory.

It should be obvious that you're dealing with a coded domain here, since CLASS is a nominal (text) attribute in the Woodlot inventory.

Related Concept: Digital mapping—Metadata (coded domain)

1 Create a *Classes* coded domain for the CLASS attribute consisting of 10 unique codes and their associated descriptions as above.

Domain Name	Description
Cover Types	Cover types
Height Class	Height classes
Material Size	Material sizes
MosaicCatalogItemCateg	Catalog item categories.
Classes	Road and stream classes

Domain Properties:

Field Type	Text
Domain Type	Coded Values
Split policy	Default Value
Merge policy	Default Value

Coded Values:

Code	Description
C4	Trail
HW	Highway
CS	City Street
ST	Permanent stream

Figure 11. Create the *Classes* coded domain for the CLASS attribute.

There is no need to enter the RG code detail twice.

2 Assign it to the CLASS field in each of the *clines*, *roads*, *proads*, and *streams* feature classes.

With that done, you have just a few Woodlot inventory attributes left that would benefit from a geodatabase domain definition.

Define and assign domains for the CC, AGE, TV, and VH attributes

All these attributes occur as fields in the cover types feature class (*cover*). You would think that defining domains for them would be straightforward. With the exception of AGE, that's true.

AGE values fall into two categories (domains): ages of nonforested features and ages of forest stands. Nonforested features are assigned an age of -99 in the inventory, making them easily distinguished from stands that have ages ranging from 0 to 120.

Defining subtypes would make dealing with AGE easy, as it would allow you to assign two domains to AGE, one a range domain for forested features (0–120) and the other a coded domain for nonforested features (-99). Unfortunately, though, the Woodlot inventory was not set up with this in mind. It doesn't have a subtype field that distinguishes between forested and nonforested features.

Question 3: *How might you actually create a cover field that distinguishes between forested and nonforested features in the woodlot?*

So, you'll have to deal with AGE somewhat crudely and define a range domain of -99 to 120.

RELATED CONCEPT: DIGITAL MAPPING—METADATA

1 Using the following as a guide, create and assign domains for the CC, AGE, TV, and VH attributes in the *cover* feature class:

Attribute (data type)	Description	Feature class	Code or range	Description
CC (text)	Crown closure	cover	A	Fully stocked
			B	Gaps
			C	Understocked
			G	Treed bog
			X	Clearcut
			Z	Nonforested
AGE (short)	Stand age		-99–120	All features
TV (double)	Total stand volume		0–100,000	Stand volume (m^3)
VH (double)	Stand volume yield		0–650	Stand yield (m^3/ha)

Table 4. Domains and code descriptions for the CC, AGE, TV, and VH attributes in the cover types feature class.

Domain Name	Description
Crown Closure	Crown closures
Height Class	Height classes
Material Size	Material sizes
MosaicCatalogItemCateg	Catalog item categories.
Stand Age	Stand ages
Stand Volume	Stand volume (m3)
Stand Volume Yield	Stand yield (m3/ha)

Figure 12. Create domains for the CC, AGE, TV, and VH attributes.

It's best to add domains one at a time using the Apply *button. That way, if an error arises in an entry, you won't run the risk of losing all your entries.*

Also, a domain can be deleted, provided it hasn't yet been assigned to a field, by selecting and pressing the Delete key.

2 Assign each of the domains to its associated attribute field.

That just about completes adding and assigning domains in the *Woodlot* geodatabase.

That leaves just the *COMPART_ID* and *BLK* fields to deal with. They have been left to last because they present a challenge.

Define and assign a domain for the management compartments attribute

While *COMPART_ID* and *BLK* occur in two different feature classes—*cover* and *compart*—and have different names, they both serve the same purpose in the Woodlot inventory. They identify the Woodlot's 12 management compartments with the numbers 1 through 12.

It would seem that creating a domain for this management compartments attribute should be easy. Simply create a range domain named Management Compartments and indicate a range of 1–12.

Related Concept: Digital mapping—Metadata (range domain)

So, where's the challenge?

If you examine the data types of the two fields, *COMPART_ID* in *compart* and *BLK* in *cover*, you'll see that they don't have the same data type; *COMPART_ID* is long integer, while *BLK* is short integer.

That precludes creating a single domain that you could assign to both fields. On the other hand, building two domains seems unnecessary when you're dealing with just one attribute—management compartments. Therein lies the challenge.

What's the workaround?

