

Exercise 2: Create Metadata from Scratch Using ArcGIS Pro

Introduction

This lesson is designed for GIS users who are familiar with the ArcGIS Pro user interface and would like to create metadata from scratch by populating the required metadata elements.

In the first exercise we viewed the metadata associated with the EDW AdministrativeForest layer. Now we will learn how to create metadata from scratch. First, we will only populate the metadata elements that are required by the ISO standards. We will then learn how the synchronize function can be used to update a couple of key, optional metadata elements.

We will be creating metadata for the Wilderness feature class. The metadata originally associated with this layer has been deleted for the purpose of this exercise. Our goal as metadata creators is to accurately describe the dataset using the ISO metadata standard. This will ensure that GIS users in the agency have all the necessary information to make decisions about how to best use the layer.

Feel free to follow along and use your own dataset if you would like!

Objectives

- Create metadata from scratch.
- Keep your metadata up to date using the Synchronize function.
- Export metadata to ISO 19115-3 XML file.

Prerequisites

GIS users must be able to access ArcGIS Pro to complete the exercises within this training. There are two ways that Forest Service GIS users can access and run ArcGIS Pro.

- **Option 1:** Forest Service Employees can utilize ArcGIS Pro through the Virtual Desktop Infrastructure (VDI). The VDI can be accessed using the following link: [ArcGIS Pro - Working in the Data Center \(sharepoint.com\)](#). Using the VDI, users can launch a remote desktop and connect directly to the T drive using ArcGIS Pro. You must have a citrix profile and a LincPass to open a desktop within the VDI. If you are unsure whether you have a citrix profile, please submit a service request to the GIS Help Desk using the following link: [GIS Support Request \(onbmc.com\)](#) (select the blue "Request Now" button). If you plan on using the VDI to complete the exercises, please test and make sure that you can access the VDI prior to the start of the course. If you opted to use Option 1 to access Pro, you must store the course data on the T drive.



- **Option 2:** Forest Service Employees can install and run ArcGIS Pro on their local machines. The latest FS-available version of ArcGIS Pro is in the Software Center for self-install. If you have issues installing ArcGIS Pro, submit a service request to the GIS Help Desk: [GIS Support Request \(onbmc.com\)](https://onbmc.com) (select the blue "Request Now" button). For further information regarding system requirements and install instructions, please see the ArcGIS Pro SharePoint Site: [ArcGIS Pro - Home \(sharepoint.com\)](https://sharepoint.com). If you opted to use Option 2 to access Pro, you must store the course data on your C drive.



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Part 1: Required Metadata Elements

A metadata element is a distinct piece of information that seeks to describe some aspect of a geospatial dataset. These metadata elements are defined and organized within metadata standards. The Forest Service is required to use the ISO metadata standards.

To be in compliance with the ISO Metadata standard, each GIS dataset metadata record must contain the following elements:

- **Title**
- **Description (Abstract)**
- **Bounding Box**
- **Topic Category**
- **Language**
- **Hierarchy Level**
- **Contact**
- **Creation Date**
- **Character Set**

In this exercise, we will learn how to populate and use each element within the ArcGIS Pro Metadata editor. Each subsequent section highlights a specific metadata page within the metadata editor, and the required elements within that page. For example, the first metadata page that we will look at is called the **Item Description Page**, which houses three required elements: **Title, Description, and Bounding Box**.

While these 9 elements must be populated to meet the minimum requirements of the ISO standards, users can also create and populate optional metadata elements as they see fit. Please reference the metadata guide to learn more about optional metadata elements.

A. Launch ArcGIS Pro

1. Open ArcGIS Pro.
2. Click on Open another project in the bottom left corner.
3. Navigate to wherever you stored the exercise data and open the following file path...
ISOmetadata_Exercise2\02_Data\
4. Within the 02_Data folder, select ISOmetadata_Exercise2 and then choose OK to open the project.

