# *GIS Day - Wednesday, November 19, 2003*

*A Showcase of GIS Applications*
*at the*
*University of Alberta*

| | | |
|---|---|---|
| 1:00 p.m. | Welcoming Address | **Dr. Carl Amhrein**<br>*Provost and Vice-President Academic* |
| 1:20 p.m. | Combining GIS and optimization for decision support | **Dr. Erhan Erkut & Dan Haight**<br>*Business* |
| 1:40 p.m. | GIS for socio-economic sciences | **Vladimir Iassenovski**<br>*Earth and Atmospheric Sciences* |
| 2:00 p.m. | Using desktop scanning, small-scale orthophotography, and ArcInfo Workstation to georectify large scale aerial photography | **Nadele Flynn**<br>*Renewable Resources* |
| 2:20 p.m. | Assessing suitable and critical habitat for wood bison using GIS and remote sensing | **Olaf Jensen**<br>*Earth and Atmospheric Sciences* |
| 2:40 p.m. | GIS and the Railway Ground Hazard Research Program (RGHRP) | **Emily Herd**<br>*Civil and Environmental Engineering* |
| 3:00 p.m. | **20-minute break** | |
| 3:20 p.m. | Historic mine plans and their interpretation: structure geology of the Pictou coalfield, Nova Scotia | **Dr. John Waldron**<br>*Earth and Atmospheric Sciences* |
| 3:40 p.m. | Creating custom spatial analyses with ArcGIS: the power of ArcObjects | **Hawthorne Beyer**<br>*Biological Sciences* |
| 4:00 p.m. | Taking GIS into the field | **Stuart Gerber**<br>*ESRI Canada* |
| 4:30 p.m. | Licensed spatial data resources | **David Jones & Chuck Humphrey**<br>*University of Alberta Libraries* |
| 4:40 p.m. | General Discussion: Future directions of GIS on campus<br>All are invited to participate | |
| 5:00 p.m. | Closing Remarks | |

*"The application of GIS is limited only by the imagination of those who use it." - Jack Dangermond, President, ESRI*

**1:00 p.m.** **Welcoming Address**

***Dr. Carl Amrhein*** *is the Provost and Vice-President (Academic) of the University of Alberta. Prior to coming to the University of Alberta, Dr. Amrhein spent 17 years at the University of Toronto, initially as Assistant Professor of Geography, then as Chair of the Department of Geography and Graduate Program in Planning from 1993 to 1997, and finally as Dean of the Faculty of Arts and Science from 1997 to 2003. Dr. Amrhein holds a Bachelor of Science Degree in Geography from Pennsylvania State University (1978) and a Ph.D. in Geography from State University of New York at Buffalo (1984) with research interests in economic geography, labour markets, decision theory, migration, and quantitative methods.*

**1:20 p.m.** **Combining GIS and optimization for decision support**

Experiences with three spatial optimization problems are described: selecting locations of fire stations in St. Albert, designing a wide-area communications network in Alberta, and political redistricting of Edmonton for city council elections. In each of these recent or current projects, GIS and optimization techniques were combined to provide decision-makers with useful information.

***Erhan Erkut*** *is Professor of Business and holder of a Vargo Teaching Chair. He has a Ph.D. in Industrial Engineering (U. of Florida, 1986). His research deals with transportation planning and facility location. He is the Director of the Centre for Excellence in Operations, a technology transfer unit that works with local organizations on applied research problems.* ***Dan Haight*** *is the Manager of the Centre for Excellence in Operations. He holds a Bcom degree from the University of Alberta, and has experience in management consulting. He serves as industry liaison and analyst on the Centre's projects and research partnerships.*

**1:40 p.m.** **GIS for socio-economic sciences**

GIS is a very useful tool for analyzing, demonstrating, and studying phenomena with a spatial aspect. Some of the GIS tools and techniques that are useful in the socio-economic sciences are described.

***Vladimir Iassenovski*** *graduated in 2000 from Moscow State University, where he earned his Master of Arts degree in Geography. For more than 5 years he worked for the Central Bank of Russia as a GIS Specialist. Currently, Vladimir is a graduate student in the Department of Earth and Atmospheric Sciences where GIS is one of his fields of research interest.*

**2:00 p.m.** **Using desktop scanning, small-scale orthophotography, and ArcInfo Workstation to georectify large scale aerial photography**

The pros and cons of using a simple desktop scanner and image warping tool to georectify 1:15,000 aerial photography based on 1:40,000-1:60,000 orthorectified photos are discussed. Results are presented that assess: 1) the accuracy of the above, using differentially corrected GPS locations, collected in the field, and 2) project cost and time. Tools used in this project were Trimble GPS CE (with TerraSync), ArcView 3.2 (ESRI), and ArcInfo Workstation 8.2 (ESRI).