Since you can't change a field's data type once established, your only course of action here is to copy existing management compartment field values in one of the feature classes into a new field with a data type the same as that in the other feature class.

It would make sense to copy the long integer *COMPART_ID* data in *compart* into a new short integer field, not vice versa, since the management compartment values 1 through 12 certainly don't require a long integer for storage.

1 Create a *Compartments* range domain using a short integer data type.

Domain Name	Description
Height Class	Height classes
Material Size	Material sizes
MosaicCatalogItemCateg	Catalog item categories.
Stand Age	Stand ages
Stand Volume	Stand volume (m3)
Stand Volume Yield	Stand yield (m3/ha)
Compartments	Management compartment numbers

Domain Properties:

Field Type	Short Integer
Domain Type	Range
Minimum value	1
Maximum value	12
Split policy	Default Value
Merge policy	Default Value

Figure 13. Create a short integer range domain for the management compartments attribute.

2 Double-click the *compart* feature class and create a new short integer attribute field named *Compart*, giving it a *Compartment* alias and assigning it to the *Compartments* domain.

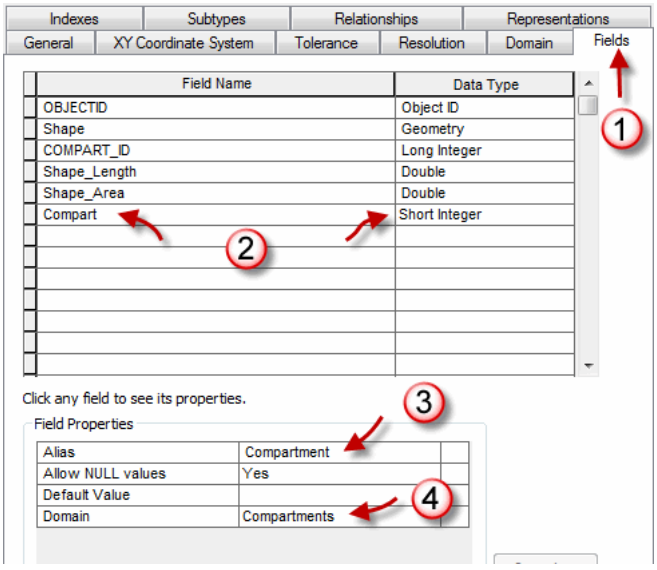


Figure 14. Create a new *Compart* field and assign the *Compartments* domain to it.

3 Use the *Calculate Field* tool in ArcToolbox (*Data Management Tools » Fields*) to calculate Compart = COMPART_ID.

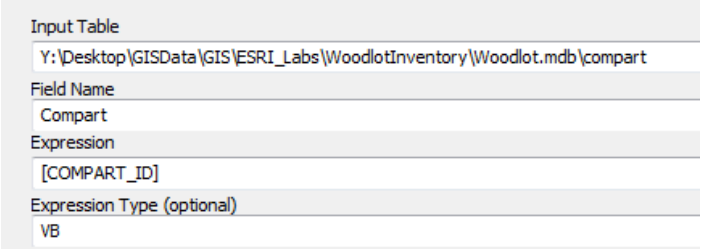


Figure 15. Populate the new *Compart* field with *COMPART_ID* values using the *Calculate Field* tool.

Question 4: *Why use the Calculate Field tool and not Field Calculator?*

Now you can get rid of the *COMPART_ID* field.

4 Double-click *compart*, click the *Fields* tab, select *COMPART_ID*, and press the Delete key.

If you now preview the *compart* attribute table, you should see the new short integer *Compart* field containing management compartment numbers.

Shape *	Shape_Length	Shape_Area	Compart
Polygon	3610.38852274512	540519.737140324	1
Polygon	6044.5648210755	2226573.0015543	6
Polygon	4581.17827192707	958832.981900623	2
Polygon	569.044050236978	11987.4598536132	5
Polygon	3519.10808740831	575892.02221979	5
Polygon	4177.36128965548	740791.881869881	3
Polygon	4447.84134950713	1155252.21177021	5
Polygon	4692.42257662269	1269366.30254848	7
Polygon	5897.79963586172	1875208.11979382	4
Polygon	3869.29530285734	938059.977568815	8
Polygon	2042.48017105877	243913.459758739	12
Polygon	3586.8098909486	722948.665017163	8
Polygon	5303.62815081706	1672505.98339569	9
Polygon	2057.57621195359	100674.620580867	11
Polygon	1483.884754245	46381.0169278205	8
Polygon	1982.6201637703	207521.151709661	11
Polygon	4548.07645627323	1068198.22480599	10

Figure 16. Revised *compart* attributes table with new short integer *Compart* field.

