

STATEMENT OF QUALIFICATIONS

September 1st, 2015

Corporate Information

Business Name: David Howes, LLC

Founded: June 2012

Owner: David A. Howes, Ph.D.

Website: <http://dhowes.com>

Phone: 253-312-3441

Mailing Address: PO Box 66543
Seattle
WA 98166

Business Type: State of Washington - Limited Liability Corporation
State of Alaska - Foreign Limited Liability Corporation

NAICS Codes: 541511 - Custom Computer Programming Services
541512 - Computer Systems Design Services
611420 - Computer Training

Summary of Services

Geographic Information Systems (GIS) consulting, specializing in the development of custom tools, processes and supporting infrastructure.

Core Services

- Extending the capabilities of GIS software to streamline processes and/or add new functionality
- Upgrading GIS-based procedures as technology and requirements change
- Providing a wide range of related GIS professional services, including spatial analysis and geoprocessing, project management and GIS training

Company Overview

David Howes, LLC is a Geographic Information Systems (GIS) consulting firm specializing in the development of custom tools, processes and supporting infrastructure.

The owner, Geospatial Information Scientist and sole employee of the company, David Howes, Ph.D., is based in Seattle, Washington and serves a wide variety of clients around the country from small businesses to multinational corporations.

With 25 years of academic and private sector GIS experience, including a Ph.D. in geomorphology from the State University of New York at Buffalo and an M.Sc. in GIS from the University of Edinburgh, David has a diverse background that is well-suited to developing innovative solutions to complex business problems with a spatial component. A strong communicator, he is experienced in the art of working with stakeholders and clients and has a proven ability to bring clarity and logic to situations, helping his clients think of things in ways they wouldn't otherwise have thought of from the detailed level of the developer to the higher level of the business analyst and project manager.

With clarity and quality central to his work, David is known for delivering services and solutions that are always well thought out and competently delivered.

Technical Competency

- Desktop and web GIS development, primarily focusing on the following technologies
 - GIS: Esri ArcGIS (Desktop, ArcObjects, Server, Online, ArcView), open source solutions
 - Development: Microsoft .NET (C#, VB.NET), Silverlight, ASP.NET, VBA, Python, Java
 - Databases: SQL Server, PostgreSQL, Oracle
 - Web: HTML, JavaScript (jQuery), CSS
- Geoprocessing, spatial analysis, modeling
- Training

Related Professional Services

- Report writing/presentation
- Project/group management
- Workshop management

Professional Development Support

David Howes is a regular orchestrator and supporter of GIS professional development activities, particularly through his GISPD.com venture with Jason Parady, which helps GIS professionals by offering technical guidance, articles, training workshops, events and presentations.

Project Example Summaries

- Produced ArcGIS/.NET (C#) data analysis and creation tools to support species protection area development for an international agrichemical company
- Created ArcGIS map series and annotation development tools using .NET (C#) for an Alaska-based engineering company
- Developed a Java/PostgreSQL location tool for a global referencing project
- Developed ArcGIS/Python spatial analysis tools for a Utah rangeland management consulting company
- Developed a Java/PostgreSQL location tool for a global referencing project

Project Examples

Species Protection Tools

The Species Protection Area tools exemplify an innovative and efficient approach to a complex analytical problem that was addressed using an Esri ArcMap add-in (figures 1 and 2) and Microsoft .NET (C#)/ArcObjects standalone procedures. Procedures that would otherwise be lengthy and convoluted in ArcMap, such as manipulation of complex geometry and efficient review of potential protection areas, are streamlined by consolidating analytical processes into a common user interface and allowing for parameterization of key inputs. For these internal tools, the output data was the primary focus and the user interface design was a minor consideration. The tools have been presented in various professional meetings, including the [Northwest GIS Conference](#) (slides 22-27). The techniques and principles demonstrated by the species protection tools are applicable to a wide variety of needs, not only in a desktop environment, but also in a server or web mapping environment.

