Publishing metadata in ArcCatalog

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ArcCatalog is part of the ArcGIS Desktop suite of applications. It's where you go to create and update metadata, publish metadata to a Metadata Service, and organize and manage the published metadata documents. The ArcCatalog Search tool can also be used to browse and search the contents of a Metadata Service.

Because this chapter is focused on publishing, it doesn't cover some of the general concepts and tasks for creating and editing metadata. You can find that information in the book *Using ArcCatalog* and in the ArcGIS Desktop Help system. Among the ArcGIS Developer samples, which are available for download from *support.esri.com*, you may also find some helpful utilities, such as a spelling checker for metadata.

Requirements for publishing metadata

Before you can publish metadata to a service, you must have metadata. By default, when you attempt to view an item's metadata, ArcCatalog will automatically create it if it doesn't already exist and will update many of the metadata properties for you. You can use the metadata editors in ArcCatalog to add documentation, such as why the item was created.

You should take a step back and review the metadata's content before it is published. The usefulness of a Metadata Service depends entirely on the quality of the metadata available on that service. The same care should be taken with your metadata that you take when constructing a written document or the data that the metadata describes.

Ask yourself if you have provided enough information for people to find your document with a search. Once someone has found your document, will they be able to find the resource it describes and use it successfully? For example, make sure there is a link to an online order form and that you've described the values that each attribute column contains. Have any legal or security issues regarding your resource been documented? You should have your legal department review this information.

The review process will take time initially, but it can save you time in the long run. Use the experience to develop a good template that will become the foundation of all your future metadata efforts. When developing a series of metadata templates, think about what applies to all your datasets and what applies just to items developed for a specific project.

What can be published to a metadata service

ArcIMS Metadata Services don't require metadata to conform to any content standard. However, by default, a Metadata Service requires five pieces of information to be provided: the title, publisher, spatial extent, content theme, and content type of the resource. This information supports basic searches with the Metadata Explorer and ArcCatalog. You can add this information using either the FGDC or ISO metadata editor that comes with ArcCatalog.

When validation is enabled for a Metadata Service, the service checks a submitted document to see if it contains the required pieces of information. If any are missing, the document won't be published. ArcCatalog will show a report indicating what information is missing.

If validation has been disabled, you can publish any XML document with any content to a Metadata Service, but you may not be able to find the document with a search.

It is important to be clear that validation according to an ArcIMS Metadata Service has nothing to do with validation according to a metadata content standard. Metadata that contains information that is required according to a content standard, such as FGDC or ISO, may not contain the information that is required by the Metadata Service.

Defining theme and content type codes

To search for resources by theme and content type, the metadata must contain one of the theme or content type codes that the Metadata Service understands. Because the same codes must be used in all metadata documents, you will be able to publish metadata in any language to any Metadata Service, and its Metadata Explorer, which may be translated for any language, will be able to find your document.

The theme categories used by the Metadata Service are described below. More than one theme can be defined for a resource. For example, if your dataset describes soil tests, you might specify the theme codes for agriculture, geophysical, and environmental categories. Searches on any of those categories will find your dataset.

The descriptive name of each category appears below with bold text. These categories actually come from the ISO metadata standard. The ISO metadata editor presents you with a list of descriptive names for each category, but the editor actually saves the appropriate code into the metadata.

Because the FGDC metadata standard doesn't directly support theme codes, the FGDC editor isn't designed to handle them. To work around this situation, the Metadata Service looks for theme codes among the document's theme keywords. The code that must be typed into the FGDC metadata editor appears in parentheses below. These codes must be typed exactly as they are shown regardless of the language in which the rest of the metadata has been defined. For example, for a shapefile of cell phone antennas, you would type the theme code "utilitiesCommunication" into the FGDC metadata editor.

Administrative and political boundaries (boundaries)—Legal land descriptions.

Agriculture and farming (farming)—The rearing of animals or cultivation of plants. For example, resources describing irrigation, aquaculture, herding, and pests and diseases affecting crops and livestock.

Atmosphere, climatology, and meteorology (climatologyMeteorologyAtmosphere)—Atmospheric processes and phenomena. For example, resources describing cloud cover, weather, atmospheric conditions, climate change, and precipitation.

Biologic and ecologic (biota)—Naturally occurring flora and fauna. For example, resources describing wildlife, biological sciences, ecology, wilderness, sea life, wetlands, and habitats.

Business and economic (economy)—Economic activities or employment. For example, resources describing labor; revenue; commerce; industry; tourism and ecotourism; forestry; fisheries; commercial or subsistence hunting; and exploration and exploitation of resources, such as minerals, oil, and gas.

Cadastral and land planning (planningCadastre)—Land use. For example, resources describing zoning maps, cadastral surveys, and land ownership.

Cultural, society, and demographic (society)—The characteristics of societies and cultures. For example, resources describing natural settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, crime and justice, recreational areas and activities, social impact assessments, and census information.

Elevation and derived products (elevation)—Height above or below sea level. For example, resources describing altitude, bathymetry, digital elevation models, slope, and products derived from this information.

Environment and conservation (environment)—Environmental resources, protection, and conservation. For example, resources describing pollution, waste storage and treatment, environmental impact assessment, environmental risk, and nature reserves.

Facilities and structures (structure)—Man-made construction. For example, resources describing buildings, museums, churches, schools, hospitals, factories, housing, monuments, and towers.

Geological and geophysical (geoscientificInformation)—The earth sciences. For example, resources describing geophysical features and processes; minerals; the composition, structure, and origin of the earth's rocks; earthquakes; volcanic activity; landslides; gravity information; soils; permafrost; hydrogeology; and erosion.

Human health and disease (health)—Health services, human ecology, and safety. For example, resources describing human disease and illness, factors affecting health, hygiene, mental and physical health, substance abuse, and health services.

Imagery, basemaps, and land cover
(imageryBaseMapsEarthCover)—Basemaps. For example,
resources describing land cover, topographic maps, and classified
and unclassified images.

Inland water resources (inlandWaters)—Inland water features,
drainage systems, and their characteristics. For example,
resources describing rivers and glaciers, salt lakes, water use
plans, dams, currents, floods, water quality, and hydrographic
charts.