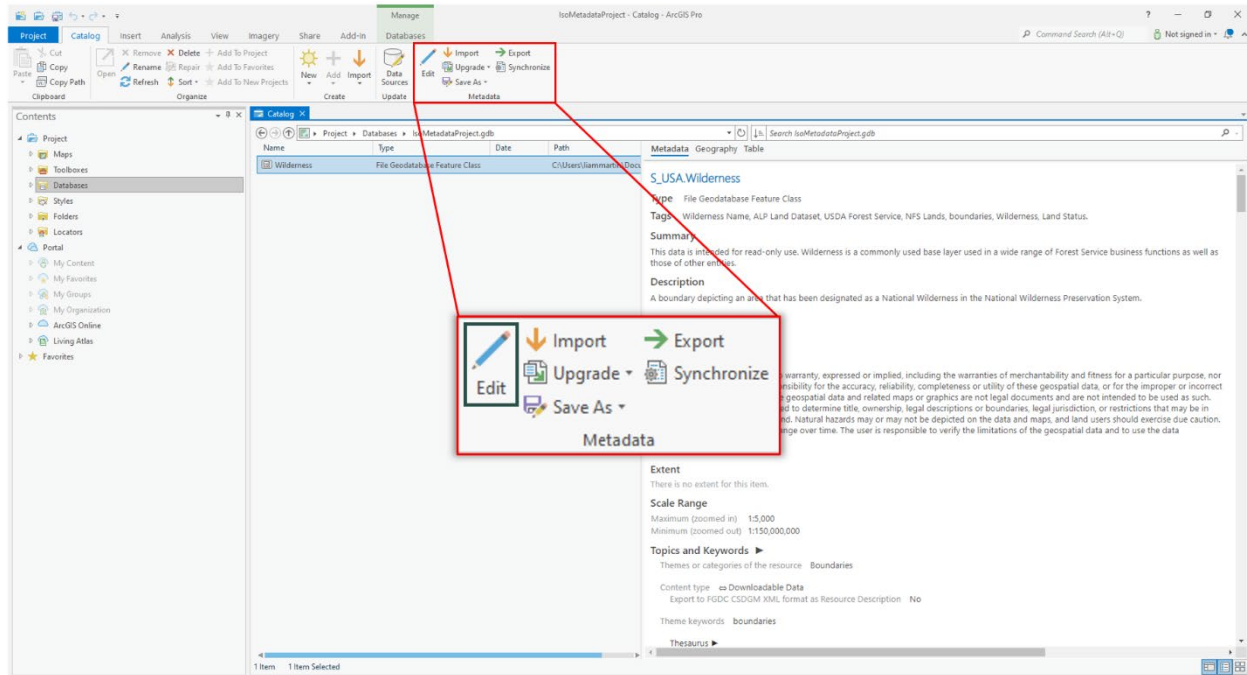
B. Configure Metadata Style

1. If you did not configure the metadata style in exercise 1, please configure the metadata style using the following steps:
 - i. Project in the top left corner.
 - ii. Select Options from the left-hand pane.
 - iii. Scroll down within the left-hand pane in the Options window and choose Metadata.
 - iv. Select the Metadata style drop down and choose **ISO 19115-3 XML Schema Implementation**.
 - v. Choose OK and then select the back button in the top left corner of the screen.

