

Using ArcGIS to Inventory Biological Surveys of the Tennessee Coalfield

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ESRI International User Conference



Department of Interior
Office of Surface Mining
Knoxville Field Office

July 15th, 2010

SMCRA and KFO

- ▶ The Surface Mining Control and Reclamation Act of 1977 (SMCRA) established a nationwide program to protect society and the environment from adverse effects of surface coal mining operations
- ▶ The Knoxville Field Office (KFO) is tasked with the review, approval, and inspection of surface coal mining operations under SMCRA



Overview of Biological Surveys

▶ Types

- ▶ Fish, Mussels, Macro-Invertebrates, and Bats



▶ Uses

- ▶ Help control environmental impacts due to surface coal mining operations
- ▶ Determine pre-mine conditions of a watershed during the permit review process
- ▶ Identify post-mining (mining and reclamation are complete) results from the approved permit
- ▶ Identify any threatened or endangered species that could be affected by surface coal mining operations



Purpose and Development of Inventory

▶ Purpose

- ▶ Migrate from paper biological surveys into a way to store the surveys electronically and have the ability to display the surveys geographically

▶ Development

- ▶ Develop a Microsoft SQL Server database to store all biological surveys
- ▶ Develop an ARCSDE geodatabase to store geographic locations of each biological survey



Geospatial Locating and Data Entry

- ▶ **Geospatial Locating**
 - ▶ Determine survey location by using map provided from survey
 - ▶ Digitize location of survey (scan and geo-reference if needed)
- ▶ **Data Entry**
 - ▶ Enter tabular data into database with the use of created forms for each type of survey



Benefits of Inventorying Biological Surveys

- ▶ **Benefits of a Microsoft SQL Server database**
 - ▶ Ability to share the information electronically (office personnel, other offices, other federal and state agencies, etc...)
 - ▶ Perform queries based on specific needs (locations, sampling dates, water chemistry, types of species sampled, etc...)
 - ▶ Generate reports based on information from surveys
- ▶ **Benefits of an ArcSDE geodatabase**
 - ▶ Display geographic locations of the biological surveys
 - ▶ Perform queries based on the geographic locations
 - ▶ Relate the locations of each survey to the tabular data stored in SQL Server (using a unique Site ID)



Paradigm Shift



Identify

Identify from: <Top-most layer>

Fish Survey Locations

- fish
- Fish Species Sampl
 - Blacknose Dac
 - Rainbow Darter
 - White Sucker

Location: 2,576,001.941 010,295.605 Feet

Field	Value
FID	0
Shape	Polyline
Type	Fish

Request: (bjhatmaker)@biolog

ID	STREAM
1 Polyline fish	2 Oolabone F3 Straight Creek
2 Polyline fish	4 Oolabone F4 Straight Creek
3 Polyline fish	6 Oolabone F6 Straight Creek
4 Polyline fish	8 Oolabone F8 Straight Creek
5 Polyline fish	7 Oolabone F7 Straight Creek
6 Polyline fish	9 Oolabone F9 Straight Creek
7 Polyline fish	10 Oolabone F10 Straight Creek
8 Polyline fish	15 Oolabone R1 Rock Creek
9 Polyline fish	17 Oolabone R2 Rock Creek
10 Polyline fish	16 Oolabone R3 Rock Creek
11 Polyline fish	27 Oolabone S4 Unnamed Tributary to Rock Creek