Locations and geodetic networks (location)—Positional
information and services. For example, resources describing
addresses, geodetic networks, postal zones and services, control
points, and place names.

Military and intelligence (intelligenceMilitary)—Military bases,
structures, and activities. For example, resources describing
barracks, training grounds, military transportation, and
information collection.

Oceans and estuaries (oceans)—The features and characteristics
of salt water bodies excluding inland waters. For example,
resources describing tides, tidal waves, coastal information, and
reefs.

Transportation networks (transportation)—The means and aids
for conveying people and goods. For example, resources
describing roads, airports and airstrips, shipping routes, tunnels,
nautical charts, vehicle or vessel location, aeronautical charts,
and railways.

Utility and communication networks (utilitiesCommunication)—
Energy, water and waste systems, and communications
infrastructure and services. For example, resources describing
hydroelectricity; geothermal, solar, and nuclear sources of
energy; water purification and distribution; sewage collection and
disposal; electricity and gas distribution; data communication;
telecommunication; radio; and communication networks.

The content type codes used by the Metadata Service are listed
below; they are described in Chapter 2 in the section 'Finding
data using Metadata Explorer'. Like the theme codes, they must
be typed in exactly as they are shown. But unlike the theme
codes, only one content type code can be defined for a resource.

• Live Data and Maps

• Downloadable Data

• Offline Data

• Map Files (supported in ArcCatalog 8.3 and later)

• Static Map Images

• Other Documents

• Applications

• Geographic Services

• Clearinghouses

• Geographic Activities (supported in ArcCatalog 8.3 and later)

When ArcCatalog automatically creates and updates metadata,
the Geography Network and ISO synchronizers will add the same
default content type code. For ArcIMS Image and Feature
Services, the code "Live Data and Maps" is added to the
metadata. For ArcMap map documents (.mxd or .pmf) and layer
files, the code "Map Files" is added to the metadata. For all other
items, the code "Downloadable Data" is added. Before you
publish metadata, you should consider whether the default
content type code is appropriate for your resource and change
the value if necessary.

Document identifiers and republishing metadata

When metadata is published, a copy of your original document is added to the Metadata Service's database and indexed for fast searching. You can later republish the original document, for example, after the dataset and its metadata have been updated. Because only one copy of the document is stored with the service, all references to that document in all folders on the service will access the new version; each reference does not have to be updated.

This is possible because ArcCatalog and the Metadata Service use a unique identifier to refer to the metadata document. The unique identifier is generated within the metadata during the publishing process. The second time a document is published, the identifier already exists; the Metadata Service locates and replaces the original document. When a document is republished, the indexes are updated with the latest information in the metadata.

While it is possible to directly edit the published document using the ArcCatalog metadata editors, those changes are made only on the Metadata Service, not to your local version. If you later republish the original document, those changes will be lost.

If metadata was created with ArcCatalog 8.1 or earlier, it will contain an identifier that is not guaranteed to be unique. For example, if you imported a metadata template, the template and every metadata document based on that template would have the same identifier. If you publish those documents, the Metadata Service can't distinguish between them; the first document will be replaced by the second document, and so on. To solve this problem, use the MetaIDChecker utility provided with ArcCatalog. It can be found in the Utilities folder in the location where ArcGIS was installed.

Preparing metadata for publication

Before you can publish metadata, you need to define the pieces of information that are required by the Metadata Service: title, publisher, spatial extent, theme, and content type. Either the FGDC or ISO metadata editor, or both, may be used to do so.

The drawback of the FGDC editor is that you must type in the theme and content type codes; the ISO editor lets you pick them from a list. With the FGDC editor you can define any number of theme keywords—the requirement is for one of those keywords to come from the Metadata Service's content theme code list. For example, metadata for a soils dataset might have existing keywords: soil, clay, and corn. To publish the metadata, add the theme code "farming" to that list.

If you want to keep the content theme code separate from the existing set of keywords, add a new group of keywords and define that group's thesaurus as "Metadata Service Theme Categories". Alternatively, leave your FGDC theme keywords list the way it is and use the ISO ▶

Choosing a metadata editor

1. Click the Tools menu and click Options.

2. Click the Metadata tab.

3. Click the Metadata Editor dropdown arrow and click the editor you want to use.

4. Click OK.
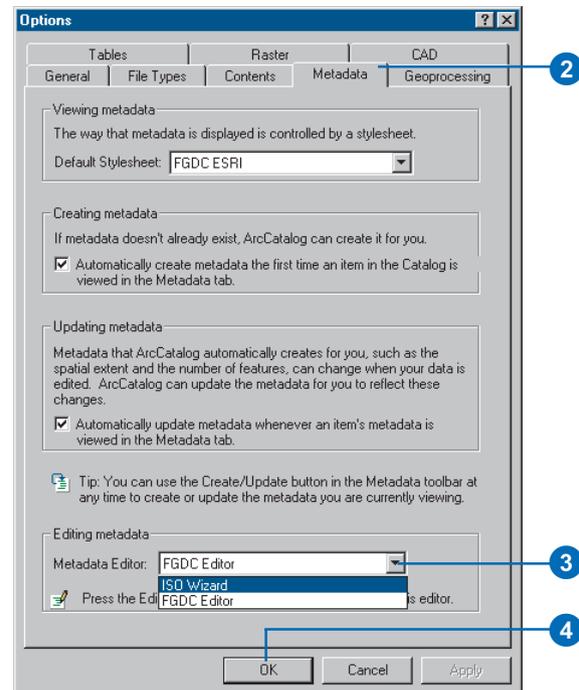
editor to define the content theme code.

Similarly, when defining the content type code, the FGDC editor's Resource Description text box must contain one of the Metadata Service's codes. That text box can't contain additional information. If your metadata contains an existing resource description, you have a few alternatives: put the existing information in another metadata element; add a second distribution information section by clicking the plus sign under the General tab, then add the content type code; or use the ISO editor to define the content type. ▶

Adding required information with the FGDC metadata editor

1. In ArcCatalog, click the item in the Catalog tree whose metadata you want to edit. For example, click a shapefile.

2. Click the Metadata tab.

3. Click the Edit Metadata button on the Metadata toolbar.

4. To add a title, click Identification at the top of the editor, click the Citation tab, then type a descriptive title that clearly identifies the item.