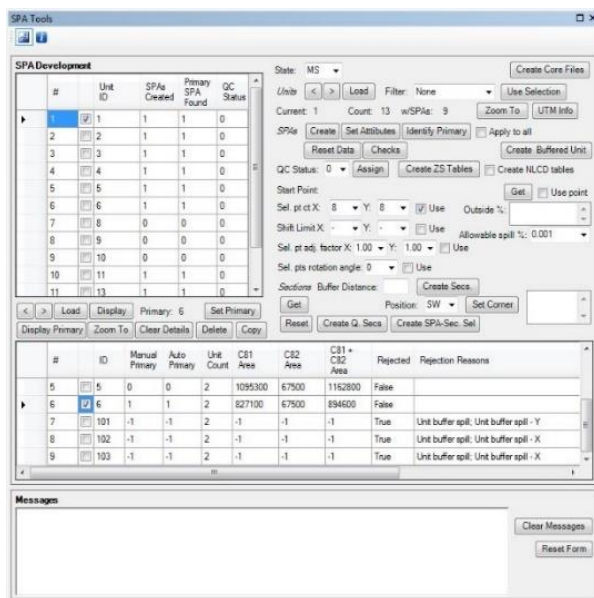


Figure 1. Species Protection Area tools ArcMap add-in form

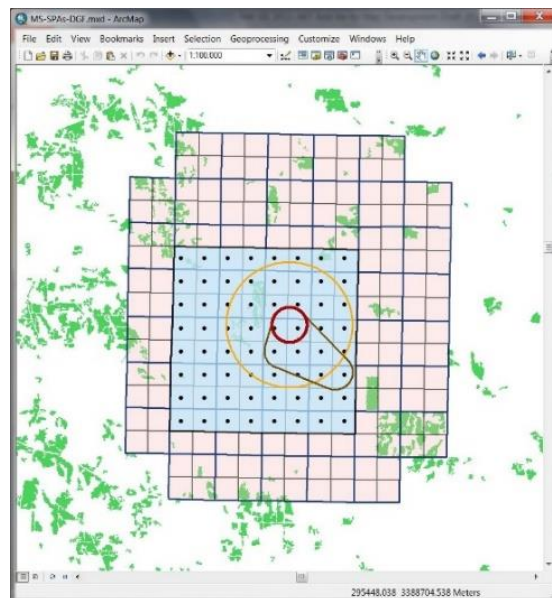


Figure 2. Snapshot of species protection area construction, including (false) species locations, protective buffer, land survey data and selection points.

Map Series and Annotation Development Tools

The map series development tools allow for the creation of maps that include custom figures based on the properties of spatial features (Figure 3). ArcGIS for Desktop Data-Driven Pages functionality provides map extent definitions and page sequencing, while a .NET (C#)/ArcObjects add-in allows the user to develop and manipulate the custom figures and adjust their complex labeling. Settings for the page may be saved and reloaded (a feature analogous to the use of multiple layouts) and the map series can be exported in various formats. For further details, please see the related Washington GIS Conference [presentation slides](#). A complementary tool enables the creation of complex labels in an ArcGIS annotation feature class, according to values stored in polygon feature class fields. The development of these tools allowed for significant time and cost savings compared to the CAD-based procedures that they replaced.

As rich as the ArcGIS out-of-the-box functionality may be, the accompanying extensibility options allow for enhancements of any level of complexity that may be associated with significant returns on the development investment. The principles underlying a project such as this one apply to any type of customization from web interfaces to server functionality to the desktop or database.