5 Assign the *Compartments* domain to the *BLK* field in the *cover* feature class.

That's it for attribute domains in the Woodlot inventory.

It was a lot of tedious work, but now, all fields with a coded domain, like TYPE, have their code descriptions listed and not the actual codes.

There's more documenting that you can do, however, to make the contents of the Woodlot inventory more obvious, especially the key cover types feature class.

ASSIGN ATTRIBUTE ALIASES TO COVER TYPES FEATURE CLASS FIELDS

Like attribute codes, attribute field names are often abbreviated in forest inventories. As a result, their meaning is not always obvious. The Woodlot inventory, like most, contains many short field names.

Short field names present a particular problem in the Woodlot cover types feature class (*cover*). Earlier, would you have known what MS, CC, and HC field names meant?

A geodatabase, however, offers a solution—the ability to assign field aliases.

RELATED CONCEPT: DIGITAL MAPPING—METADATA (ALIASES)

The following table provides suggested aliases for the array of fields that exist in the cover types feature class:

Feature class	Field name	Suggested alias
cover	COVER_ID	Stand#
	BLK	Compartment
	TYPE	Cover Type
	HC	Height Class
	CC	Crown Closure
	MS	Material Size
	AGE	Age
	SI	Site Index
	TV	Total Volume
	VH	Volume Yield

Table 5. Suggested aliases for the cover types feature class (*cover*) fields.

1 Double-click *cover*, select the *Fields* tab, and use the above table as a guide to assign field aliases.

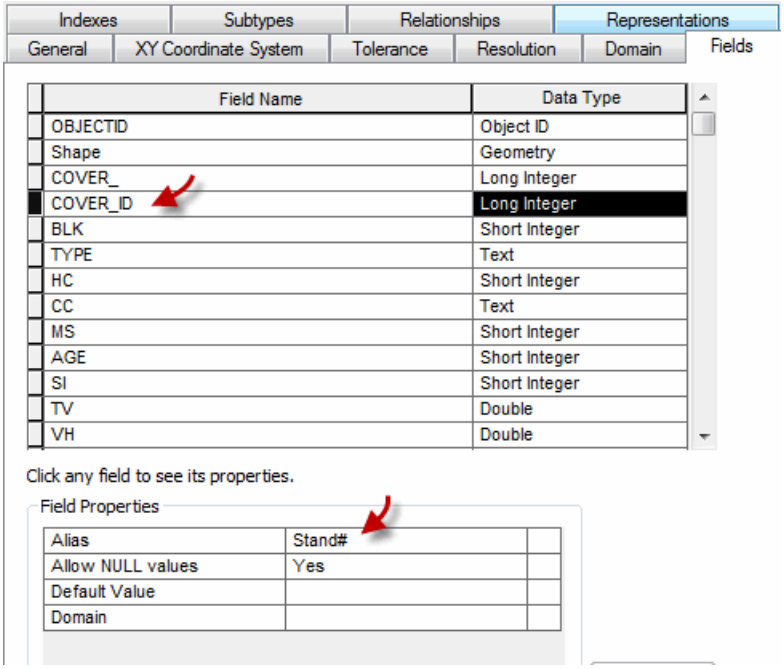


Figure 17. Assign aliases to *cover* feature class fields; COVER_ID is illustrated.

There are many more attributes in the Woodlot inventory that you could define domains and aliases for, but you get the idea, and you've addressed the most often used attributes.

The value of all your efforts thus far, however, is not immediately apparent.

Recall, as noted earlier, that the ultimate utility of attribute aliases and domains only becomes apparent when you add feature classes to ArcMap and map their attributes or perform queries or other operations that use feature class fields.

Consider an illustration.

MAP A CODED DOMAIN ATTRIBUTE IN THE COVER TYPES FEATURE CLASS

When you add a well-documented feature class in ArcMap, a number of things happen.

First, the feature class alias is displayed as a layer name. Second, if you open the attributes table, field aliases are displayed in place of actual names. And, in a fashion similar to what you've seen in previewing tables in ArcCatalog, all fields with a coded domain have their code descriptions listed in place of, or alongside, the actual codes. Last, when you query features, field aliases appear.

These things prove helpful in selecting and mapping a feature class's attributes.