C. Open the Metadata Editor

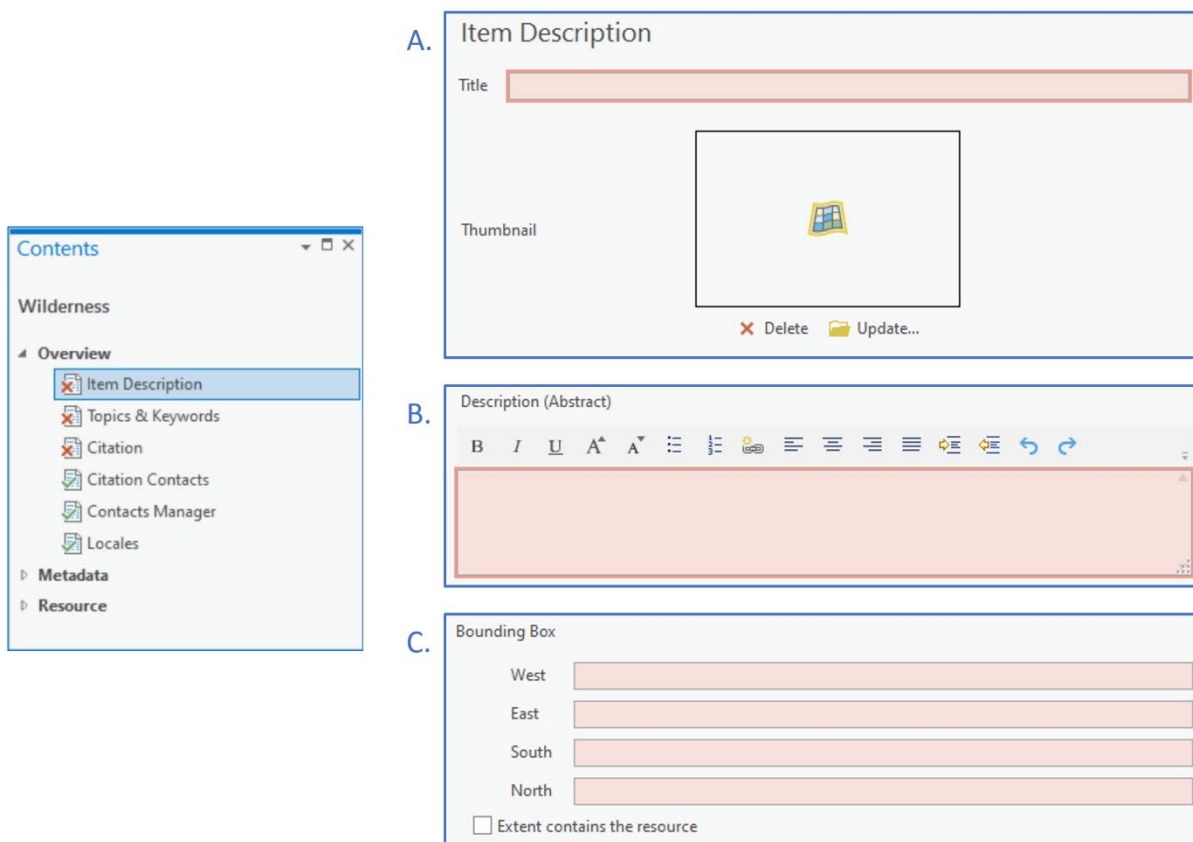
1. Using the Catalog Pane, which is usually docked on the right-hand side, expand the Databases section, then expand the ISOmetadata_Exercise2 geodatabase.

2. Right click the Wilderness Feature Class and choose **View Metadata** from the context menu.
3. Highlight the Wilderness feature class, then choose **Edit** from the metadata group.



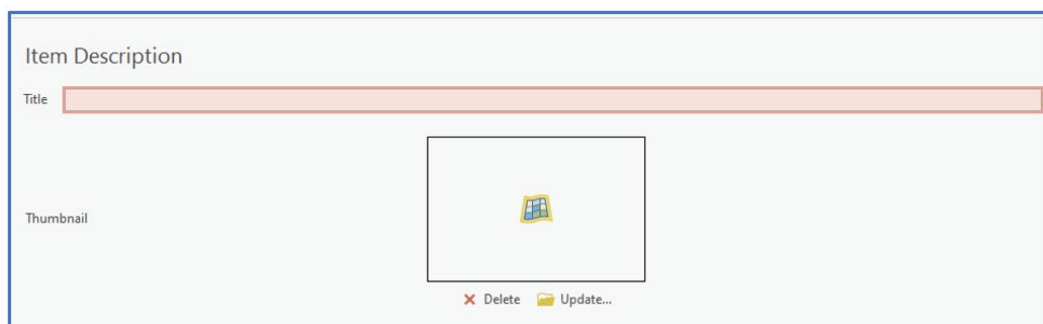
Part 2: Item Description Page

In the Metadata Editor Contents pane, make sure the **Overview, Item Description** page is selected. The Item Description page houses three required elements: **Title, Description (Abstract), and Bounding Box**.



A. Title

The Title element should contain succinct text that summarizes the dataset being described. The title is one of the most important metadata elements because it is the first piece of metadata a user will see! The title element, at a minimum, should include the 'what', 'where' and 'when'; at the maximum, the element could also include the 'who' and 'why'. If the element is populated correctly, the title should encapsulate the features being represented within the dataset.



1. Type the following in the Title box: Designated Wilderness Areas within the United States.

B. Description (Abstract)

The Description (Abstract) element should contain a brief description of the dataset. The abstract can be thought of as an extension of the title element. If the title element indicates what the features are, then the description (abstract) element should describe the features in greater detail. This should include explaining how the features were developed. If the optional summary (purpose) element is not populated, then the intended use should also be included within the abstract.