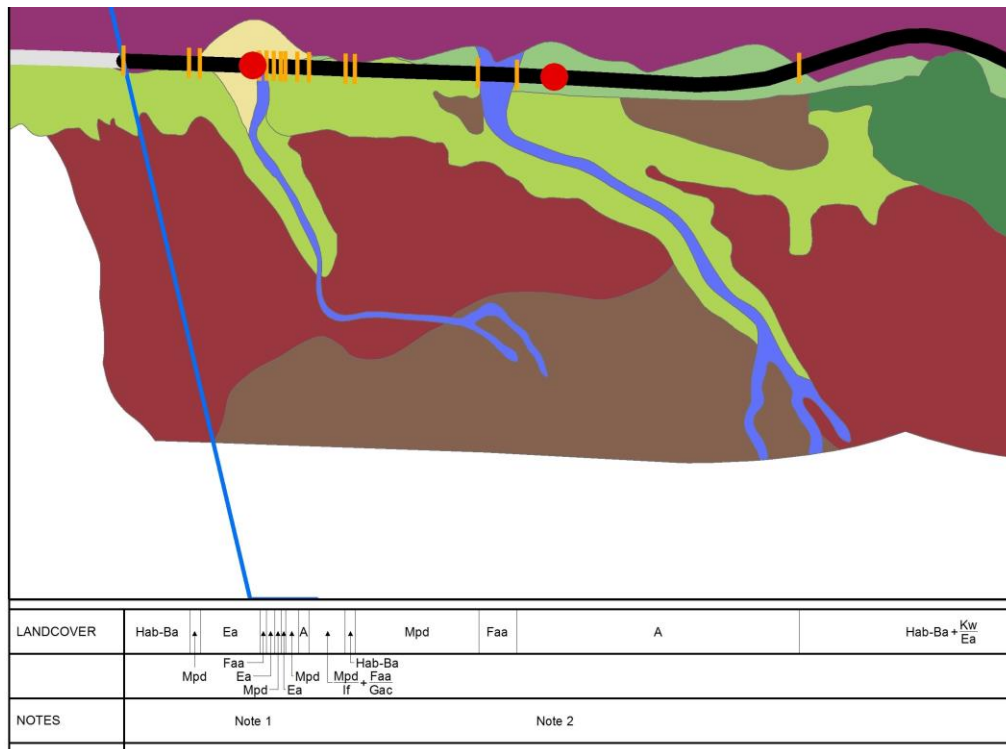


Figure 3. Custom figure based on properties of spatial features produced using the map series development tools.

Python Spatial Analysis Tools

Open Range Consulting specializes in the management of working landscapes in the American West and uses sets of very large images as part of their land suitability evaluations. David Howes developed Python geoprocessing tools to support this work. One of them, the Apply Raster Conditions tool, reads output from the statistical package R that provides complex conditional expressions to be applied to a set of images. The tool converts these expressions into a sequence of nested ArcGIS Con statements and runs them to deliver a single output image. Running the tool with, for example, 12 12 GB images and 70 Con statements, however, takes 24 hours, even on a powerful server, and efforts to reduce the processing time were deemed worthwhile.

The Apply Raster Conditions process is spatially independent in that the Con statements operate on corresponding pixels in the input images and there are no calculations that involve more than one pixel in the same image at once. It was possible, therefore, to split the input data into parts, with the images corresponding to each part stored in their own file geodatabase, such that, for example, using four parts would yield four file geodatabases, one for each quadrant. Using Python multiprocessing functionality, the Apply Raster Conditions tool can be run simultaneously for as many parts as there are processors on a machine and the output images from all of the processes appended to provide the final output image. For the 12-image example introduced above, the splitting of the data into eight parts takes five hours, the running of the Con statements takes two hours and the appending of the output takes an hour. Since the splitting only needs to be done once for a given set of images, subsequent analysis runs are typically much faster than they would be with the original non-parallel approach, significantly improving the analyst's productivity. Needless to say, Open Range Consulting is extremely pleased with this outcome. The parallelization process was presented at an Esri GeoDev Meetup event in Seattle, WA.

Details of many other presentations are also available from dhowes.com and GISPD.com.

RESUME - DAVID A. HOWES, Ph.D.

Skills

General

- Tool/process development
- Project management
- Training
- Professional development
- Workshop management
- Report writing/presentation

Technical

- GIS: Esri ArcGIS (Desktop, ArcObjects, Server, Online, ArcView), open source solutions
- Development: Microsoft .NET (C#, VB.NET), Silverlight, ASP.NET, VBA, Python, Java
- Databases: SQL Server, PostgreSQL, Oracle
- Web: HTML, JavaScript (jQuery), CSS

Experience

Geospatial Information Scientist & Owner

2012-present

David Howes, LLC, Seattle, Washington, USA (dhowes.com)

Company description

Geographic Information Systems professional services provider, specializing in the development of custom tools, processes and supporting infrastructure.