5. Click Details to show the Citation information dialog box.

6. To add the publisher, click the Series/Publication Information tab, then type in the publisher. ▶
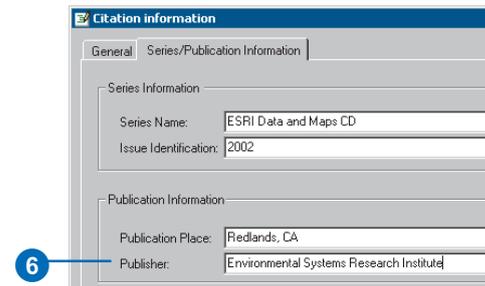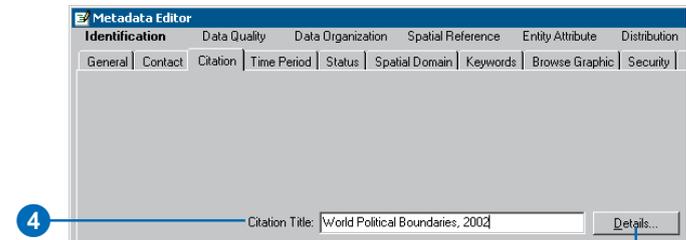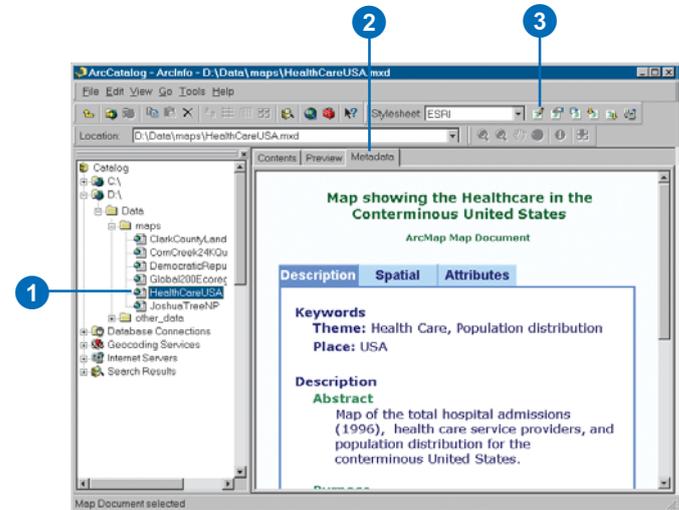
When the metadata is published, the Metadata Service looks for the required information in the appropriate FGDC and ISO metadata elements. If a title has been defined in both the FGDC element and the ISO element, the value in the FGDC element will be used.

The FGDC and ISO synchronizers both add a default title to the metadata—the FGDC synchronizer adds it to the appropriate FGDC element, the ISO synchronizer to the appropriate ISO element. After modifying the default title with the ISO editor, the default title will still exist in the FGDC element. Because of the Metadata Service's rules, the default FGDC title takes precedence and will be indexed as the title. A full text search based on words in the ISO title will still find the document, but the FGDC indexed title will be the one that appears in the Metadata Explorer's search results.

To work around this situation, you may want to define the Metadata Service's required information using both the FGDC and ISO editors. Or, if you only want to use the ISO metadata editor, you may want to turn off the FGDC metadata synchronizer. For information ▶

7. To add the spatial extent, click the Spatial Domain tab and click the Bounding Coordinates and G-Polygon tab. The North, South, East, and West coordinates will be added automatically by ArcCatalog if the data's coordinate system has been defined. If these boxes are empty or if the item is nonspatial, such as a table, you will have to type in an appropriate extent in decimal degrees.

8. To define the item's theme, click the Keywords tab, click the plus sign (+) under Theme Keyword, then type one of the following codes into the Keyword text box:

biota
boundaries
climatologyMeteorologyAtmosphere
economy
environment
farming
geoscientificInformation
health
imageryBaseMapsEarthCover
intelligenceMilitary
inlandWaters
location
oceans
planningCadastre
society
structure
transportation
utilitiesCommunication ▶
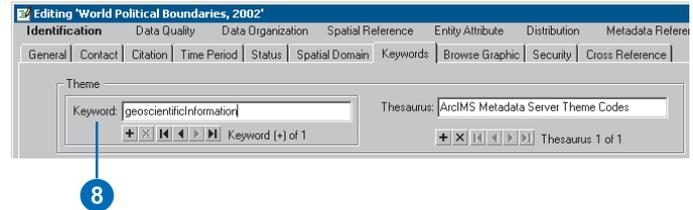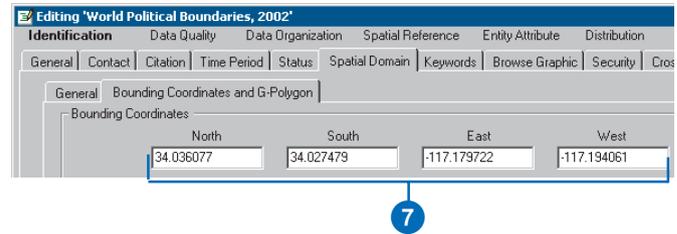
about how to do this, refer to metadata synchronizer information in the ArcGIS Desktop Help system.

Before publishing metadata, you should remove the documentation hints that are added by the FGDC synchronizer to the elements that are mandatory according to the FGDC standard. Because these hints are stored as values of those elements, they will be in the metadata that is published to the Metadata Service. You can delete the hints manually with the FGDC metadata editor; the Help button in the editor shows where to find the mandatory elements. Alternatively, the ArcObjects™ developer samples include a Visual Basic® for Applications (VBA) script that can be used to delete the FGDC hints. Documentation hints are not added to ISO metadata elements.

