California Department of Fish and Game Implements ArcGIS Server

By Barbara Shields (Esri) and Will Patterson (California Department of Fish and Game)

California is a great state for wildlife. Its varied topography and climate yield a broad range of habitats that are home to a uniquely large and diverse number of species. The foggy and cool conditions of the Napa Valley, arid heat of the Mojave Desert, long expansive coastline along the Pacific Ocean, and rich forests of the Sierra Nevada are some of the many environments that the state hosts for plants and animals.

The California Department of Fish and Game (DFG) monitors, maintains, and inventories the state’s wildlife and habitats and oversees the use of natural species for recreation, commerce, science, and education. For more than 20 years, DFG has been using geographic information system (GIS) technology to assist with these efforts. Available from DFG’s website are GIS-produced maps and downloadable GIS data layers that illustrate many department functions. The website also offers interactive mapping applications that allow visitors to view and query data without having to install GIS applications on their computers.

DFG is transitioning the technology it uses to serve map content. For many years, it has been successfully using ArcIMS but has now begun implementing a migration plan to ArcGIS Server. Reasons for the migration include ArcGIS Server capabilities of more rapid deployment of map services, faster map service delivery through caching, and easier development of web mapping applications. The ArcGIS Server Image extension was also especially appealing because of its ability to quickly serve large amounts of aerial imagery with little preprocessing and no requirement to load and manage the imagery in a database system.

DFG’s migration plan from ArcIMS to ArcGIS Server involves two phases. The already-completed first phase included publishing new statewide map and image services for use as background layers within ArcGIS Desktop and future web mapping applications. The in-progress second phase is to migrate existing ArcIMS web mapping applications to the ArcGIS Server environment.

The first phase of the migration has provided the following California statewide services
Kansas Broadly Delivers GIS with ELA

The State of Kansas has signed an enterprise license agreement (ELA) with Esri. The agreement gives state agencies unlimited access to core ArcGIS software that will enhance coordination, service delivery, and decision making in and between state agencies.

"The ELA is a really good idea and makes good sense for the way that we do business," said Ivan Weichert, GIS director for the State of Kansas. "Saving money is part of the benefit, but working smarter is even more important."

With the ELA, all requests for ArcGIS software will come through the state’s Data Access and Support Center, which will provide Weichert and his team with a full picture of GIS implementations and initiatives throughout agencies. The knowledge gained from this centralized coordination will help inform agencies about activities in other parts of state government that could benefit them. It will also help Weichert eliminate redundant efforts in agencies.

"Our goal is to improve coordination of the state’s GIS resources and develop infrastructure that improves efficient service and data sharing," Weichert said. "Those processes had been fractured, but now we have a tool that will help us achieve our goals."

GIS is critical to many business processes and workflows in a majority of the state’s agencies. The Department of Revenue, Department of Health and Environment, Division of Emergency Management, and Corporation Commission are leaders in using GIS and strongly advocated the ELA. "It supports common government functions and provides a great framework for sharing data, information, and ideas," Weichert said. "It is important to have strong GIS implementations throughout state agencies, because decision makers want to make better decisions based on sound information."

In addition to agencies, legislators are increasingly using GIS to understand issues and make decisions. Ultimately, state CTO Don Heiman would like to geospatially enable every bill, giving legislators and citizens a sense of place—the information that links what is done to where it’s done. Once a bill is enacted, its effects could be tracked by geographic reference to measure whether it had the intended impact.

"Legislators have begun to see how important location is to understanding how the next bill they are going to introduce or vote on affects people in their district—with GIS, we can answer those questions for them," Weichert said. "We anticipate fast growth and high demand for GIS, especially regarding legislation and citizen engagement, and we want to be ready to deliver smart solutions with efficiency."

"For more information on the Esri ELAs, visit esri.com/ela."

Salina, Kansas, Staff Use GIS to Improve Their Work

Keith Ganzenmuller, GIS supervisor at the City of Salina, Kansas, says the best thing about having an Esri small government enterprise license agreement (ELA) is that he always has the right GIS software to solve a user’s need.

