

Finding Aerial Photography in the Tennessee Region

Author: William Nichols

Abstract

The Tennessee Valley Authority (TVA) has been photographing the Tennessee Valley region prior to its creation in 1933, so finding the right aerial photograph can sometimes be a challenge. A project may call for historical black and white photography to compare how the land has changed over time or the needs may be more current. When was the last color photography flown over a particular fossil plant? The goal of the Aerial Photo Index (API) is to aid the user in finding what aerial photography exists for a particular area. The API brings together over 60 years of photography under one application to save both the customer time and money as well as aiding the GIS department in locating and supplying the photograph to the customer.

The Index is updated continuously each time a project is completed. There are also original paper records being added to the system from vintage photography.

Introduction

TVA provides public power and promotes economic development in the seven-state Tennessee Valley region. TVA is responsible for the integrated management of the resources of the Tennessee River system to maximize navigation, flood control, electric power, water quality, public land use, and recreation benefits to the region.

TVA uses GIS technology to support many aspects of its integrated resource management mission:

- River operations and water quality management
- Management of TVA reservoir lands
- Evaluation of siting alternatives for TVA generation and transmission facilities
- Regional economic and environmental studies

Overview

The Aerial Photo Index (API) Version 2.0 is an ArcGIS subsystem that provides a set of integrated tools to construct and query the TVA Aerial Photo Index database. The API along with the standard ArcGIS platform provides tools to archive detailed project specific spatial and tabular data into the database. The

API has a query/viewer utility designed to provide the user with a set of tools to easily analyze, retrieve, and review the related data in both textural and spatial formats.

The API database is a part of the TVA Enterprise GIS database that is dedicated to Geographical Information & Engineering (GI&E) for TVA aerial photography projects. The database is an Oracle/SDE RDBMS that consists of the two ArcSDE feature classes. API_PROJECT is a polygon feature class that represents all TVA project photo areas beginning with 1/1/2000 and the API_PHOTOS feature class is the related project photo centers.

The Project Data Review function (query/viewer utility) provides the user with a list of API projects available to select for further review from the database. This utility allows for a variety of project data analysis by providing various query and filtering options that modify the list of projects reflected into the data selection window. The query options filter the selection list based on the project completion date, film type, scale, roll number, related quadrangle name, and by project data that has been spatially selected in the active ArcMap data view.

The general ArcGIS environment provides a common platform for both TVA and TVA contractors to share and exchange spatial data for TVA aerial photography projects. ArcMap provides a platform to review contractor data and the API provides the integrated tool set required to build and maintain the related database. The API tool set is intended to provide for the ease of use in capturing and archiving TVA aerial photo project data and the ease of retrieving that data for user review in textural, tabular, and spatial format. The API also provides set of other tools that generate project related flight line plots and creates the required Spatial Metadata Management System (SMMS) intermediate file as the metadata record for importation into the GI&E metadata database.

The API was originally designed as an ArcMap application but is now available through TVA's internal web via ArcIMS. All screenshots in this presentation were taken from the ArcIMS version of the application. The ArcIMS application only allows the user to query the photo index whereas the ArcMap version will allow the user to add and or update the database.

Web Based API

The TVA Region shown below in Figure 1 shows the area in which TVA maintains and collects aerial photography.