While thumbnails aren't required, they can be useful. The Metadata Explorer will show thumbnails in the search results if they exist. Existing FGDC standard metadata that is published on the National Spatial Data Infrastructure (NSDI) Clearinghouse may have "browse graphics" rather than thumbnails. These are separate graphic files that are ▶

9. If the item falls into more than one theme category, click the plus sign again and type in another code.

10. To define the item's content type, click Distribution at the top of the editor, then type one of the following codes into the Resource Description text box:

Live Data and Maps
Downloadable Data
Offline Data
Map Files
Static Map Images
Other Documents
Applications
Geographic Services
Clearinghouses
Geographic Activities

11. Click Save.
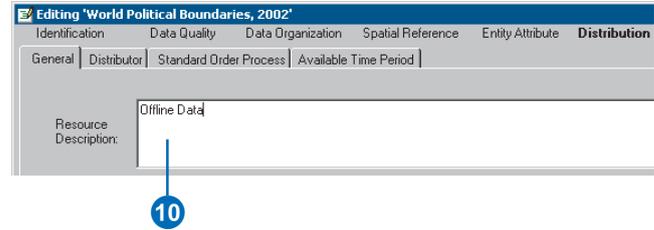
NOTE: The Map Files and Geographic Activities content type codes are only supported in ArcGIS 8.3 and later. These values are not supported in earlier versions.

Adding required information with the ISO metadata editor

1. Click the Edit Metadata button on the Metadata toolbar.

2. To add a title, click the Title page in the table of contents and type a descriptive title that clearly identifies the item. ▶
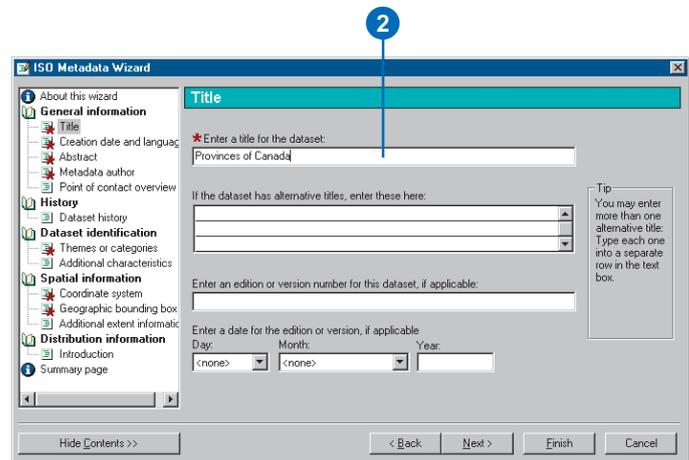
referenced, rather than enclosed, in the metadata. Like thumbnails, a browse graphic may illustrate the dataset symbolized in various ways. If a thumbnail does not exist, the Metadata Service will see if a browse graphic exists; the first browse graphic in GIF or JPEG format that can be accessed will be loaded into the database as the document's thumbnail. Additional browse graphics will not be loaded.

3. Click the Point of contact overview page in the table of contents, click Yes in response to the second question to add a new point of contact, then click Next.

4. To add the publisher, click the last Point of contact page in the table of contents; it will be empty. Load a contact into the page from the contacts database, or type the publisher's name into the organization name text box.

5. To define the contact as the publisher, click the Function in relation to the dataset dropdown list and click publisher.

6. To define the item's theme, click the Themes or categories page in the table of contents and check all the categories that apply for this item. ▶

7. If the Geographic bounding box page appears in the table of contents, click that page and type in an appropriate spatial extent in decimal degrees. If the page doesn't appear, skip to step 8.

The page doesn't appear in the table of contents if ArcCatalog automatically added the item's extent in decimal degrees, which happens when the item contains spatial data and its coordinate system has been defined.

8. Define the item's content type by clicking the On-line delivery options 1 page in the table of contents and click the appropriate content type from the resource description dropdown list.