Project examples

- Created an Esri map series development add-in using .NET/C# to build on the capabilities of ArcPy (Python) mapping for an Alaska-based engineering company
- Developed ArcGIS/.NET data analysis/creation tools to support species protection area development for an international agrichemical company
- Developed a Java/PostgreSQL location tool for a global referencing project
- Updated VB.NET map development tools for a national U.S. forest management company
- Produced ArcGIS spatial analysis tools using Python for a Utah rangeland management consulting company
- Conducted training in extending ArcGIS for Desktop using Python and .NET add-ins

Director of Geospatial Development

2010-2012

Integral GIS, Inc., Seattle, Washington, USA

General responsibilities

- Provided technical/administrative support to existing/new projects
- Managed projects
- Developed new business and produced proposals
- Promoted the company at conferences/events
- Contributed to the development of processes to improve company operations
- Assisted in evolving the relationship between the company and partners and in creating corresponding strategies

Project examples

- Converted custom ArcGIS 9.x tools to ArcGIS 10.x add-ins to support electrical transmission network maintenance and development for a major east coast energy transmission company
- Developed Silverlight 5/ArcGIS Server spatial data editing capabilities as part of a global market planning system for an international retail company
- Developed an ArcGIS Server/jQuery mobile web application for a U.S. Gulf state department of marine resources
- Developed an ArcGIS Server/JavaScript (jQuery) web application for an international hospitality company

Geospatial Information Scientist

2001-2010

Compliance Services International, Inc. (CSI), Tacoma, Washington, USA

- Developed Geographic Information Systems (GIS)-based spatial analysis methods and high-volume map production procedures to support evaluation and use of endangered species data and investigation of potential pesticide use impacts
- Delivered spatial information on endangered species distribution to clients using web GIS solutions
- Managed endangered species assessment, information technology, and computer system administration staff
- Provided regulatory and technical support for the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Endangered Species Task Force (FESTF), for the benefit of both US Environmental Protection Agency and agribusiness Task Force members
- Conducted workshops and training sessions for private industry and government participants
- Created and implemented the comprehensive assessment process that now serves as the basis for much of the company's endangered species risk assessment work
- Designed and built information management systems to support endangered species risk assessment, including provision of a FESTF website and redevelopment of the FESTF Information Management System (IMS)
- Produced training materials, including a FESTF IMS tutorial website

Geographic Information Systems Analyst/Project Manager

1999-2001

Ecology & Environment, Inc., Buffalo, New York, USA

Managed and served as lead developer for the Shanghai Environmental Project TA-7/TA-8 - Development of the Huangpu River Basin Environmental Monitoring Information System water resource decision support system

Research/Teaching Assistantships

1994-1999

Department of Geography/ National Center for Geographic Information and Analysis (NCGIA), State University of New York at Buffalo, Buffalo, New York, USA

- Obtained a \$45,000 US National Science Foundation research grant - *Modeling water, sediment, and nutrient fluxes in a desert shrubland ecosystem*
- Developed one- and two-dimensional overland flow models based on field experiments
- Employed parcel-level property data and Landsat Multispectral Scanner (MSS) imagery to examine the predictability of temporal patterns in urban development
- Created methods for modeling spatial variability in infiltration
- Taught *Introduction to Physical Environmental Geography* (Geography 101), *Introduction to GIS* (Geography 481)

Research Associate

1992-1994

North West Regional Research Laboratory, Department of Geography, Lancaster University, England

- Developed a GIS-based crime prevention scheme evaluation system (for the UK Home Office)
- Produced GIS- and census-based variables for use in predicting village services (for the UK Rural Development Commission)
- Taught graduate and undergraduate (final year) introduction to GIS classes

Education

Ph.D. - Geography (Fluvial Geomorphology)	1994-1999
State University of New York at Buffalo, Buffalo, New York, USA	
Dissertation: Modeling Runoff in a Desert Shrubland Ecosystem, Jornada Basin, New Mexico - recognized with an Association of American Geographers (AAG) Geomorphology Specialty Group Best Student Paper award	
M.Sc. - Geographic Information Systems	1990-1991
University of Edinburgh, Scotland	
B.Sc. (Hons) - Geography	1987-1990
University of Salford, England	