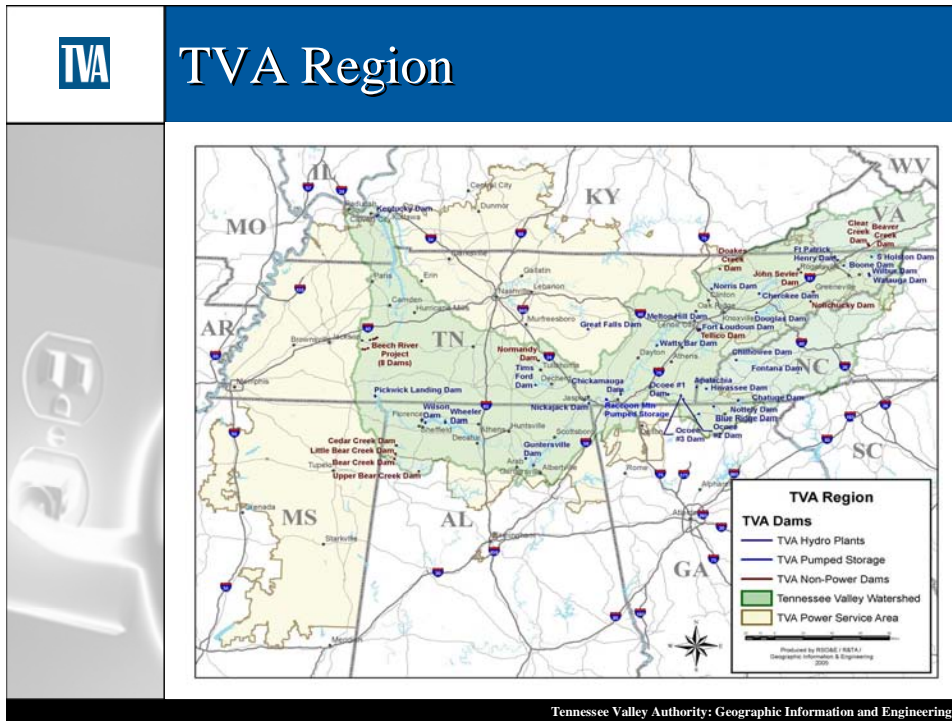


Figure 1

As we “zoom in”, you get more detail about the projects, including the project number, roll number, film type, completion date and any remarks. As you will notice areas may have several overlapping projects. These may be different due to several factors; different flight dates, scales, film types, etc.

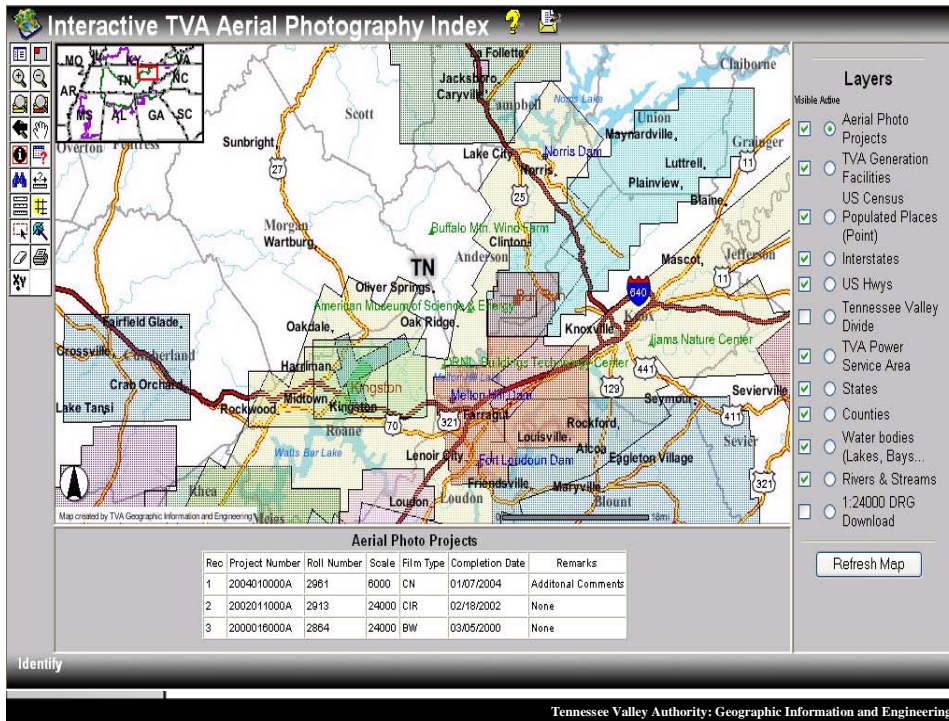


Figure 3

Another “zoom in” and you can now see the photo center numbers. This photo center number allows us to quickly determine which photo will most closely meet the customers’ needs.