RELATED CONCEPT: DIGITAL MAPPING—USING METADATA

1 Start ArcMap and add the *cover* feature class as a layer.

The feature class is listed with its alias, *Cover Types*.

2 Use a definition query and the TYPE field to limit the *Cover Types* layer to just untreated forested features.

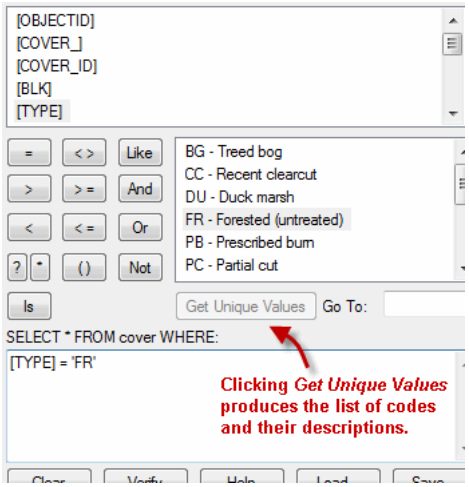


Figure 18. Take advantage of an attribute's coded domain in building a query.

Note that field aliases, unfortunately, don't make it into Query Builder.

Having access to a field's code descriptions is very useful when building queries, especially when you are not familiar with an inventory or don't work with it on a daily basis.

3 Open the *Cover Types* attributes table.

Stand#	Compartment	Cover Type	Height Class	Crown Closure	Material Size	Age	Site I
101	1	Forested (untreated)	9	Under stocked	Pulpwood	36	
103	1	Forested (untreated)	12	Gaps	Pulpwood	41	
106	1	Forested (untreated)	9	Gaps	Pulpwood	64	
601	6	Forested (untreated)	9	Gaps	Non-merchantable	25	
104	1	Forested (untreated)	9	Gaps	Pulpwood	30	
109	1	Forested (untreated)	12	Gaps	Pulpwood	70	
108	1	Forested (untreated)	12	Gaps	Pulpwood	63	
602	6	Forested (untreated)	3	Under stocked	Non-merchantable	2	
107	1	Forested (untreated)	12	Under stocked	Pulpwood	91	
611	6	Forested (untreated)	15	Gaps	Pulpwood	46	
617	6	Forested (untreated)	12	Under stocked	Pulpwood	35	
612	6	Forested (untreated)	3	Fully stocked	Non-merchantable	2	
613	6	Forested (untreated)	12	Gaps	Pulpwood	57	
603	6	Forested (untreated)	15	Gaps	Pulpwood	53	
614	6	Forested (untreated)	3	Fully stocked	Non-merchantable	2	
111	1	Forested (untreated)	3	Fully stocked	Non-merchantable	53	

Figure 19. Attributes of *Forested (untreated)* stands in the woodlot.

The table lists *Cover Types* attribute fields with their aliases and code descriptions for those fields where a coded domain has been assigned. This is definitely more informative, but it does consume more screen real estate.

You can, though, turn the code descriptions off if space is an issue.

4 From the *Table Options* drop-down list, select *Appearance*.

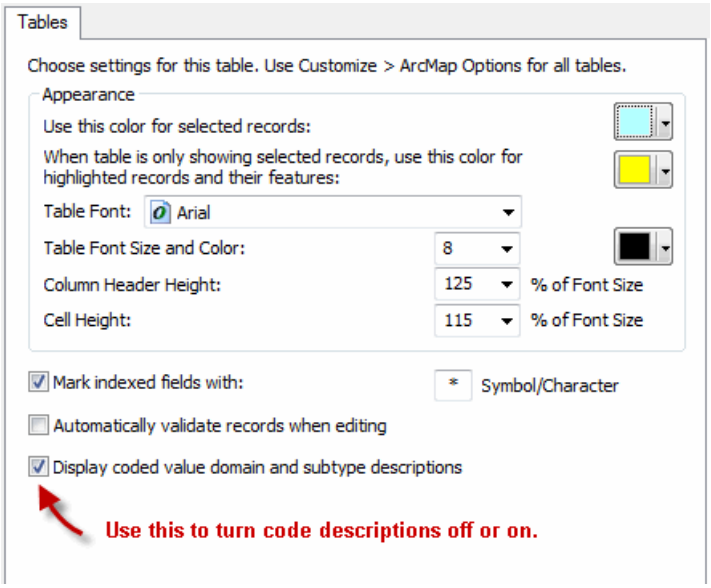


Figure 20. You can turn a table's code description off or on.