***Nadele Flynn*** *is currently in her second year of a Master of Science degree in the department of Renewable Resources, co-supervised by Dr. Lee Foote and Dr. Steve Cumming. She has been a consultant in the field of Geographic Information Systems and landscape ecology for the past 5 years.*

**2:20 p.m.** **Assessing suitable and critical habitat for wood bison using GIS and remote sensing**

Protection and recovery of the Wood Bison, a threatened species, requires that critical habitat be defined and identified. Radio-telemetry relocation data, vegetation maps derived from satellite remote sensing, and landscape pattern analysis are used to help understand habitat selection at the site and landscape scale. This multi-scale analysis of resource selection is used to define critical habitat.

> ***Olaf Jensen*** *was presented with an opportunity to pursue a Masters of Science degree with Dr. Arturo Sanchez as a result of his career with Parks Canada. Having worked as a park interpreter, research assistant, and currently as a park warden at Elk Island National Park he came to realize the potential of GIS and Remote Sensing for analyzing ecological problems. Olaf was keen to develop his skills in GIS by applying it to Wood Bison, whose management and protection under the new Species at Risk Act requires the identification of critical habitat. He has worked in Riding Mountain, Grasslands, Wood Buffalo and Elk Island National Parks. Prior to joining Parks Canada Olaf completed his undergraduate degrees at Lakehead University in Thunder Bay, Ontario, in 1995 and returned to his prairie home of Regina, Saskatchewan by paddling 2500km across Ontario, Manitoba and Saskatchewan with his wife, Alison. They now live in Elk Island Park with their two-year old daughter.*

**2:40 p.m.** **GIS and the Railway Ground Hazard Research Program (RGHRP)**

The Canadian railway industry is unique in that it must maintain tens of thousands of kilometers of tracks that traverse four diverse physiographic regions between the east and west coasts of North America. Along this narrow corridor, ground hazards are often encountered, such as earth slides, rock slides, debris slides, hydraulic erosion, subsidence, and snow avalanches. In this presentation, the RGHRP program will be outlined focusing on the role of GIS in developing a railway ground hazard risk assessment tool.

> ***Emily Herd*** *is currently working with the Geotechnical Group in the Department of Civil and Environmental Engineering. Before starting at the University of Alberta, Emily gained GIS experience in the oil and gas and environmental consulting fields through her employment in Houston, Texas, and Albuquerque, New Mexico, respectively. Ms. Herd is an alumnus of the BCIT GIS Advanced Diploma Program.*

**3:00 p.m.** **Refreshment break**

**3:20 p.m.** **Historic mine plans and their interpretation: structure geology of the Pictou coalfield, Nova Scotia**

Historic coal mining plans and other types of data are used to construct a model of the three-dimensional structure beneath Stellarton Nova Scotia. The model, constructed with the assistance of graduate student James Bradley, shows how the Pictou coalfield was formed, and how the coal seams became folded and faulted in response to ancient plate movements. Its complex structure had a significant influence on coal mining in the 20th century.

> *After receiving his education in the UK,* ***John Waldron*** *spent the first part of his career in Nova Scotia, where he collected a large amount of data on the structural geology of the Stellarton area. Upon arriving at the University of Alberta in 2000, he encountered colleagues and students with significant expertise in GIS techniques. This inspired Dr. Waldron to bring together the body of data he had previously collected, resulting in the current presentation.*

**3:40 p.m.** **Creating custom spatial analyses with ArcGIS: the power of ArcObjects**

ArcObjects makes it possible to create highly customized spatial analyses in a way that has never been possible before. This presentation illustrates the power of customization and explains (in non-technical terms) what ArcObjects is and how it can be used. The examples used in the presentation will be of particular interest to researchers using resource selection functions, or telemetry based movement analysis.

> ***Hawthorne Beyer*** *has been a GIS professional for over nine years. He has worked in the U.S. and Britain, and has been a Research Associate at the University of Alberta for 3 years now, working with Dr. Mark Boyce, Dr. Evie Merrill, and their students.*

**4:00 p.m.** **Taking GIS into the field**

Collecting data for sample plots or doing site inspections... the days of paper field forms and paper maps are over!! ArcPad GIS allows you create, update, and standardize GIS field data for immediate use back in the office or your research.

> ***Stuart Gerber*** *is currently a GIS Consultant with ESRI Canada with over 8 years of GIS experience. Stuart has worked in the forestry and energy sectors, and over the past 5 years has been in a consulting role. His education background includes a Diploma in Forestry, Degree in Natural Science, and an Advanced Diploma in GIS.*

**4:20 p.m.** **Licensed spatial data resources**

An outline of the spatial data resources and services available through the University of Alberta Libraries is presented.

> ***David Jones*** *is the Map Librarian and oversees the William C. Wonders Map Collection in the Cameron Library.*
> ***Chuck Humphrey*** *is the Data Library Coordinator at Rutherford Library.*

**4:40 p.m.** **General discussion**

Time is allotted after the presentations for an open discussion on "Future Directions of GIS on Campus" and all are invited to participate.

**5:00 p.m.** **Closing remarks**

*Thank you to this year's sponsors:*

Department of Biological Sciences | Civil & Environmental Engineering | Earth & Atmospheric Sciences

**Computing and Network Services** **University of Alberta Libraries**