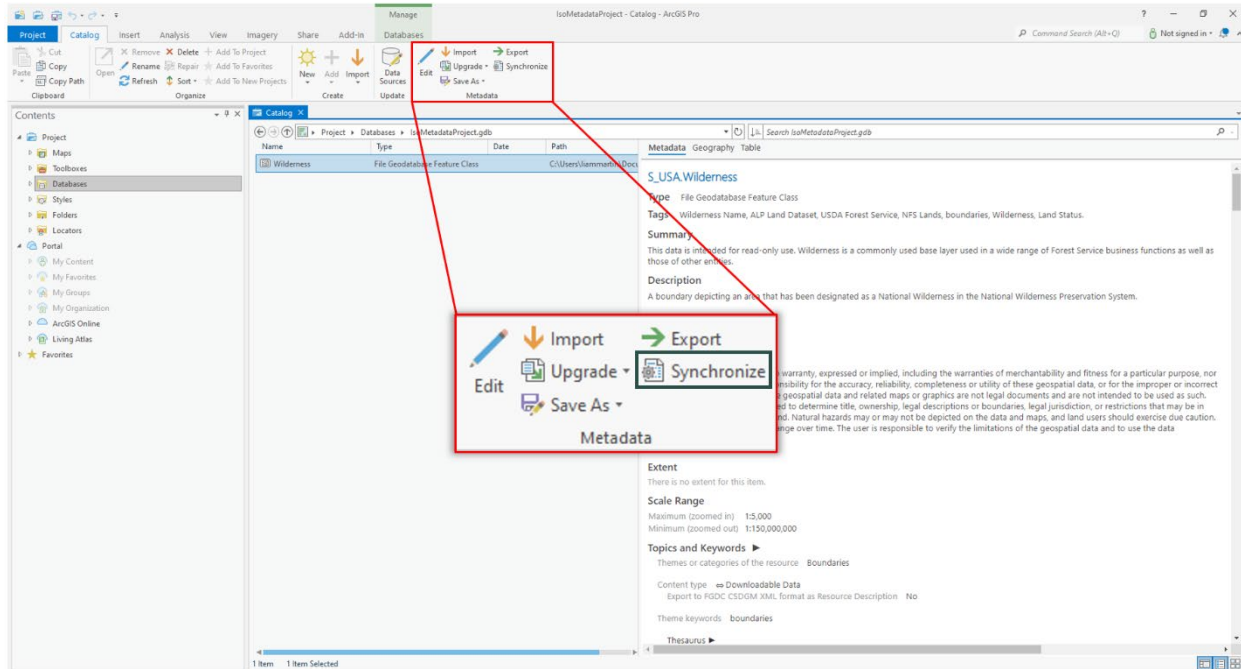
1. Copy and paste the following text into the Description (Abstract) box:
 - i. A boundary depicting an area that has been designated as a National Wilderness in the National Wilderness Preservation System. This data is intended for read-only use. Wilderness is a commonly used base layer used in a wide range of Forest Service business functions as well as those of other entities.

C. Bounding Box

The Bounding Box metadata element is a spatial extent that encompasses the resource being described. Users can manually type in the decimal coordinate information for each cardinal direction; however, it is much easier to use the synchronize function.

1. At the bottom of the Item Description page, choose New Bounding box.

2. Navigate to the Metadata Tab on the Ribbon and select **Save** from the Manage Metadata group. Close the metadata editor tab.
3. Navigate back to the **Catalog View** and highlight/select the feature class of interest.
4. With the Wilderness feature class highlighted, navigate to the Metadata Tab on the Ribbon, and select **Synchronize** from the Metadata group.