By the way, the setting is not a global setting and applies only to the current table.

5 Close the attribute table and map the *Material Size* attribute using a graduated polygon fill pattern.

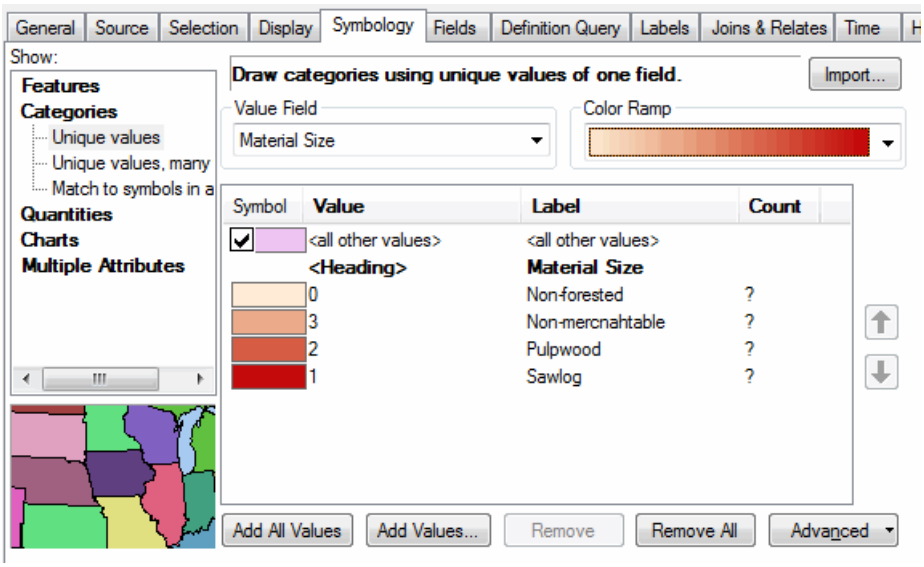


Figure 21. Field aliases and code descriptions appear on the Layer Properties dialog box.

You'll see that the *Layer Properties* dialog box lists fields by alias and uses field code descriptions for *Labels*, making it easy to produce your map.

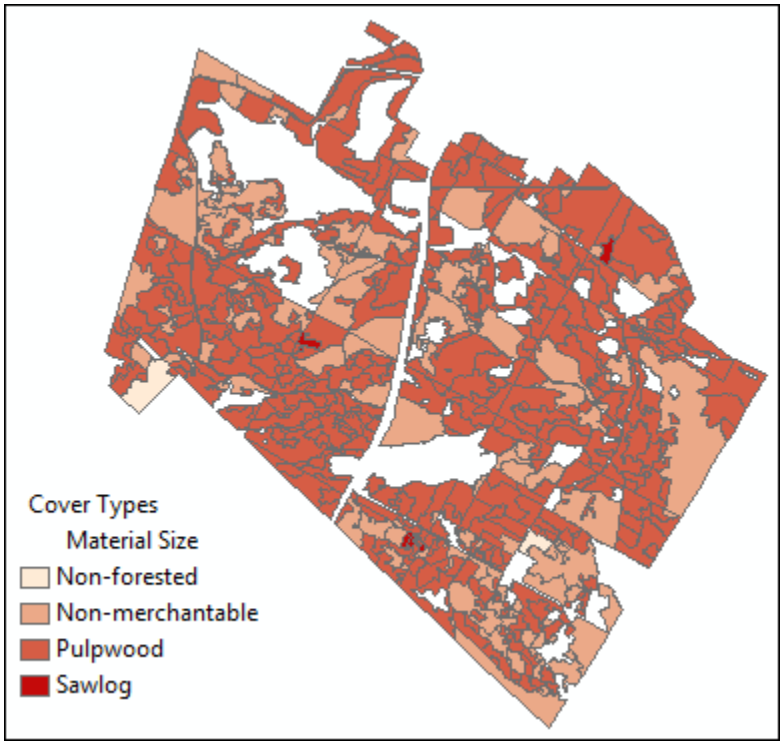


Figure 22. Field aliases and their code descriptions appear in ArcMap compositions.

You can see that the feature class alias, field alias, and code descriptions have all made their way into your map composition.

Conclusion

Hopefully, you now appreciate the value of aliases and defining and assigning attribute domains in your forest inventory.