So, if you call the TVA Map & Photos records to inquire about photography, by using this index, we can tell you right away:

- a) Do we have recent photography (after 2000) in the area you are looking at
- b) When it was flown
- c) At what scale
- d) And what film roll we need to pull to get you the particular photo you need

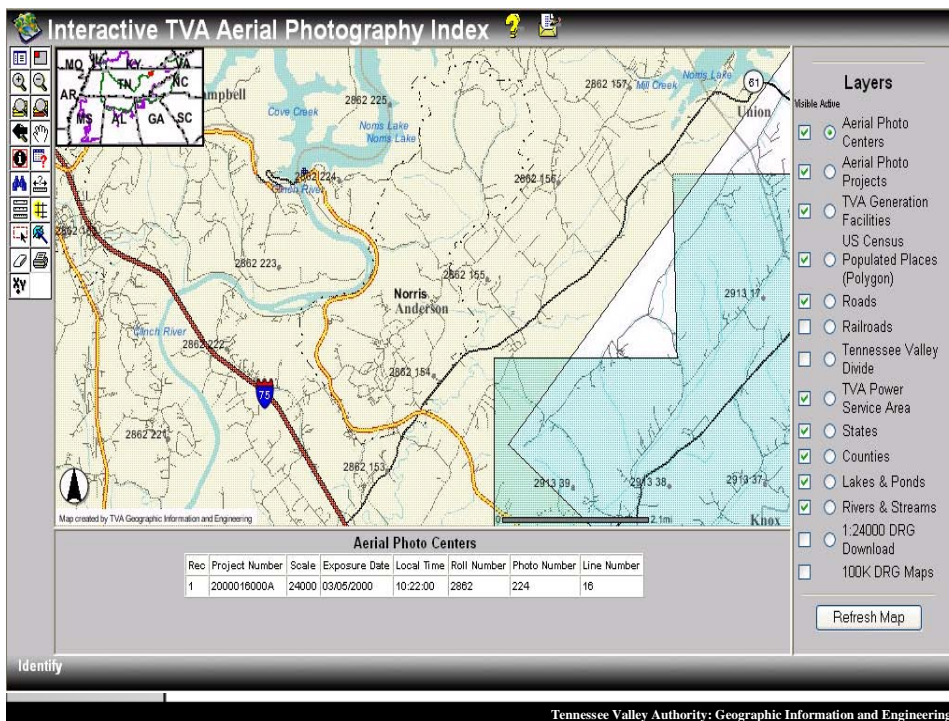


Figure 4

Future Plan of the API

We plan to make information about historical aerial photo holdings (pre-2000) available through the API.

Prior to 2000, every aerial photo project was logged manually and kept in notebooks, indexed by 7.5 minute quadrangles.


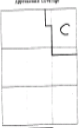


This is an example of the “old” system (Figure 5).

We can still tell you what aerial photography we have for a specific area, but we may have to dig through a few notebooks until we find the appropriate photography requested. To gain an idea of the magnitude of this, there are over 25 thousand projects with a total of over 1 million aerial photos stored in 30 notebooks.

If we get in a little closer (Figure 6), this better shows how the “old” information was recorded.

In this example, project #24 has the routine information about date, scale, etc. – but the way we recorded the area covered was by sketching in the area on a quadrangle, divided into ninths.

These sheets are being scanned and will be “searchable” in a future upgrade of API.

TVA		Future Plan of the API	
	24	<p>Date: 1933 Photo No.: 1339 Photo Scale: 1:2500</p> <p>Object Type: _____ Photo Length: 2.794 Photo Width: 2.19" Photo Scale from Base Ground Level: 10,300" Area to: _____ Original Project: Morris Res. Dam Notes: Photo in Morris Reservoir</p> <p>Aggregation Coverage: 2</p> 	
	25	<p>Date: 1935 Photo No.: 12506</p> <p>Object Type: _____ Photo Length: 5.071 Photo Width: 2.19" Photo Scale from Base Ground Level: 10,100" Area to: _____ Original Project: White Creek Coulter Dam Notes: Photo in White Creek Reservoir</p> <p>Aggregation Coverage: 3</p> 	
	26	<p>THIS AREA REPRESENTS THE SECTION IDENTIFIED AS QUADRANGLE WITH CLINTON, TENN. T14 NO. 132.5W.</p>	
	27	<p>Date: 1937 Photo No.: 30006</p> <p>Object Type: Photo Photo Length: 3.907 Photo Width: 2.19" Photo Scale from Base Ground Level: 11,200" Area to: _____ Original Project: V.T. Mapping Notes: Photo 132.5W</p> <p>Aggregation Coverage: _____</p> 	