"I don’t have to think anymore about whether or not I have the appropriate GIS software or how to make the software that I do have work for a particular problem," he says. "I can take what the user needs, come up with the right solution, and use the best available software—no workarounds and no more delays while we budget for additional software."

The City of Salina serves a population of approximately 50,000 and has had the Esri ELA for more than a year (an ELA provides an organization with unlimited access to core ArcGIS software). In that time span, the number of Salina government staff using GIS on their desktops has doubled from 10 to more than 20. Gone are the days of sharing licenses when people had to follow rules for using ArcGIS, such as making sure users exit the program if they will be away from their desks for 15 minutes or more.

Administrative assistants are now using GIS to improve service to citizens. They can look up property ownership and barricade requests, for example, and quickly answer inquiries. Other staff, such as the sanitation supervisor and street superintendent, now use ArcGIS on their own to get their work done more quickly and make better decisions. The sanitation supervisor is planning to use GIS for improved routing; the street superintendent will use it to improve workflows such as tracking inventory, leaf collection, snow plowing, and general mapmaking.

"Having professionals throughout our organization take hold of GIS is pushing us to do more with it," Ganzenmuller adds. "Since our GIS staff only includes me and Toby Gebhart, who does GIS work for our Utilities Department, having people doing GIS on their own allows us to accomplish more than Toby and I could have done on our own before—that helps everybody."

Ganzenmuller also has the supplemental ArcPad ELA for unlimited access to ArcPad software. Previously, the organization had people using various versions of ArcPad, which created significant difficulty in supporting applications on the different versions. Moving all the users to the current version provides improved capabilities to staff and eases maintenance of ArcPad applications.

In addition to desktop and mobile implementations, the city plans to use ArcGIS Server to provide maps to citizens via the Amazon Elastic Compute Cloud. Ganzenmuller wants to share capital improvement plans, floodplain maps, and more, with citizens. These maps are currently available on an internal server but haven’t been shared with the public.

continued on page 10
Expected to do the impossible?

Geocortex transforms how you design, build and maintain ArcGIS® Server applications.

You already know that the Esri® ArcGIS Server platform is very powerful. By taking advantage of a reusable set of tools, as well as a supportable infrastructure, you will be able to do even more. In fact, that is what hundreds of organizations around the world have done in choosing Geocortex.

Geocortex software provides unrivalled out-of-the-box capabilities for Esri’s Developer APIs (REST, Silverlight®, Flex®, and JavaScript).

Off-the-shelf components reduce risk and cost while greatly increasing functionality in areas such as printing, reporting, workflow and security. And because Geocortex always remains closely aligned with the evolution of Esri’s ArcGIS product roadmap, ongoing maintenance and upgrade costs are minimized as well.

Be a superhero all over again. Geocortex helps make it possible.

Let’s talk. Please contact us for a personal demonstration.
Local Government Resources

Visit arcgis.com to find templates, applications, and other resources to make your work easier. Here are a few examples:

Parcel Value for iPhone Template for ArcGIS 10
This template is an ArcGIS API for iOS application that provides public access to tax parcel and related assessment information.

Election Results Viewer Template for ArcGIS 10
This JavaScript application and configuration for ArcGIS Server provides election results information to the public.

Land Use Public Comment for ArcGIS 10
This application allows the public to comment on proposed land-use cases.

Discover New Videos
Watch Craig Fugate, administrator of the Federal Emergency Management Agency (FEMA) on video.esri.com. In Haiti: The Importance of Social Media Use During a Disaster, he explains that in big disasters, the initial response is generally not from the government but from individuals helping each other, trying to find out what is going on, and reporting information via social media. He discusses creating common operating pictures with social media feeds and GIS viewers.

Get Prepared for Esri UC
Go to blogs.esri.com to read the UC Blog and get the latest news, tips, and reviews before, during, and after the Esri International User Conference (Esri UC). Find out about sessions, deals, social activities, and more.