9. Click Finish.
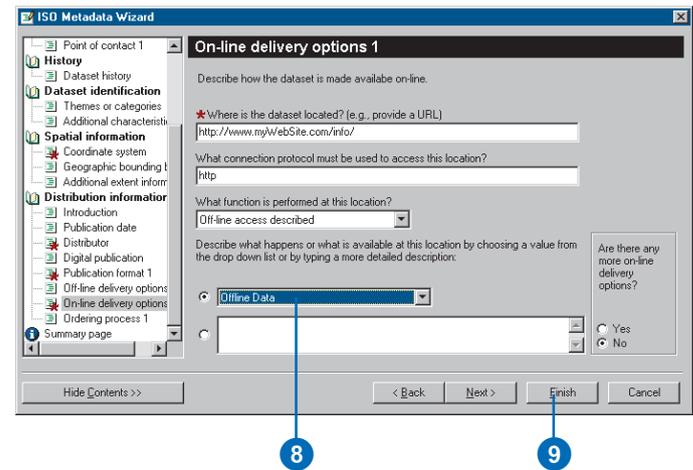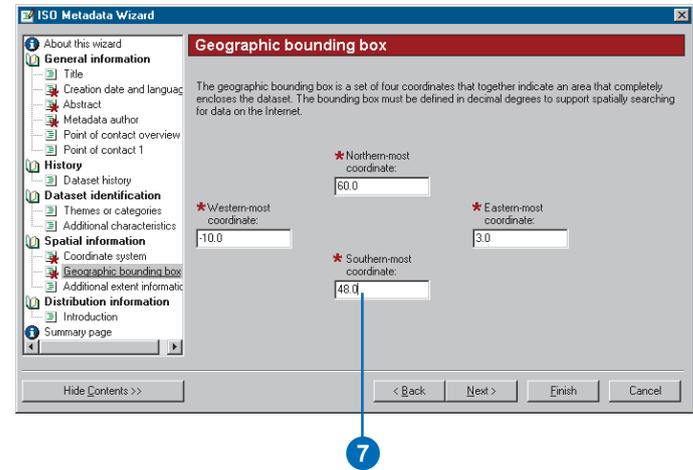
Creating a thumbnail

1. In the Catalog tree, click the item for which you want to create a thumbnail.

2. Click the Preview tab.

3. Click the Preview dropdown arrow on the Preview tab and click Geography.

4. Click the Zoom In button on the Geography toolbar and zoom to the area that best represents the layer's contents.

5. Click the Create Thumbnail button.
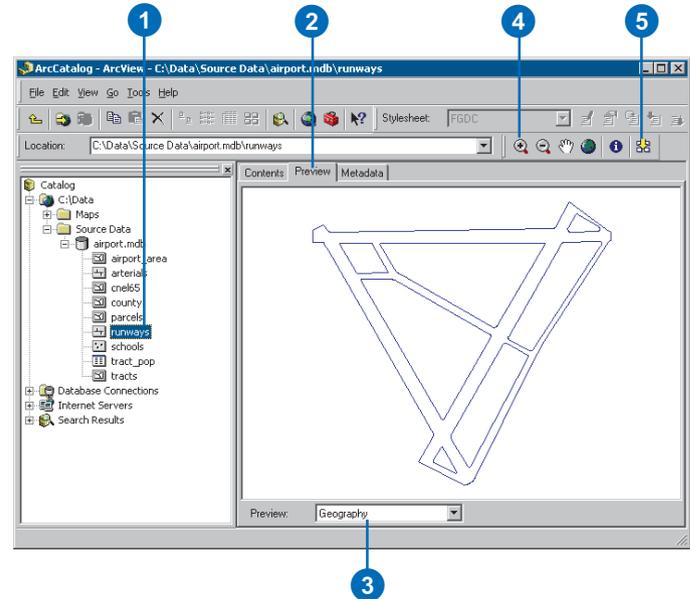
Publishing to a Metadata Service

You can publish an item's metadata or any XML document to an ArcIMS Metadata Service using ArcCatalog. To do so, you must have permission to publish; the ArcIMS administrator will give you a username that has the role metadata_publisher. After connecting to the ArcIMS server with that login information, the icon of the Metadata Service to which you can publish will show a hand holding a pencil.

To publish an item's metadata, either copy and paste or drag and drop the item onto the Metadata Service. Metadata created for ArcIMS Image and Feature Services is not automatically published to a Metadata Service that exists on the same ArcIMS server; you must publish their metadata by dragging and dropping them onto the Metadata Service. When an item is pasted or dropped, its metadata is retrieved and a copy of it is added to the Metadata Service's database. The original metadata document remains in its initial location. If the original metadata changes, you must republish it to the Metadata Service.

1. In ArcCatalog, click the item whose metadata you want to publish. To select more than one item in the Contents tab, hold down the Ctrl key while clicking the items.

   These datasets should already have metadata.

2. Click the Copy button.

3. Click the folder in the ArcIMS Metadata Service to which you want to publish the metadata.

4. Click the Paste button.

   The published documents will appear in the ArcIMS metadata folder. Publishing can take a few moments. If any problems were encountered, a report will appear indicating why a document could not be published. If any documents were previously published, the report will also show which documents were updated.
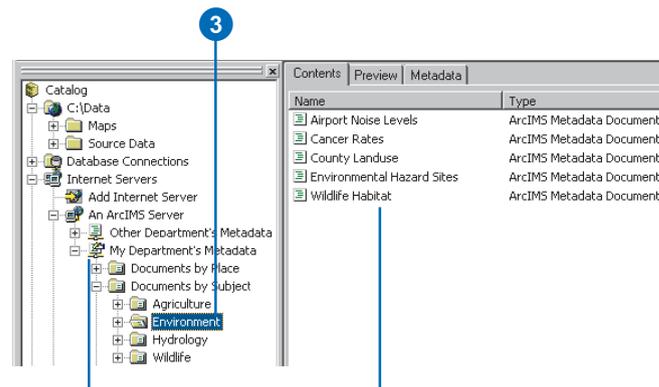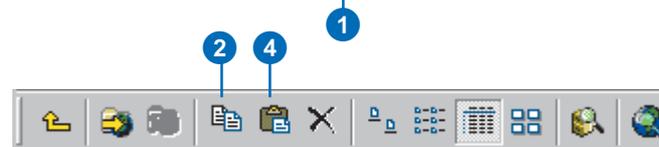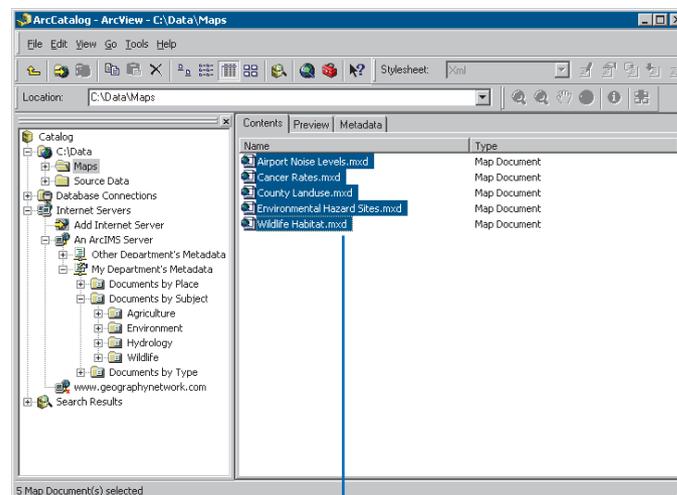
If you have permission to publish, the Metadata Service's icon shows a hand holding a pencil.

The published documents will appear in the ArcIMS metadata folder.
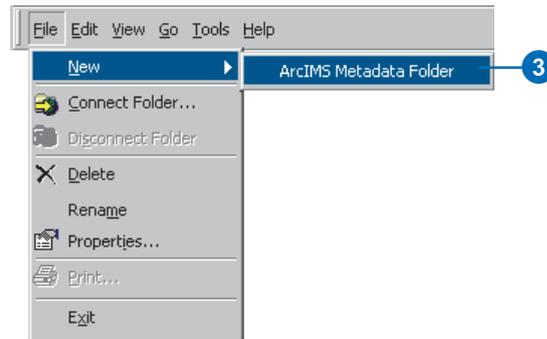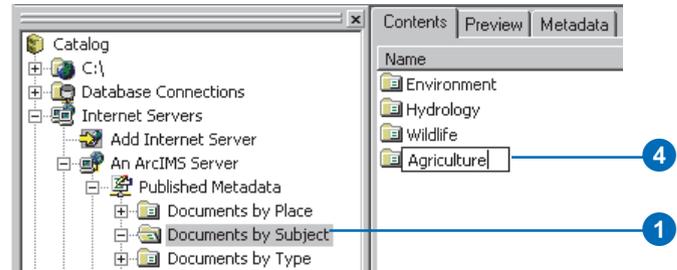
Managing published documents

A Metadata Service is only useful if the published documents are easy to find. Like building an index for a book, creating a true catalog of documents requires you to think about the various ways that people will look for data.