Tennessee Valley Authority: Geographic Information and Engineering

Figure 5


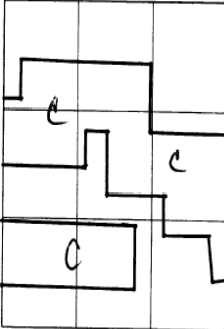

	Future Plan of the API			
	Remarks: Colls 2541, CONTRACT FLOW N by Photo Science, Inc.			
24	Photo Date: 4 Feb 93	Photo Scale: 1000'/"		
	Camera Type: RC-8	Lens No: UA9326		
	Focal Length: 6.017"	Negative Size: 9x9		
	Flight Altitude Above Mean Ground Level: 6,000			
	Area No: #5,6,8,9,10	Line Dir: E-W		
	Original Purpose: CHEROKEE FORESTRY			
	Index: 7m CHEROKEE			
	Remarks: CN-2565-018-062			
25	Photo Date: 17 April 96	Photo Scale: 2000'/"		

Figure 6

Also in our library are additional oblique photos of TVA sites that are available for viewing in the API. (Figure 7)

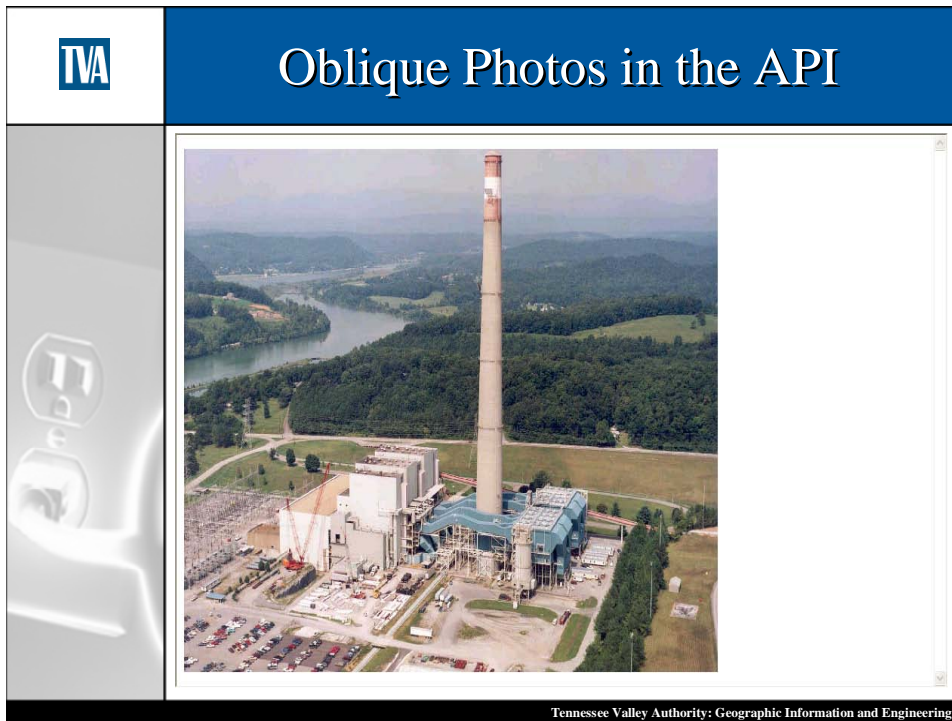


Figure 7

Another enhancement to the system will be the inclusion of a thumbnail image for each of the aerial photos in the system.

Author Information

William Nichols
GIS Technician
Tennessee Valley Authority
Geographic Information and Engineering
400 West Summit Hill Drive
Knoxville, Tennessee 37920
865-632-3771
wfnichols@tva.gov