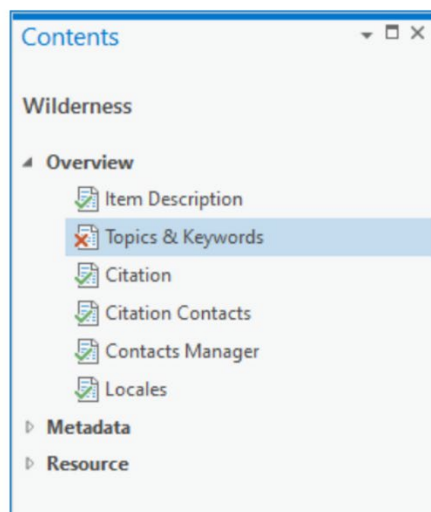
5. Re-highlight/select the Wilderness feature class in the Catalog View and navigate back to the Metadata Tab on the Ribbon and select **Edit** from the Metadata group.
6. Make sure the **Overview, Item Description** page is selected and note how the coordinate information has been populated within the Bounding Box metadata element.
7. Make sure that the 'Extent contains the resource' box is checked.

Use the synchronize function to automatically update the bounding box after editing any dataset's geometry. This is a great way to make sure that your coordinate info is always up to date! We will discuss the other benefits of the Synchronize function in Part 6.

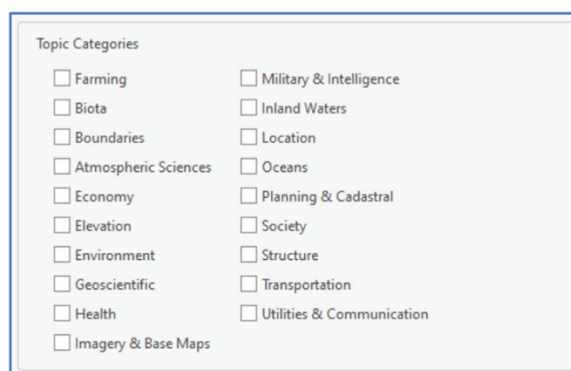
8. Please note, the following must be true if a user opts to manually enter the coordinate information:
 - i. West coordinate must be between -180.0 and 180.0; must be less than east bounding longitude.
 - ii. East coordinate must be between -180.0 and 180.0; must be greater than west bounding longitude.
 - iii. North coordinate must be between 90 and -90; must also be greater than south bounding latitude.
 - iv. South coordinate must be between 90 and -90; must also be less than north bounding latitude.

Part 3: Topics and Keywords Page

In the Metadata Editor Contents Pane, make sure the **Overview, Topics & Keywords** page is selected. The Topics & Keywords page houses one required element: **Topic Categories**.



A.



A. Topic Categories

The Topic Category element is a descriptive code that provides information regarding the resource's subject matter. Additionally, the selected value (or values) can be used to create groups of similar datasets. The topic categories element supports multiple entries; so users may select more than one value. Each topic category is defined within the [topic category code list](#).

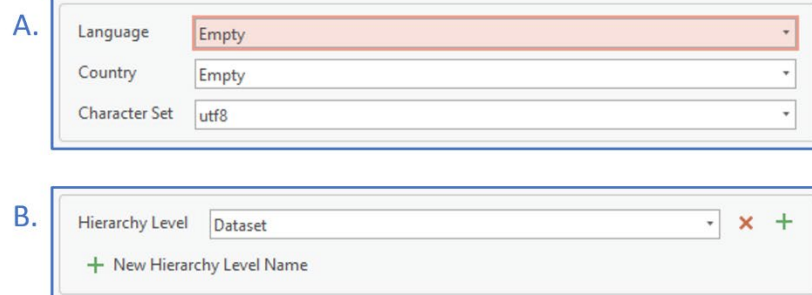
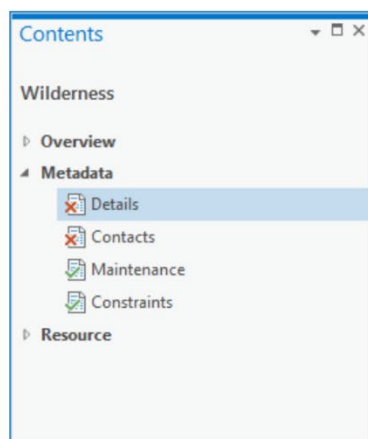
1. Select **Boundaries** from the list of possible Topic Categories.

Choose a minimum of 1 Topic Category that best describes the dataset's subject matter. The Topic Categories element supports multiple entries so a user may select more than one topic category.