You can use ArcCatalog to construct a series of folders that organize the published documents in different ways. One document would appear in a different place in each hierarchy. A Metadata Service might contain one folder that organizes the documents by geographic location like a gazetteer, another folder that organizes documents by publisher, another by subject, and so on. When browsing the contents of the service in ArcCatalog or the Metadata Explorer, people will use each of those folders as a different entry point to drill down through the catalog and find what they need.

For example, a Metadata Service that publishes information about the western United States might have one folder that organizes documents by ▶
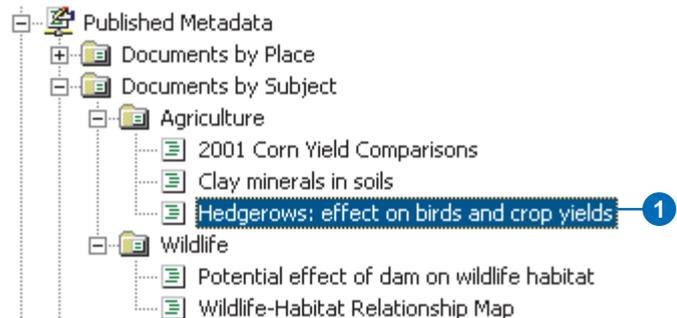
Creating a folder in a Metadata Service

1. Click the Metadata Service or the folder within that service in which you want to create a new folder.

2. Click the File menu.

3. Point to New and click ArcIMS Metadata Folder.

4. Type a new name for the folder.

5. Press Enter.

Copying a published document

1. Click the document you want to copy. ▶

publisher and another that organizes by geographic location. Each organization that contributes information could publish its metadata into a folder that is just for them.

The librarian who oversees the Metadata Service could then copy the published document into the appropriate places in the other hierarchies. The folder that organizes documents by geographic location could contain one folder for each state, which in turn would contain one folder for each county, and so on. Metadata describing an image that covers a large area of California would be copied to the California folder. Metadata describing a report about election results in Riverside County would be copied to the Riverside County folder.

While a published document can be referenced by many folders, only one physical copy of the document is stored in the database. And no matter how many folders the published document appears in, the document will only appear once in a list of search results.

Similarly, when you delete a document on the Metadata Service you are only deleting the selected reference to that document. All references to a ▶

2. Click the Copy button.

3. Click the Metadata Service or folder within that service to which you want to copy the document.

4. Click the Paste button.

The metadata document now appears in both folders on the Metadata Service.

The metadata document appears in both folders.
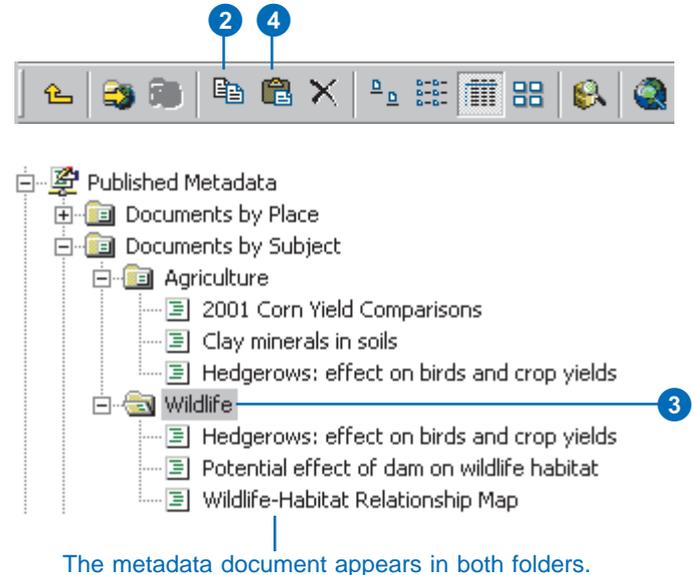
Deleting a published document

1. Click the metadata document you want to delete.

2. Click the Delete button.

3. Click OK to confirm that you want to delete the document.

If this is the last reference to the document on the Metadata Service, you must confirm that you want to remove the document from the service.

4. Click Yes to remove the document from the service.
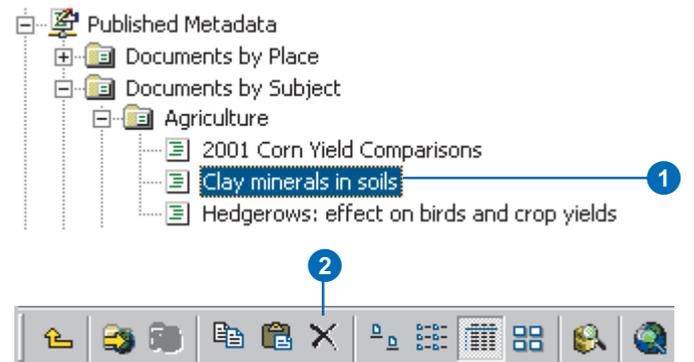
document must be deleted to remove that document from the service. When you delete the last reference to a document, a message will appear confirming that you want to remove the document from the Metadata Service.

Another way to make it easier to browse through the contents of a Metadata Service is by establishing relationships between different documents. For example, you might establish a relationship between metadata for a coverage describing electoral regions and metadata describing a paper that analyzes election results. Or you might establish a relationship between a paper map and the aerial photographs that cover the area on that map. When you look at the contents of a document in the Details tab of the Metadata Explorer, links to any related documents are listed at the bottom. In ArcCatalog you can view and manage the list of related documents with the Properties dialog box.