Watch a Webinar
Listen as Esri’s Christian Carlson and other Esri experts discuss ArcGIS for local government. The recorded webinar at esri.com/localgovwebinar includes map and app demonstrations for citizen engagement, public infrastructure, public safety, and land records.

Listen to New Podcasts
Visit esri.com/podcasts to hear the latest interviews with industry and GIS leaders.

Recommendations
Using Linked Spatial Data at the UK Ordnance Survey
Carsten Roensdorf, corporate data manager for UK Ordnance Survey, explains how linked data helps make public-sector data more transparent.

ArcGIS for Windows Phone Expands Mobile GIS Options
Esri’s David Cardella and Rex Hansen share their insight into the recently released ArcGIS app and API for Windows Phone 7 devices.
Cityworks®

It has all the elements
Asset Management, Permitting, Licensing

Cityworks is the GIS-centric public asset management solution that empowers local government, public works, and utilities.

www.cityworks.com

<table>
<thead>
<tr>
<th>Elements in a sample workflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
</tr>
<tr>
<td>Permitting</td>
</tr>
<tr>
<td>Ta</td>
</tr>
<tr>
<td>Tasks</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>Notices</td>
</tr>
<tr>
<td>Cu</td>
</tr>
<tr>
<td>Or</td>
</tr>
<tr>
<td>Fm</td>
</tr>
<tr>
<td>Sw</td>
</tr>
<tr>
<td>El</td>
</tr>
<tr>
<td>Wb</td>
</tr>
<tr>
<td>Dt</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>Db</td>
</tr>
<tr>
<td>St</td>
</tr>
<tr>
<td>Lg</td>
</tr>
<tr>
<td>Pm</td>
</tr>
<tr>
<td>Eq</td>
</tr>
<tr>
<td>Eq</td>
</tr>
<tr>
<td>Gc</td>
</tr>
<tr>
<td>Ww</td>
</tr>
<tr>
<td>Ww</td>
</tr>
<tr>
<td>Sr</td>
</tr>
<tr>
<td>Sr</td>
</tr>
<tr>
<td>Wo</td>
</tr>
<tr>
<td>Sr</td>
</tr>
<tr>
<td>Am</td>
</tr>
<tr>
<td>In</td>
</tr>
<tr>
<td>Wp</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>Wf</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>T</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>Rm</td>
</tr>
<tr>
<td>Pm</td>
</tr>
<tr>
<td>Cs</td>
</tr>
<tr>
<td>Cs</td>
</tr>
<tr>
<td>Mh</td>
</tr>
<tr>
<td>Co</td>
</tr>
<tr>
<td>Os</td>
</tr>
<tr>
<td>Cr</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>Is</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>Bc</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>Lm</td>
</tr>
<tr>
<td>Lm</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>Eq</td>
</tr>
<tr>
<td>Eq</td>
</tr>
<tr>
<td>Gc</td>
</tr>
<tr>
<td>Tc</td>
</tr>
<tr>
<td>Gc</td>
</tr>
<tr>
<td>Cn</td>
</tr>
<tr>
<td>Pj</td>
</tr>
<tr>
<td>Ca</td>
</tr>
<tr>
<td>Mm</td>
</tr>
<tr>
<td>Pc</td>
</tr>
<tr>
<td>Dp</td>
</tr>
<tr>
<td>Fe</td>
</tr>
</tbody>
</table>

2011 Azteca Systems. All rights reserved. Cityworks is a registered trademark of Azteca Systems, Inc. Cityworks is an Esri ArcGIS® application, and works with Microsoft Windows®, Silverlight®, SQL Server®, and Oracle®
for DFG and public use. For widespread access, these services are offered from ArcGIS Server in both Esri and OpenGIS WMS formats. Some of the services are unique and not available elsewhere.