Records: 12 of 12 Selected



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Capabilities of ArcGIS

Surface Coal Mining Permits in the Tennessee Coalfield



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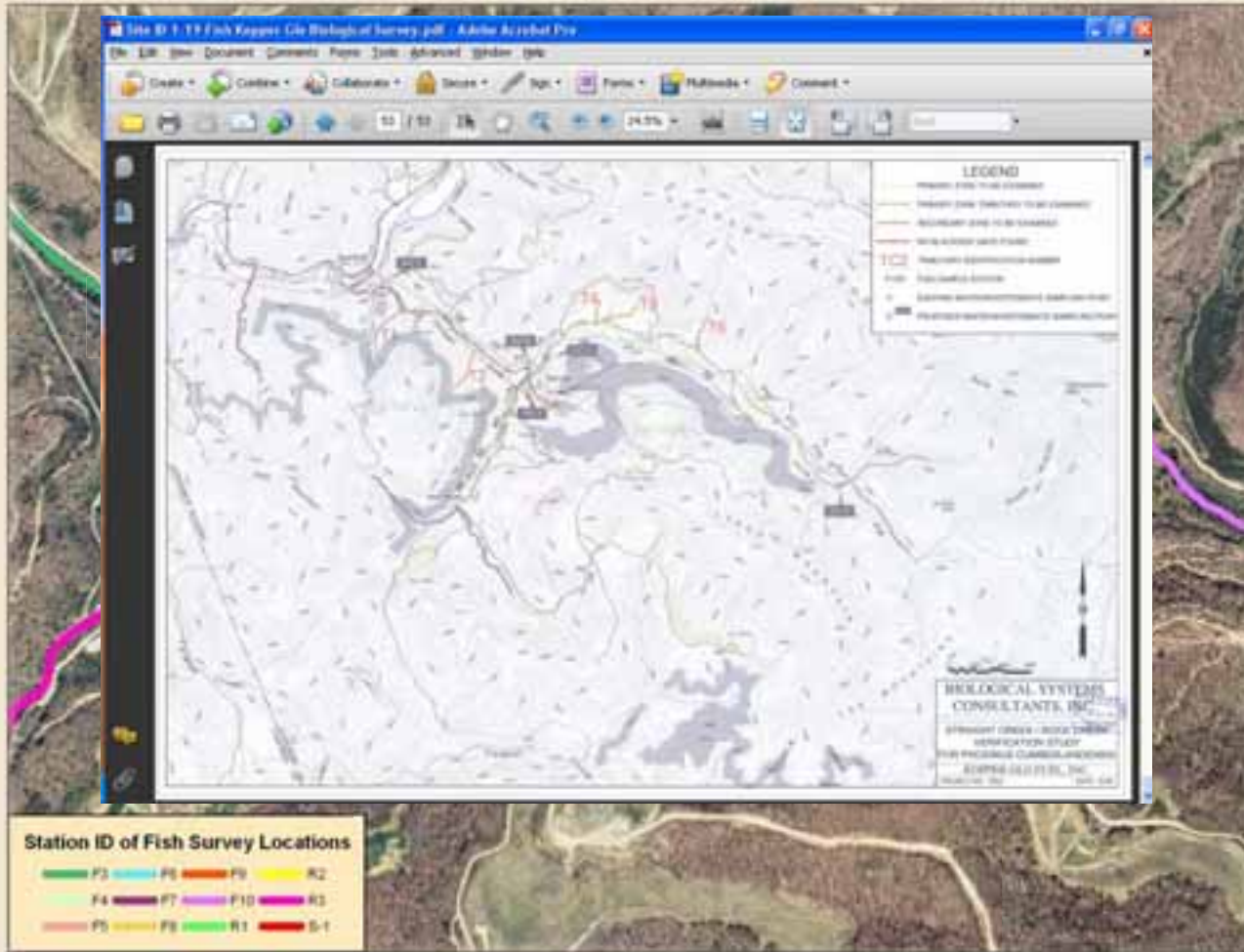
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Capabilities of Biological Surveys in ArcGIS

Biological Survey Locations in relation to a Pending Permit



Utilizing Biological Surveys in ArcGIS



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Out-of-Office Capability

- ▶ Ability to utilize ArcPad in the field
 - ▶ Locate specific biological survey locations
 - ▶ Identify possible environmental impacts based on results from the specific location
 - ▶ Conduct additional sampling if needed (present or future)
 - ▶ Determine possible water quality issues



Questions

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