Anyone who has permission to publish to a Metadata Service can create folders on that service, copy documents, and establish relationships between documents on the service. Publishers also have permission to rename, edit, and delete the ▶

Establishing a relationship between documents in the same folder

1. Click the folder containing the related documents in the Catalog tree.

2. Press the Ctrl key while clicking the related documents in the Contents tab.

3. Right-click the selected documents.

4. Click Group Related Documents.

   When viewing the contents of a document in the Metadata Explorer, its related documents are listed at the bottom.
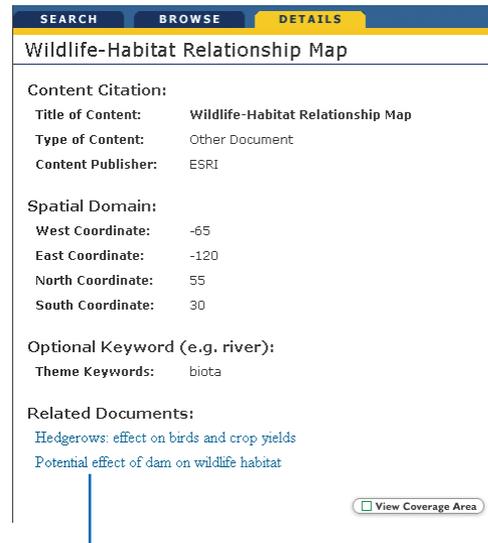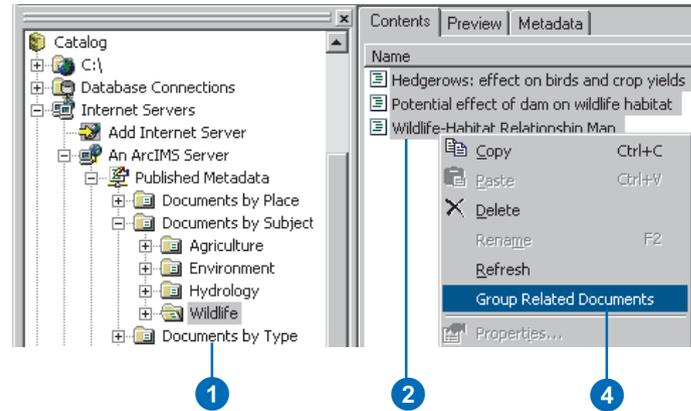
When looking at a document's Details in the Metadata Explorer, its related documents are listed at the bottom.

documents that they own and to make their documents private. To view a private document, a person must log in to the Metadata Service with the appropriate username and password.

The librarian who manages the catalog of documents on a Metadata Service should be granted administration privileges by the ArcIMS administrator. The metadata administrator can view and delete all documents that are available on the service.

Establishing a relationship between documents in different folders

1. Click the document with which you want to establish a relationship.

2. Click File and click Properties.

   The ArcIMS Metadata Service Properties dialog box appears.

3. Click the Related Documents tab.

4. Click Add, navigate to and select the related document, then click Add.
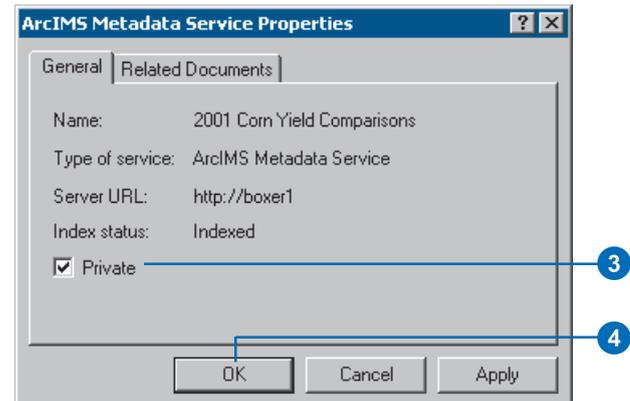
5. Click OK.

   The document appears in the related documents list.
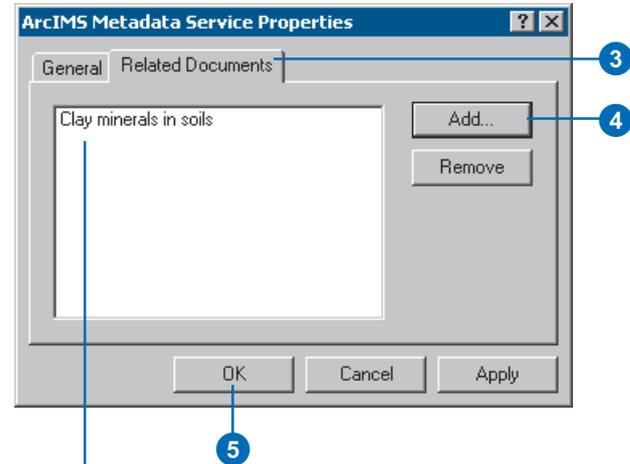
The related document appears in the list.

Making a published document private

1. Click the document that you want to be private.

2. Click File and click Properties.

3. Check Private on the General tab.

4. Click OK.

Finding data

When you need to find data to use in your maps, you can use ArcCatalog or the Metadata Explorer to browse through or search the contents of a Metadata Service. The Metadata Explorer runs in a Web browser; it is described in Chapter 2, 'Finding data in Metadata Explorer'.

Before you can browse or search a Metadata Service's contents in ArcCatalog, you need to connect to the ArcIMS server. Once you establish a connection, you can browse the server's contents just like you would browse through folders on your local computer. You can look at published documents in the Metadata tab. If a published document describes an ArcIMS Image or Feature Service, its icon has a little globe; in addition to looking at the document, you can explore the ArcIMS service's data in the Preview tab.

The ArcCatalog Search tool lets you create more complex searches than the Metadata Explorer. You can search for datasets that are available in a specific format, such as shapefiles or AutoCAD® drawings. With geographic searches, you can specify that ▶

Browsing published metadata documents in ArcCatalog

1. In ArcCatalog, double-click GIS Servers and double-click Add ArcIMS Server.

   The Add ArcIMS Server dialog box appears.