2. Navigate to the Metadata Tab on the Ribbon and select **Save** from the Manage Metadata group.

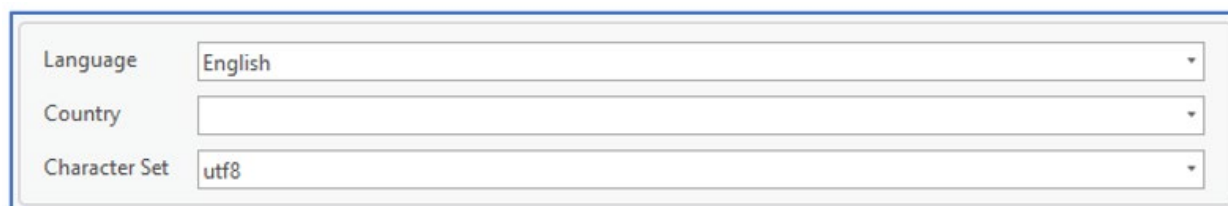
Part 4: Metadata Details Page

In the Metadata Editor Contents Pane, make sure the **Metadata, Details page** is selected. The Details page houses three required elements: **Language, Character Set, and Hierarchy Level**.



A. Language

The Language element defines the language being used to describe the resource.



1. When you create a new feature class, the Language element will be listed as empty and will be marked as required, as seen in the Metadata Details page screenshot. However, in our case, the synchronize function that we used previously populated the Language element for us.
2. Confirm that the Language element is set to **English**.

B. Character Set

The character set element specifies the character set that will be used to encode the textual value of the selected language. The default value is “UTF-8” which is suitable for our selected language.

C. Hierarchy Level

The Hierarchy Level element represents the type of resource that the metadata is describing. The default value is “dataset”. For most GIS users, the default value “Dataset” should suffice. Users are encouraged to browse the [hierarchy level code list](#) to see if there is an option that more accurately describes the type of resource. For example, if a user is creating metadata for a standalone table, they should choose “Non-geographic Dataset”.

1. Select the Hierarchy Level dropdown menu and browse the different options.
2. Select **Dataset**.

If you select a value other than Dataset for hierarchy level, then you must add a Hierarchy Level Name. The hierarchy level name is a text string that provides a description of the chosen hierarchy level. For example, if the hierarchy level is set to Non-Geographic Dataset, the hierarchy level name might be 'Standalone table'.

Part 5: Metadata Contacts Page

In the Metadata Editor Contents Pane, make sure the **Metadata, Contacts page** is selected. The Contact element (within the Contacts page) houses the name of individuals associated with the data being documented, their position, their associated organization, and the role that they performed. Each role is defined within the [role code list](#).

A.

A. Contact

1. Select New Contact.
2. Insert your name in the Name metadata box.
3. For Organization, enter your Program Area (e.g., Fire and Aviation), National Forest Name (e.g., Gifford Pinchot National Forest), Region (e.g., Pacific Northwest Region), Forest Service, U.S. Department of Agriculture.
4. For Position, enter your title (e.g., Fire Planner).
5. Select the Role drop down and choose Author.
6. Please see the following example as a reference:
 - i. Name: Smokey Bear

- ii. Organization: Fire and Aviation, Gifford Pinchot National Forest, Pacific Northwest Region, Forest Service, U.S. Department of Agriculture
- iii. Position: Fire Planner
- iv. Role: “author”

We have populated all the required elements within ArcGIS Pro. Please continue to Part 6 if you would like to learn how to use the Synchronize function to keep your metadata up to date. Please continue to Part 7 if you would like to convert the ArcGIS metadata format to a standalone ISO 19115-3 XML document.

Part 6: Keep your Metadata Up to Date using the Synchronize Function

The Synchronize function converts “known” information about a GIS dataset into metadata. This function can be used to initially add metadata information that is currently not present in the metadata record, as well as update metadata elements already populated within the metadata record.

For example, in Part 2 we used the Synchronize function to populate the bounding box element. Later, if we edited the dataset’s spatial geometry, we could use the synchronize function again to update the bounding box coordinate information, as it may have changed during the editing process.

The Bounding Box is just one of many different metadata elements that the synchronize function can be used to populate / maintain. And while the function can be used to populate all sorts of different metadata elements, here we will highlight five main elements that every Forest Service GIS user should use the synchronize function to populate/maintain.