Selected Publications

- Howes, D.A. and Stevenson, M. 2014. Venturing into Open Source GIS: A Global Conference Lands on Our Doorstep, The Summit (Washington URISA Newsletter), Issue 36, Autumn 2014, 7, 22-24
- Howes, D.A. 2014. Waurisa GIS Conference Outcomes - Thought Leaders and Closing Session, The Summit (Washington URISA Newsletter), Issue 35, Summer 2014, 9-12
- Howes, D.A. and Abrahams, A.D. 2006. One- and Two-Dimensional Modeling of Overland Flow in Semiarid Shrubland, Jornada Basin, New Mexico, Hydrological Processes 20, 1027-1046
- Howes, D.A. and Abrahams, A.D. 2003. Modeling runoff and runoff in a desert shrubland ecosystem, Jornada Basin, New Mexico, Geomorphology 53, 45-73
- Howes, D.A. and Abrahams, A.D. 2003. Modeling Runoff and Runon in a Desert Shrubland Ecosystem, Jornada Basin, New Mexico, in Shroder, J.F. and Bishop, M.P., editors, Integration of Computer Modeling and Field Observations in Geomorphology: Binghamton Geomorphology Symposium 2000, pp. 45-73

Please see dhowes.com/publications for a complete list

Selected Presentations/Events

- Howes, D.A., 2015. The Value of Coding for GIS. Presentation for the University of Washington Master of Geographic Information Systems GIS Programming class (Geog 565), Seattle, Washington
- Howes, D.A. et al, 2015. Eastern Washington GISPD Day. Full-day event conducted at Central Washington University, Ellensburg, Washington
- Howes, D.A. and Pardy, J. 2015. Extending ArcGIS for Desktop Using Python and .NET Add-Ins. Full day workshop conducted at the 49th Annual Alaska Surveying & Mapping Conference, Anchorage, Alaska
- Howes, D.A., Knapp, M., Johnson, A., Anderson, R. and Norton, S. 2015. The (not so) Secret (but very necessary) Skills of GIS Professionals. Session conducted at the 49th Annual Alaska Surveying & Mapping Conference, Anchorage, Alaska
- Howes, D.A. and Stevenson, M. 2014. Explorations into Open Source GIS. Presented at the 2014 Washington State Joint Agency GIS Day, Olympia, Washington
- Howes, D.A. and Pardy, J. 2014. Extending ArcGIS for Desktop: Python and .NET Add-Ins in a Nutshell. Session conducted at 2014 Northwest GIS Conference, Lynnwood, Washington
- Howes, D.A., Eklund, J., Owen, C., Radcliff, J., Stull, M. and Wallis, D. 2014. They'll Stone You When You're Trying to Build Your GIS: The Multi-Dimensional Role of the GIS Coordinator. Session conducted at 2014 Washington GIS Conference, Tacoma, Washington
- Howes, D.A. 2014. How Good are Your Data and Analyses? Communicating Quality. Part 3 of 3: Analysis. Presented at 2014 Washington GIS Conference, Tacoma, Washington
- Howes, D.A., 2013. Beyond Data-Driven Pages: .NET-Based Map Series Development. Presented at 2013 Washington GIS Conference, Lynnwood, Washington

- Howes, D.A. 2013. .NET Add-Ins for ArcGIS Map & Data Development. Presented at the 2013 Northwest GIS Conference, Sunriver, Oregon
- Howes, D.A., Stevenson, M., Savelle, M. and Vennemann, K. 2013. The Lone GIS Professional: Running Your Own GIS Business. Presented at 2013 Washington GIS Conference, Lynnwood, Washington

Please see dhowes.com/presentations for a complete list

Professional Development Activities

- Co-founder, GISPD.com, supporting GIS professional development through technical guidance, articles, training workshops, events and presentations 2014-present
- Member, [URISA GIS Pro & NWGIS 2015 Conference](#) Committee 2014-present
- Member at-large, Washington URISA Board of Directors 2013-2014
- Founder and coordinator, The Lone GIS Professional Initiative, supporting GIS professionals working on their own or in small groups 2008-present

Personal Development Activities

- Mountaineering
- Cycling
- Distance running
- Skiing