2. Type the URL of the ArcIMS server to which you want to connect.

3. If appropriate, check Show secure services and type your username and password.

   Usernames and passwords for accessing secure Metadata Services are defined in the ACL file.
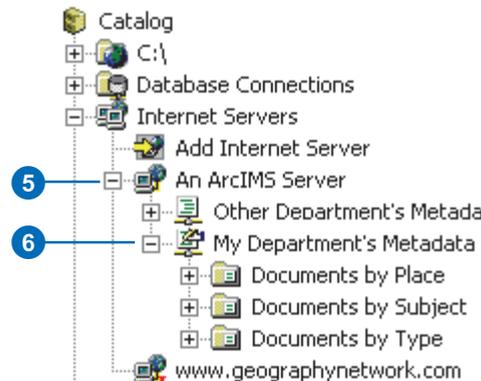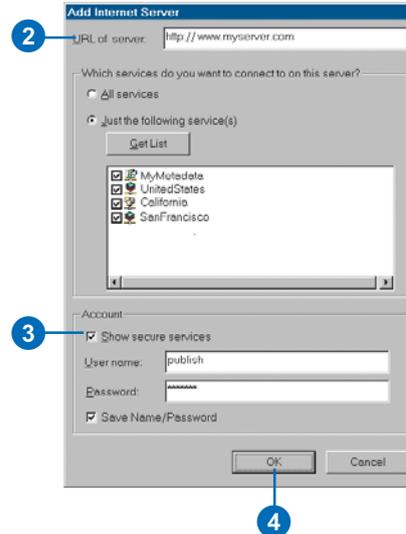
4. Click OK.

   The ArcIMS server appears in ArcCatalog.

5. Double-click the ArcIMS server to show its contents.

   If you have permission to publish to a Metadata Service, its icon has a hand with a pencil.

6. Double-click a Metadata Service to show its contents.

   The folders and documents contained by the Metadata Service appear in ArcCatalog.

you want to find datasets that are either completely within or that overlap the specified area. You can search using dates, such as when the document was modified, and using keywords, such as the name of the person who created the data. Unfortunately, date searches won't find information defined in ISO metadata elements in the published documents, but other types of searches will work.

Searching in ArcCatalog
You can also start an ArcCatalog search by clicking the Search button on the standard toolbar. If you start the search this way, choose ArcIMS Metadata Service in the Search dropdown list to take advantage of the Metadata Service's indexes. Click the Browse button next to the Look in text box and navigate to the ArcIMS Metadata Service you want to search.

Searching published metadata documents in ArcCatalog

1. In ArcCatalog, right-click the folder in the Metadata Service in which you want to start looking for data.

2. Click Search.

   The Search dialog box appears. The type of search and the place to start looking are set for you.

3. To search by name, type all or part of the name you're looking for into the Name text box. Use an asterisk (*) to represent one or more letters.

4. To search for specific types of data, such as shapefiles, press the Ctrl key while clicking the types of items you want to find in the Data type list.

5. To search by content type, such as Live Data and Maps, choose the appropriate type from the Content type dropdown list.

6. Use the other tabs to define additional search criteria.

    For example, with the Geography tab you can specify the geographic location in which to search. With the Advanced tab you can look for a word in a ▶
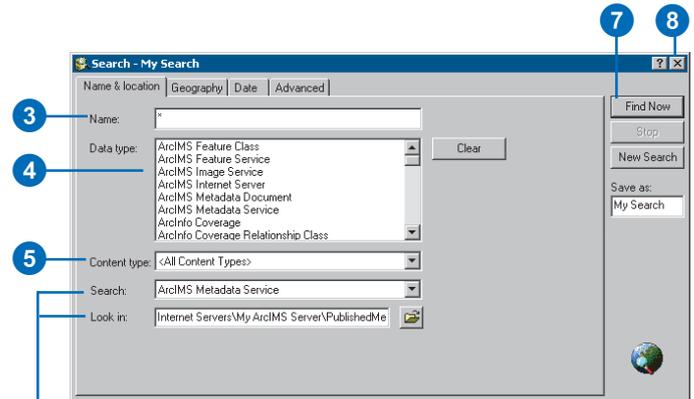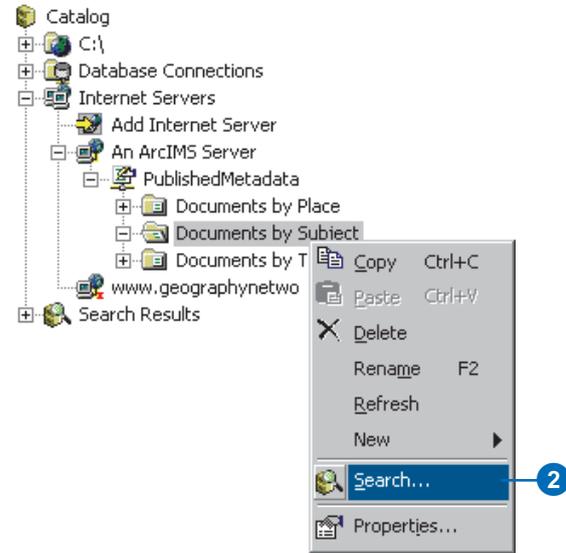
When you start a search by right-clicking an ArcIMS Metadata Service, the type of search and the place to start searching are set for you.

specific metadata element, such as the abstract, or do a full text search to look for the word anywhere in the metadata. To search by content theme, pick Data theme in the Metadata element dropdown list on the Advanced tab.

7. Click Find Now.

   The search is saved in the Search Results folder and is selected in the Catalog tree. As metadata documents are found that satisfy the search criteria, shortcuts to those documents are added to the Search Results list.

8. Click the Close button in the upper right corner of the Search dialog box.
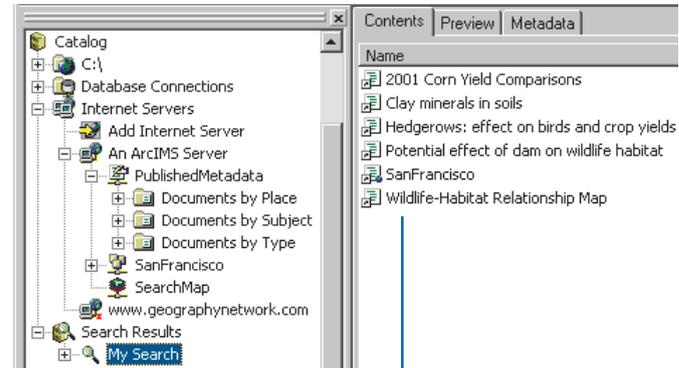
As items are found that satisfy your search criteria, shortcuts to those items are added to the Search Results list.