A. Bounding Box

1. As previously discussed, the Synchronize function automatically calculates the spatial extent of the dataset and populates the Bounding Box section with the appropriate coordinate values.
2. After editing the spatial geometry, it is a good idea to synchronize your metadata! This will automatically update the bounding box with new coordinates if the extent was altered.

Bounding Box

West	-139.636218
East	-65.770541
South	18.248406
North	59.999703

☒ Extent contains the resource

B. Revision Date

1. The Date Stamp metadata element will be populated with the date the data was last revised.

File Identifier	<input type="text"/>	Create
Parent Identifier	<input type="text"/>	
Dataset URI	<input type="text"/>	
Date Stamp	2022-02-18 <input type="text" value="15"/>	

C. Spatial Representation Type

1. Synchronizing the metadata populates the Spatial Representation Type element with the resource's data type. This will most likely be Vector or Grid.

Spatial Representation Type	<input type="text" value="Vector"/>		
Scale Resolution	<input type="text"/>		
Distance Resolution	<input type="text"/> Empty		

D. Reference System

1. The reference system group will automatically be updated with coordinate system information.
2. An [European Petroleum Survey Group](#) (EPSG) code will be added, which indicates the coordinate system that is being referenced by the dataset.

▼ Reference System		
Code	<input type="text" value="4269"/>	
Code Space	<input type="text" value="EPSG"/>	
Version	<input type="text" value="6.5(3.0.1)"/>	
New Authority Citation		

E. Fields

1. Using the synchronize function also pulls field names and field types from the dataset's attribute table. This attribute information is then stored in the Metadata Editor - Fields tab.
2. It is always a good idea to synchronize your metadata after adding new fields to your attribute table! The same logic applies after removing attribute fields. This will ensure that the attribute information stored in the Fields tab is accurate and up to date. Interested in learning more about attribute information and metadata? Please see exercise 4.

Details: Wilderness

Label

Wilderness

Entity Type

Attribute: OBJECTID

Attribute: WILDERNESSID

Attribute: WILDERNESSNAME

Attribute: AREAID

Attribute: BOUNDARYSTATUS

Attribute: GIS_ACRES

Attribute: SHAPE

Attribute: WID

Attribute: SHAPE_Length

Attribute: SHAPE_Area

+ New Attribute

3. Close the Metadata Editor.

It is always a good idea to synchronize your metadata after editing!

Part 7: Export Metadata to an XML File

XML (Extensible Markup Language) files use text to store data. Data stored within the XML format is primarily intended to be processed by a website, web application, or software program, but it can also be read by humans.

Developers can create custom tags within XML, which means the language can be used in a flexible manner to describe all sorts of different kinds of data. In our case, the XML tags and format were designed to house and validate metadata information.

In this portion of the exercise, we will learn how to export metadata stored in the ArcGIS Metadata document to an ISO 19115-3 XML file. Users may need to export metadata to an ISO 19115-3 XML file if they are passing data to EDW or if they need to share metadata with an external partner.

A. Open ArcGIS Pro

1. If necessary, open ArcGIS Pro.
2. Click on Open another project in the bottom left corner.
3. Navigate to wherever you stored the exercise data and open the following file path...
ISOmetadata_Exercise2\02_Data\
4. Within the 02_Data folder, select ISOMetadata_Exercise2 and then choose OK to open the project.
5. Make sure that the Metadata Style is set to **ISO 19115-3 XML Schema Implementation**.

B. Export an ISO 19115-3 XML File

1. Using the Catalog Pane, expand the Databases section, then expand the IsoMetadata_Exercise2 geodatabase.
2. Right click the Wilderness feature class and choose **View metadata**.
3. With the Wilderness highlighted in the Catalog View, make sure that the Catalog tab is activated on the ArcGIS Pro Ribbon, navigate to the Metadata group and choose **Export**.
4. Within the Export Metadata window, ensure the following parameters are set:
 - i. The metadata content to export: **Without Sensitive Information**
 - ii. The type of metadata to export: **Current style (ISO19115_3)**
 - iii. Export metadata to: Select the folder icon and browse to the ...\\ISOMetadata_Exercise2\03_OutputXML folder and click **Save**.