ArcGIS offers additional opportunities for documenting an inventory not covered in this lab. You can, for example, add detailed descriptions for shapefiles, feature classes, rasters, and just about any document that ArcMap or Arccatalog recognizes. Simply right-click an item in the catalog listing in either program and select *Item Description*. You may want to investigate the possibility.

Submit your work

Suggested student deliverables

- A Woodlot geodatabase with coded and range domains, field aliases, and feature class aliases
- Answers to the questions posed in the exercise:

    - If you hadn't been told, how would you determine the data type of TYPE, or any feature class field?
    - If, after creating and saving a domain, you notice a mistake, such as a spelling mistake, how do you go about correcting the problem?
    - How might you actually create a cover field that distinguishes between forested and nonforested features in the woodlot?
    - Why use the Calculate Field tool and not Field Calculator in ArcCatalog?

- A paragraph describing, with examples, the different data types that ArcGIS supports for storing attributes
- A paragraph describing, with examples, range and coded domains
- A simple map that symbolizes Woodlot features using the Crown Closure *cover* field, but with nonstand features excluded
- A simple map that symbolizes Woodlot features using the Cover Type *cover* field
- Location of some forest inventory data available for download via the web, then assembled into a geodatabase of feature classes and documented with feature class aliases, field aliases, and range and coded domains

Credits

Sources of supplied data

Course Data

Data\cover, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\highway, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\newprop, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\tin, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Woodlot.mdb, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Codes\Woodlot_Codes.xls, courtesy of University of New Brunswick UNB Faculty of Forestry and Environmental Management

Data\Coordinate Systems\ATS 1977 New Brunswick Stereographic.prj, courtesy of ESRI

Data\Coordinate Systems\NAD 1983 CSRS New Brunswick Stereographic.prj, courtesy of ESRI

Data\GPS\Knowledge.shp, courtesy of University of New Brunswick

Data\GPS\towers.xls, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Layer Files\Age Classes.lyr, courtesy of Glen Jordan

Data\Layer Files\Air Photo Centre Points.lyr, courtesy of Glen Jordan

Data\Layer Files\Main Roads.lyr, courtesy of Glen Jordan

Data\Layer Files\Mgt Compartments.lyr, courtesy of Glen Jordan

Data\Layer Files\Non-forested.lyr, courtesy of Glen Jordan

Data\Layer Files\Secondary Roads.lyr, courtesy of Glen Jordan

Data\Layer Files\Streams.lyr, courtesy of Glen Jordan

Data\Mass Points\DTM.txt, courtesy of Service New Brunswick

Data\Models\Clearcutting.tbx, courtesy of Glen Jordan

Data\Models\Forest Analysis.tbx, courtesy of Glen Jordan

Data\Models\Forest Values.tbx, courtesy of Glen Jordan

Data\Orthophotos\Z45856650.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45856660.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45856670.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45906650.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45906660.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45906670.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45956650.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45956660.tif, courtesy of Service New Brunswick
Data\Orthophotos\Z45956670.tif, courtesy of Service New Brunswick

Data\Photos\l18_178.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_178.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_178r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_180.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l18_180.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_180r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_182.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_182.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_182r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_184.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_184.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l18_184r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l19_61.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l19_61.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l19_61r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l19_65.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management
Data\Photos\l19_65.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_65r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_67.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_67.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_67r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_69.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_69.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l19_69r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l20_112.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l20_112.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l20_112r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l20_114r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_30.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_30.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_30r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_32.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_32.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_32r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_34.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_34.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_34r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_36.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_36.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_36r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_38.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_38.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l21_38r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l22_77.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l22_77.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l22_77r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_16.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_16.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_16r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_18.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_18.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_18r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_20.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_20.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_20r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_22.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_22.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l23_22r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_129.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_129.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_129r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_131.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_131.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l24_131r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l26_175.TIFF, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l26_175.tiffw, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\l26_175r.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\image2345, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\image2345c1, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\image2345c2, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Photos\image2345c3, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Rasters\accessibility, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Rasters\dollarvalue, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Rasters\elevation, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\basemap.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\clines.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\compart.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\cover.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\cpoints.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\outline.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\proads.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\publicrow.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\roads.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\s4551.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\s4552.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\streams.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\towers.shp, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Shapes\volumes.dbf, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Updates\l20_112u.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Updates\l20_114u.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Updates\l23_16u.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Updates\l23_18u.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\Updates\l24_129u.tif, courtesy of University of New Brunswick Faculty of Forestry and Environmental Management

Data\WatershedDelineation\Watershed Delineation Tools.tbx – ESRI