- **Topo maps.** Several map services that include seamless US Geological Survey topo maps (DRGs) rendered in different ways, including grayscale colors, hillshade background, regular colors, and transparent background (These services are cached for fast display.)
- **Aerial images.** Several separate image services that offer various years (2005, 2009) and band combinations of US Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP)-related aerial imagery, including 4-band, color infrared (CIR), natural color, and Normalized Difference Vegetation Index (NDVI)

Second-phase migration plans include the transition of these DFG interactive mapping applications:

- The Biogeographic Information and Observation System (BIOS), with its own catalog of hundreds of layers of biogeographic and habitat data that can be added as needed into its map viewer
- The Online Fishing Guide, which provides a map viewer that allows the user to see recommended fishing spots and related services and facilities
- The DFG Properties viewer, which provides the ability to explore DFG lands and facilities throughout the state for possible hunting and wildlife viewing activities

DFG offices are spread throughout California, with some locations having limited network bandwidth and reduced capability to use online GIS resources. From an enterprise GIS perspective, it has been challenging to deliver data, such as specific aerial imagery, to those who need it. One solution has been to copy the imagery onto portable drives and ship them to the offices so that users can make a local copy. However, with imagery storage requirements growing to terabyte levels, this process has become cumbersome. Fortunately, after implementing the ArcGIS Server Image extension, DFG can host more aerial imagery in one office and serve it on demand through image services to other offices. The image services also have compression settings that can be adjusted by end users to reduce bandwidth requirements.

DFG’s topo map and aerial image services

Photo Courtesy of Carrie Wilson
Custom Turn by Turn Navigation

Asset Management
- Intelligent ROW Imaging
- Click on Photo Locate Assets
- Click Road to View Video
- Measure Dimension on Photos
- Geo-referenced Voice Notes
- WEB Distribution Ready

Pavement Management
- Automatic Crack Detection
- Full Lane Downward Imaging
- Complete Repair Decision Support
- Optimal Repair Strategy Analysis
- Road Condition Forecasting
- ArcGIS® Integrated

Material
- SOLID (Lbs/Mile)
- LIQUID (L/Ton)
- 300
- 15

Field Data Collection
- Pot Hole
- Pavement
- Sign
- Signal
- Repair
- Branch Remove

Mobile Data Terminal
- GPS: SiRF Star IV, 48 channels
- Field data collection
- Ruggedized with touch screen
- 3G & 4G CDMA-EVDO
- Carriers: Verizon, Sprint, AT&T
- Smart phone support
- Two way voice communication
- Two way SMS messaging
- Remote route assignment
- Remote work order assignment
- Treatment progress map
- Custom hydraulic sensor option
- Supports most spreader controllers
- Remote OBD II & CAN Bus Interface
- Real time camera

(410) 884-7888
www.eRoadTrack.com

3D CUSTOM TURN BY TURN NAVIGATION
South Bend, Indiana, Uses GIS for Brownfields Inventory

Home to the University of Notre Dame, the city of South Bend, Indiana, is the cultural hub of the stateline region where Michigan and Indiana meet—commonly known as Michiana. Rich in history dating back to early nineteenth-century fur trading, the city has undergone many changes as it has progressed from frontier and agrarian beginnings to a thriving industrial era, which in turn began to wane by the end of World War II. Today, remnants of abandoned industrial buildings can still be seen around the city. GIS is helping city managers designate areas of risk and prioritize redevelopment projects.

Seeking to revitalize its commercial corridors, South Bend set aside city funds for the job and applied for and received an assessment grant from the US Environmental Protection Agency’s (EPA) Brownfields Program for a redevelopment study. As part of the EPA study, the city used its existing GIS to create a brownfields inventory. The primary goals of the inventory project were to understand the distribution of brownfields within the city, identify the best properties on which to expend redevelopment funds, and create and maintain a database for future projects. The inventory has been useful in applying for additional EPA Brownfields and Land Revitalization funding and for economic development planning.