The dialog box titled "Export Metadata" has a close button (X) in the top right corner. It contains three sections:

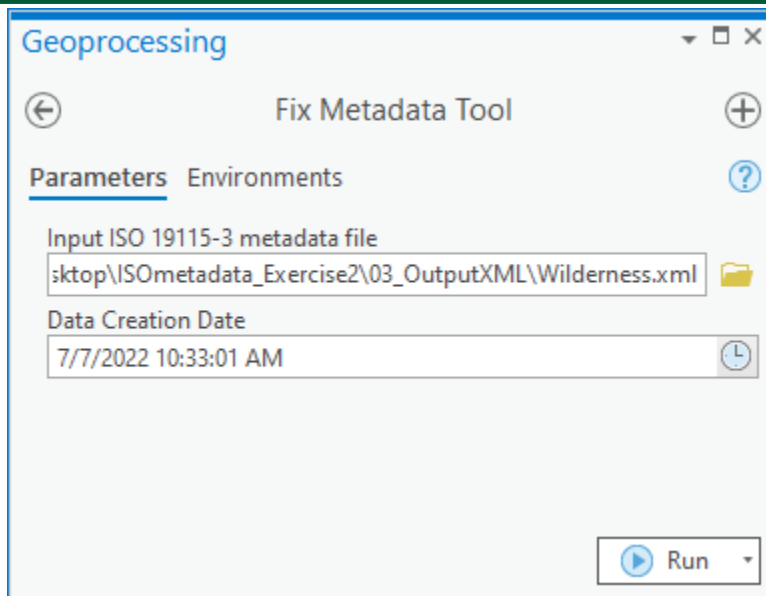
- The metadata content to export:** A dropdown menu with "Without Sensitive Information" selected. An information icon (i) is to the right.
- The type of metadata to export:** A dropdown menu with "ISO 19115-3" selected. An information icon (i) is to the right.
- Export metadata to:** A text box containing the file path "martin\Desktop\ISOmetadata_Exercise2\03_OutputXML\Wilderness.xml". A folder icon is to the right.

At the bottom right are "OK" and "Cancel" buttons.

5. Choose **OK** to start the export.
6. Using file explorer, navigate to ... ISOmetadata_Exercise2\03_OutputXML folder and double click the Wilderness XML file. The structure of the XML document, as well as the individual tags, are outlined in the ISO metadata standard: ISO 19115-3. Close the XML file.
7. As of this writing (using ArcGIS Pro version 2.9), the ISO 19115-3 XML document produced by ArcGIS Pro contains a number of XML errors. Additionally, in order to be in compliance with the ISO metadata standards, the date the dataset was created must be included in the metadata record. Currently, this metadata element cannot be added using the ArcGIS Pro metadata editor and thus, it is not included in the ISO 19115-3 XML file.
8. The Forest Service has created a custom tool to fix the XML errors and add the creation date to the ISO 19115-3 XML file.

C. Run the ISO Metadata Fix Tool

1. Copy the ISO_MetadataToolbox folder from the following location:
T:\FS\Reference\GeoTool\agency\Toolbox\MetadataToolboxes\ISO_MetadataToolbox
2. Paste the ISO_MetadataToolbox folder within the ...\ISOmetadata_Exercise2\03_OutputXML folder.
3. Within the Catalog Pane, right click the Toolboxes folder and choose **Add Toolbox**. Navigate to the location where you saved the toolbox, click within the ISO_MetadataToolbox folder, then select ISO_Metadata_Tools.pyt and choose Ok.
4. Expand the ISO_Metadata_Tools toolbox and double click the Fix Metadata Tool script.
5. Configure the following parameters:
 - i. Input ISO 19115-3 metadata file: Navigate to and select the exported Wilderness XML file.
 - ii. Date Created Date: Choose the clock symbol and specify the date the dataset was created using the calendar interface. For the purpose of this training, the current date and time will suffice.
 - iii. Select Run at the bottom of the Geoprocessing Pane.



6. A new output file will be created with the text “_fixed” appended to the original file name. The new XML file is now compliant with the ISO 19115-3 metadata standard!
 - i. If you are interested in the changes that were made, open the original Wilderness XML file. Press and hold the ctrl key and the F key. Search for the text string: creation.
 - ii. Now open the new Wilderness_fixed XML file and repeat the search. Note that the creation date metadata element has been added to the Wilderness_fixed XML file.
7. We now have ISO compliant metadata!