South Bend’s GIS department has been using ArcGIS software since 1999 to manage geographic data and generate maps for different city projects. “Various departments in the City of South Bend have embraced using GIS technology to enhance services provided to its citizens,” explains Deb Kuehn, South Bend’s GIS manager. “Examples are hot spot mapping of crime, tracking of basement flooding, utility inventory, and basic maps used for various city festivals and events. Much of the work has been taking existing data that has been in different departments and putting it into a standardized format and centralized repository where anyone within the city can find it.”

Teaming with a consultant, Esri partner Hull & Associates, Inc., city planners and the GIS department designated the commercial corridors they wanted to study for the project and began creating attribute categories for the database. They identified assets and liabilities based on criteria and ranked them, helping the city target resources for remediation.

Managing and Seeing Data
Initially, the scope of the pilot study included 20,000 parcels for assessment. Today, the project has grown to include data for 46,000 parcels. The database contains ownership and tax information, parcel identification numbers, and zoning maps acquired from county records. The staff uses GIS to process data that represents real-world objects and dynamically links it to an on-screen map. When the data in the database changes, GIS updates the map to reflect these changes. This means that South Bend’s parcel and environmental data can be easily maintained and kept current for timely reporting.

In the early years of South Bend’s GIS department, much of this information was still in paper form and had to be prepared for computer use. Now the city’s database includes digitized data about utilities, zones, parcels, and so forth. Good data is essential for analysis, and the project team considered data quality, quantity, source, and completeness when compiling data resources from local and state government resources. The team also captures information at the site that members verify and log into the geodatabase, which is a collection of geographic datasets for use by ArcGIS.

Inventory, Classification, and Rank
The brownfields project database includes structural and environmental data; for exam-
ple, underground storage tank locations and ownership had been previously recorded on a spreadsheet. The project team reused this data by adding it to the geodatabase and generating an underground tank data layer. Numerical environmental risk-level ratings were applied to each tank location in the geodatabase. Once location information is added to the geodatabase, it is available for analysis. The user runs a query and visualizes the result on a map.

The project team uses various criteria for ranking parcels in need of remediation and weighting their level for prioritizing remediation. If a property is attached to cross-referenced environmental data found in any of 16 government databases, such as EPA’s Resource Conservation and Recovery Act, the Comprehensive Environmental Response Compensation and Liability Information System, and the National Response Centers’ Spills and Accidents Database, it is ranked accordingly. Parcels attached to ecological concerns, such as wetlands with unique and endangered species, are factored into the ranking.

Additional considerations are classifications for surface water (flood zones, water quality), groundwater resources (potential resources, use wells, existing wells, land use), general industrial activities (foundries, machine shops), and pollution potential. Community support is essential. Therefore, community acceptance of redevelopment, community input on specific properties, city and county support of redevelopment, and existing owner and outside investor interest are also ranked and weighted. ArcGIS calculates these ranking and weighting factors and generates a parcel redevelopment ranking map that uses a color scale to highlight redevelopment needs.

Support for Economic Development and City Services
The site analysis has also been useful for developing city services, such as adding a fire station. However, South Bend also needs to attract business. Large businesses that are prospecting for franchise sites use GIS technology to consider a site’s location value, such as proximity to target markets, transportation, and commercial zoning. Because the city uses GIS, it can share data with these investors, thereby helping them make their decisions. Moreover, the city can support developers with their own efforts in applying for remediation project funds.

More Information
For more information, contact Ann Kolata, senior redevelopment specialist, City of South Bend (e-mail: akolata@southbendin.gov, tel.: 574-235-9374). Learn more about urban redevelopment with Hull & Associates, Inc., at www.hullinc.com. Read about other GIS brownfields projects and learn more about Esri’s GIS solutions for brownfields management at esri.com/brownfields.
Best Practices

California Department of Fish and Game Implements ArcGIS Server

have been cataloged in ArcGIS Online for easy discovery along with content published by other contributors. In the future, DFG plans to use other already-published services, such as those from Esri, whenever possible to reduce the need to develop its own services.

Special thanks go to DFG’s server team for setup, configuration, and maintenance of the Windows servers that host the department’s ArcIMS, ArcGIS Server, web server, and data storage environments.


Salina, Kansas, Staff Use GIS to Improve Their Work

In addition to the productivity benefits, the ELA has eased budgeting for Ganzenmuller. “Some people think that because the economy is bad, it’s not a good time to invest in ELAs, but when you look at the numbers and the certainty involved—we are going to need more ArcGIS licenses—the program works out in our favor,” he says. “I don’t have to continually ask for GIS software-related money; for three years, no one is going to hear from me when we need more licenses.”

To learn more about Esri’s ELA programs, visit esri.com/ela.

ArcGIS Online Showing Unique Topo Service for California in Grayscale Offered by California Department of Fish and Game

Esri International User Conference

July 11–15, 2011 | San Diego, California

Register by May 20, 2011

esri.com/uc
Accuracy and productivity. Anywhere the job takes you.

INTRODUCING THE TRIMBLE GEOEXPLORER 6000 SERIES

With the power and precision to get the job done, this GPS and GLONASS handheld field computer increases GNSS position availability for productive data collection. You can be confident in your results with decimeter accuracy in real time.

GNSS THAT WORKS WHERE YOU DO

Featuring Trimble® Floodlight™ satellite shadow reduction technology for reliable performance under trees and in urban canyons. The GeoExplorer® 6000 series gives you the ability to work—even in the toughest GNSS environments.

THE POWER TO PERFORM

With a large sunlight-optimized display, text is crisp and easy to read, background maps and photos are rich and vibrant. Access the Internet in the field for VRS™ network corrections or file transfers with the optional 3.5G cellular modem. And the 5 megapixel autofocus camera makes photo capture seamless and simple to integrate with existing data capture workflows.

Work accurately, productively, and in more places.

Learn about Trimble Floodlight technology. Download our new technology brief:
trimble.com/floodlight3
esri.com/trimbleoffers

DESIGNED FOR WORK

GEOEXPLORER 6000 SERIES

© 2011, Trimble Navigation Limited. All rights reserved. Background image © Mario Beauregard / PhotoExpress.com.
Government Matters is a publication of the State and Local Government Solutions Group of Esri.

To contact the Esri Desktop Order Center, call
1-800-447-9778
within the United States
or 909-793-2853, ext. 1-1235, outside the United States.

Visit the Esri website at esri.com.

View Government Matters online at esri.com/governmentmatters.

Advertise with Us
E-mail ads@esri.com.

Submit Content
To submit articles for publication in Government Matters, contact Christopher Thomas at cthomas@esri.com or Emily Vines Pierce at epierce@esri.com.

Manage Your Subscription
To update your mailing address or subscribe or unsubscribe to Esri publications, visit esri.com/manageyoursubscription.

International customers should contact an Esri distributor to manage their subscriptions. For a directory of distributors, visit esri.com/distributors.

Circulation Services
For back issues, missed issues, and other circulation services, e-mail requests@esri.com; call 909-793-2853, extension 2778; or fax 909-798-0560.

The State and Local Government Solutions Team
Christopher Thomas
Government Industry Solutions Manager
E-mail: cthomas@esri.com

Jeff Allen
State and Local Government Coordinator
E-mail: jallen@esri.com

Richard Leadbeater
State Government/Trade Associations Manager
E-mail: rleadbeater@esri.com

Britney Hinthorne
State and Local Government Coordinator
E-mail: bhinthorne@esri.com

Copyright © 2011 Esri. All rights reserved. Esri, the Esri globe logo, ArcGIS, ArcIMS, ArcPad, arcgis.com, @esri.com, and esri.com are trademarks, registered trademarks, or service marks of Esri in the United States, the European Community, or certain other jurisdictions. Other companies and products mentioned herein may be trademarks or registered trademarks of their respective trademark owners.